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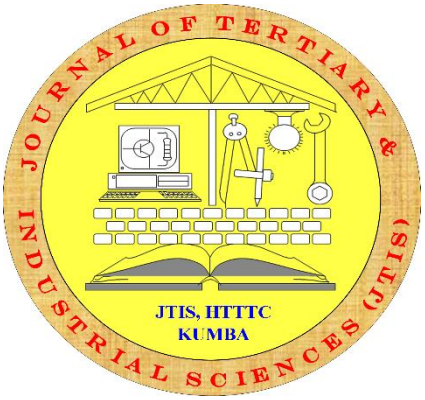

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Cocoa Value Chain Dynamics and Agroforestry Pathways in Kumba, Cameroon: Balancing Livelihoods and Forest Conservation

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Abstract
This study examines the cocoa market chain in Kumba Municipality, South West Region, Cameroon, with a focus on its implications for deforestation and the potential of non-timber forest product (NTFP) agroforestry systems to reconcile livelihood improvement with biodiversity conservation. Primary data were collected from 60 farmers, 15 informal intermediaries (coaxers), 15 formal intermediaries, and 3 exporters using structured questionnaires and stratified purposive sampling. Results reveal inequitable profit distribution along the chain: farmers earned 25 FCFA/kg, coaxers 55 FCFA/kg, formal intermediaries 61 FCFA/kg, and exporters 67 FCFA/kg, indicating market inefficiency. Paired sample t-tests showed that cocoa income contributions were statistically significant for coaxers and formal intermediaries ($p=0.001$), but not for farmers ($p=0.580$) or exporters ($p=0.066$). Key constraints included socio-political insecurity, poor road conditions, high agrochemical costs, and labour shortages. Drawing parallels with broader deforestation drivers in Cameroon's cocoa sector, this paper argues that the existing value chain structure incentivizes forest conversion. We propose the integration of cocoa-based agroforestry systems incorporating NTFPs as a strategy to enhance farmer incomes, reduce deforestation pressure, and conserve biodiversity. Policy recommendations include road infrastructure development, conflict resolution, and support for agroforestry adoption.
Keywords: **Cocoa value chain, deforestation, agroforestry, non-timber forest products (NTFPs), livelihoods, biodiversity conservation.**

1 Introduction

Cocoa is one of Cameroon's most important agricultural commodities, providing income for a large share of rural households and contributing significantly to national export earnings (ICCO, 2021; Lescuyer et al., 2020). In the South West Region, and particularly in Kumba Municipality, cocoa production is dominated by smallholder farmers operating within liberalized and increasingly complex market systems. While recent policy debates emphasize sustainability and deforestation-free cocoa, the

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organization and performance of cocoa value chains at the local level continue to shape production decisions, income outcomes, and land-use practices (Ingram et al., 2025).

The liberalization of Cameroon's cocoa sector in the early 1990s marked a fundamental shift in the governance of cocoa production and marketing. The dismantling of state-controlled marketing boards transferred responsibility for pricing, purchasing, and distribution to private actors, including licensed buying agents (LBAs), cooperatives, exporters, and informal intermediaries (Gbetnkom & Khan, 2002). Although liberalization aimed to improve market efficiency and competition, several studies suggest that it has also weakened price stabilization mechanisms and reduced farmers' bargaining power, leading to uneven distribution of benefits along the cocoa value chain (Kamdem et al., 2013).

The value chain framework provides a useful lens for analysing these dynamics, as it captures the sequence of actors and activities involved in moving a product from production to final markets, as well as the distribution of value created along the chain (Ingram, 2014). In principle, efficient value chains enhance productivity, reduce transaction costs, and promote more equitable sharing of returns among actors (Fama, 1991; Rutherford et al., 2016). However, empirical evidence from smallholder-based agricultural markets in sub-Saharan Africa shows that value chains are often characterized by power asymmetries, high intermediary margins, and limited value capture at the farm level (Makhura, 2001; Ogunleye & Oladeji, 2007).

In Cameroon, cocoa marketing involves multiple actors with distinct roles and varying degrees of market power. Farmers sell dried cocoa beans through several channels, including cooperatives, LBAs, and informal traders commonly referred to as "coaxers" (Lenou, 2017). Coaxers play a particularly prominent role in rural areas by providing immediate payment and pre-financing at the beginning of the production season, although often at lower prices and with limited transparency in quality assessment (Bagal et al., 2013). Exporters typically source cocoa through LBAs and cooperatives, which are responsible for grading, standardization, and aggregation before export or local processing (Adubi & Okunmadewa, 1999).

Available evidence in some cocoa producing areas in Cameroon, suggests that cocoa farmers receive a relatively small share of the final export value, while a substantial proportion of marketing margins is captured by intermediaries (Bagal et al., 2013; Ingram et al., 2025). Low and unstable farm-gate prices, combined with rising production and transport costs, constrain household incomes and limit farmers' ability to invest in productivity-enhancing inputs and improved farm management. Under such conditions, farmers may respond by expanding cultivated areas rather than

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intensifying production, with potential implications for surrounding forest landscapes (Ruf & Varlet, 2017; Vancutsem et al., 2021).

Beyond income distribution, actors along the cocoa value chain face a range of structural and operational constraints. Smallholder farmers commonly experience limited access to credit, quality inputs, extension services, and timely market information (Ndoping, 2016; Sanial et al., 2019). Cooperatives and LBAs face challenges related to access to working capital, transport infrastructure, quality control, and compliance with evolving sustainability and traceability requirements (Lescuyer et al., 2020; Waarts et al., 2019). Exporters, in turn, operate within increasingly stringent international regulatory environments, including due diligence obligations and deforestation-free sourcing requirements linked to major consumer markets (EFI, 2023).

Despite the economic and policy importance of cocoa, empirical studies examining the functioning of cocoa value chains at the municipal level in Cameroon remain limited. Existing research has largely focused on national production trends, sustainability certification, or deforestation outcomes, with less attention to how local market structures influence income distribution and actor behaviour (Ingram et al., 2018b; Waarts et al., 2019). As a result, policy interventions often lack a detailed understanding of the incentives and constraints faced by different actors within local cocoa markets.

This study addresses this gap by analysing the cocoa value chain in Kumba Municipality with a focus on market structure and economic performance. Specifically, the study seeks to: (a) identify the main actors and distribution channels involved in cocoa marketing in Kumba Municipality; (b) evaluate profit margins and the contribution of cocoa to the incomes of the main actors along the cocoa market chain with implications for deforestation; and (c) identify the key constraints faced by these actors. By providing evidence on how value is created and distributed within the cocoa chain, the study aims to inform policies and interventions designed to improve market efficiency, enhance smallholder incomes, and support more inclusive and sustainable cocoa value chains that reduces deforestation pressure, and conserve biodiversity.

2 Materials and Methods

2.1 Study area

The study was conducted in Kumba Municipality, located in Meme Division of the South West Region of Cameroon. Kumba lies between latitudes 4°37″ and 6°35″ N and

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longitudes 9°25″ and 10°28″ E. The municipality forms part of the coastal lowland zone, with elevations ranging from approximately 200 to 800 m above sea level. The area falls within the mono-modal, semi-humid forest agro-ecological zone, characterized by a long rainy season extending from March to November and a short dry season lasting about three months (Molua & Lambi, 2006). Mean annual rainfall ranges between 2,500 and 3,250 mm, with peak rainfall occurring between July and October. Mean monthly temperatures average around 25 °C, with minimum temperatures of about 21 °C recorded during the cooler months. The period from November to February is generally the hottest, and strong winds are common during April and October. Soils are predominantly clay-loam, and vegetation is dominated by trees, including cocoa, other cash crops, and agroforestry species, with limited grass cover (Kotto-Same et al., 1997). These climatic and ecological conditions correspond to a tropical wet forest life zone and are well suited for cocoa cultivation.

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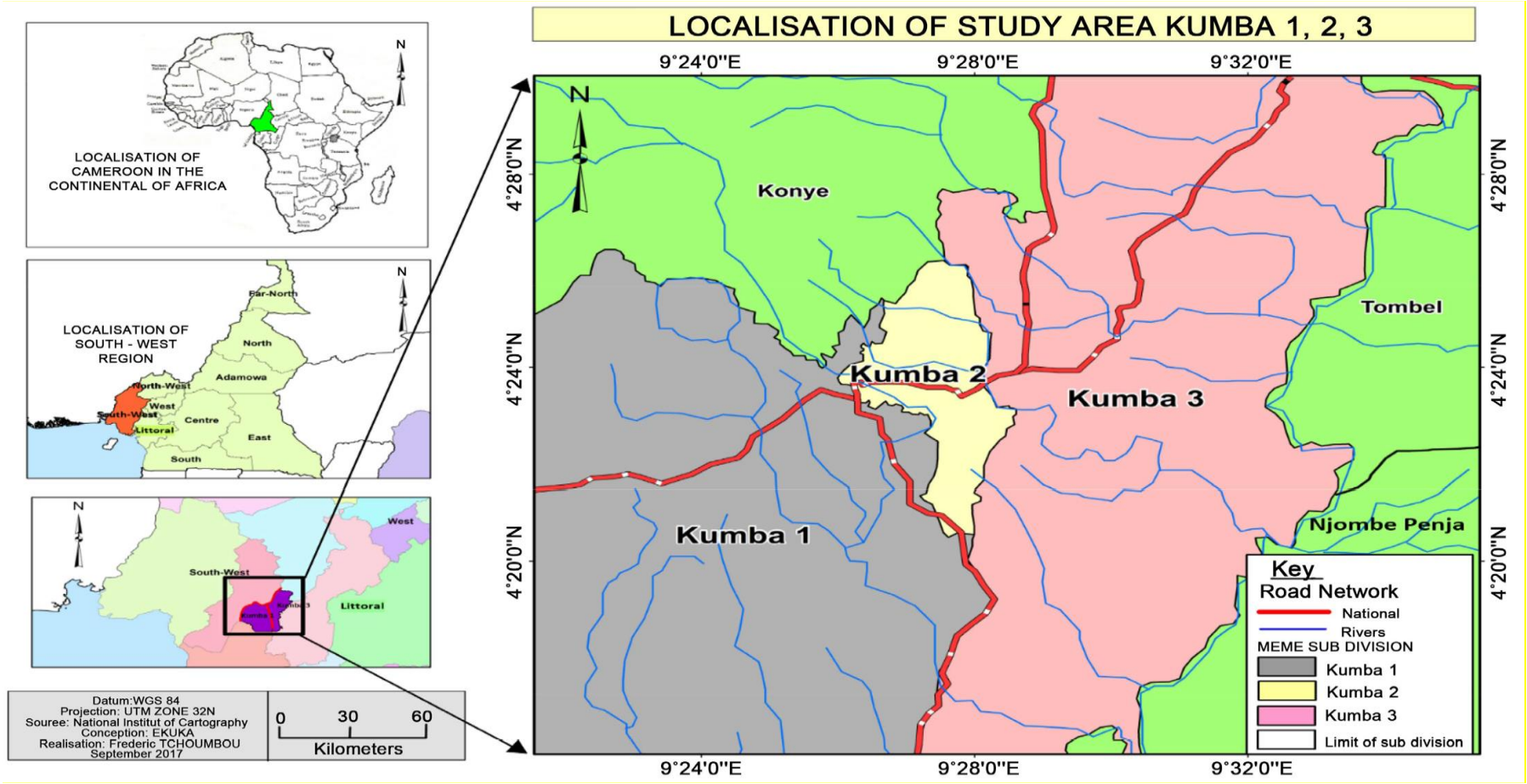

Figure 2.1. The map of Kumba

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2.2 Study population

The study population comprised men and women aged 20 years and above who are actively involved in the cocoa market chain in Kumba Municipality. The main actors considered included cocoa farmers (producers), formal market intermediaries, licensed buying agents (LBAs), licensed buying companies (LBCs), and cooperatives, informal market intermediaries (commonly referred to as coaxers or middlemen), and exporters operating within the municipality.

A preliminary market prospection was conducted to identify the different categories of actors and to estimate their population size. Additional information was obtained from key informants, including Sub-Delegates of the Ministry of Agriculture and Rural Development in Kumba I, II, and III, to validate the presence and roles of market actors.

2.3 Sampling technique and sample size

A stratified purposive sampling technique was used to select respondents, reflecting the structure of the cocoa value chain and ensuring representation of key actor groups. Four strata were defined. The first stratum consisted of cocoa farmers. A total of sixty (60) farmers were sampled, including thirty (30) farmers belonging to common initiative groups (CIGs) and cooperatives, and thirty (30) non-organized farmers. Organized farmers included ten (10) members of Kumba Urban Farmers Cooperative (KUFCOOP) in Kumba I, five (5) members of a multipurpose CIG in Fiango, five (5) members of New Area Farmers Cooperative (NEFCOOP) in Kumba II, and ten (10) members of Dschang Area Farmers Cooperative (DAFCOOP) in Kumba III. Non-organized farmers were selected from Mabanda (Kumba III), Fiango (Kumba II), and Kumba I, with ten (10) farmers sampled from each location. The second stratum comprised informal market intermediaries. Fifteen (15) coaxers were selected, with five (5) respondents each from Kumba I, Kumba II, and Kumba III. The third stratum included formal market intermediaries, consisting of fifteen (15) respondents drawn from LBAs, LBCs, and cooperatives operating within the municipality. The fourth stratum consisted of exporters. Three (3) exporting firms were purposively selected based on their operational presence in Kumba: Achanyi and Sons (Fiango), Cameroon Marketing Commodity (CAMACO) along Mbonge Road, and TELCAR Cocoa in Kumba I. Sample size determination was guided by the Krejcie and Morgan (1970) table. However, actual respondent selection was influenced by actor availability and the ability of respondents to provide reliable records of production, marketing costs, and revenues. Consequently, the effective sample size reflects the number of actors accessible and willing to participate in the study rather than the theoretical sample size alone.

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Table 1: Sample size determined using the Krejcie & Morgan table (1970)

Actors	**Population (*n*)**	**Sample size (*s*)**	**Effective sample size**
Producers (farmers)	65	60	60
Formal market intermediaries	20	19	15
Informal market intermediaries	20	19	15
Exporters	3	3	3
TOTAL	**108**	**101**	**93**

Table 2: Showing the distribution of sample size within Kumba Municipality

Municipality	**Farmers**	**Informal market intermediaries**	**Formal market intermediaries**	**Exporters**	**Total**
Kumba I	20	5	5	2	**32**
Kumba II	20	5	5	1	**31**
Kumba III	20	5	5	-	**30**
TOTAL	**60**	**15**	**15**	**3**	**93**

2.4 Data collection and analysis

Prior to the main data collection, a preliminary market assessment was conducted using a qualitative approach. This involved key informant interviews with six staff members from the Ministry of Agriculture and Rural Development, purposively selected with two representatives from each of Kumba's three subdivisions (I, II, and III). This initial scoping phase served to identify the relevant actor categories within the local cocoa value chain and to validate their respective roles, thereby informing the design and focus of the subsequent quantitative survey. Primary data were collected through structured questionnaires administered to the selected actors. The questionnaires captured information on production volumes, marketing channels, prices, costs, revenues, and constraints faced by each actor group. To assess environmental implications, questionnaires also included questions on farm expansion practices, use of agroforestry systems, forest clearance for cocoa cultivation, and knowledge of sustainable practices. Quantitative data were analysed using both descriptive and inferential statistics in the Statistical Package for Social Sciences (SPSS) version 21.0 and Microsoft Excel. Descriptive statistics, including means, percentages, and proportions, were used to summarize key variables. Tables, pie charts, and bar charts were employed to facilitate interpretation and presentation of results. To assess the contribution of cocoa to actor incomes, a paired sample *t*-test was used to

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determine whether income derived from cocoa was statistically significant relative to total household income among the main actor groups.

2.4.1 Estimation of costs, margins, and profits

Quantitative analysis involved standard mathematical procedures. The mean of grouped data was calculated as:

Mean = $\frac{\sum xf}{\sum f}$**.....equation 1**

x= Midpoint,

f=Frequency,

$\sum$ **f =** Sum of frequencies,

$\sum(f \ast x)$**=** sum of frequencies and midpoint

Net Profit or income (NP) = Revenue (Net Sales) – Total cost and expenses**.... equation 2**

Where; Revenue = Total cost of goods sold and

Expenses = Total cost of goods bought + transport + tax + labour + other**..... equation 3**

The Gross Marketing Margin (GMM) and the Net Profit Margin (NPM) was estimated using the following formulas (Hussain *et al.,* 2013);

GMM= Ps – Pb**.....equation 4**

Where Ps represents the selling price and Pb represents the buying price.

NPM= GMM-TMC**.....equation 5**

Where NPM represents the net profit margin, GMM represents that gross marketing margin and TMC represents the total marketing cost. For cocoa farmers, who do not purchase cocoa but produce it, the gross marketing margin was calculated as the average net amount earned per kilogram of cocoa sold at the farm gate after deducting production-related costs.

3 RESULTS AND DISCUSSIONS

3.1 Distribution Channels of the Cocoa Value Chain in Kumba Municipality

Table 3.1: Market channels of cocoa

Market channels				
1	Farmers	Coaxer	LBAs*	Exporters
2	Farmers	LBAs	Exporters	
3	Farmers	Cooperatives	LBAs	Exporters
4	Cooperative	Exporters		

* *LBAs = Licensed Buying Agents*

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The cocoa value chain in Kumba Municipality is characterized by multiple distribution channels linking farm input suppliers, farmers, market intermediaries, cooperatives, and exporters. The dominant structure reflects a combination of formal and informal arrangements, with value addition occurring mainly through aggregation, drying, quality standardization, and bulk transportation before export.

Four main marketing channels were identified. Only one channel involves informal intermediaries (coaxers or middlemen), this channel remains the most prevalent in the municipality. The rest of the channels are dominated by formal actors such as Licensed Buying Agents (LBAs), Licensed Buying Companies (LBCs), cooperatives, and exporters. Across all channels, cocoa passes through successive intermediaries who ensure conformity with export quality standards, particularly moisture content and bean homogeneity, before delivery to exporters and eventual shipment to European markets. This structure aligns with established cocoa trade systems in which fermented and dried beans move through multiple trading stages prior to final consumption or export.

The most common marketing route involves farmers selling cocoa to informal buyers (coaxers), who then supply LBAs and exporters. This channel persists largely due to farmers' immediate cash needs, limited storage capacity, and insecurity linked to the ongoing socio-political crisis in the South West Region. Farmers often sell cocoa that does not fully meet quality standards, accepting lower prices in exchange for rapid payment. Coaxers, in turn, benefit from reduced transaction costs and exploit price distortions arising from insecurity. Credit relationships further reinforce this channel, as coaxers provide advance payments or farm inputs during the production season, thereby tying farmers to future sales.

Direct sales from farmers to LBAs constitute another important channel, particularly among farmers producing larger volumes. Although these farmers are often not members of cooperatives, they benefit from services such as transportation and credit facilities offered by LBAs, which strengthen buyer–seller loyalty and reduce marketing costs. Cooperative-based channels provide farmers with stronger bargaining power and relatively higher prices through collective marketing. Cooperatives aggregate cocoa, set minimum prices, and negotiate with LBAs, LBCs, or exporters. However, logistical constraints, especially inadequate transport, sometimes weaken their negotiating position and force them into less favorable sales arrangements. Contractual agreements between cooperatives and buyers, though limited, tend to offer better and more stable prices.

Direct sales from cooperatives to exporters represent the shortest channel but remain uncommon due to volume requirements, transport challenges, and delays in payment. Trust remains central to cooperative arrangements, yet side-selling by members, often driven by urgent financial needs, continues to undermine cooperative efficiency.

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3.2 Profit Margins and the Contribution of Cocoa to the Income of Main Actors

Table 3.2: Profit margin per kg and gross marketing margin per kg of Cocoa sold by farmers in Kumba Municipality in FCFA*

Farmers	Mean selling price per kg	Mean annual quantity produced and sold in kg	Gross marketing margin per kg	Marketing cost per kg	Net profit margin per kg
Kumba I farmers	896	6,660	70	42	28
Kumba II farmers	900	3,832	68	40	29
Kumba III farmers	878	4,430	55	37	19
Total	**2674**	**14,922**	**193**	**119**	**74**
Average farmer	**891**	**4,974**	**64**	**39**	**25**

**FCFA = Franc CFA (Central African currency)*

Results for the period January to December 2021 indicate that cocoa farmers earned the lowest profit margin along the value chain, estimated at 25 FCFA per kilogram of cocoa sold (Table 3.2). This comparatively low margin reflects structural weaknesses in farmers' market position and their high dependence on informal financial arrangements. A key factor contributing to low farmer profitability is the widespread reliance on credit provided by informal buyers, commonly known as coaxers or middlemen. These actors frequently extend credit to farmers at the beginning of the agricultural season, mainly in the form of agricultural inputs required for plantation management. In addition, farmers often request cash advances from coaxers to meet urgent household needs such as medical expenses or the payment of school fees. Repayment of these credits is typically enforced during the harvest period through the compulsory sale of cocoa to the lending middlemen, often at prices below prevailing market rates, as observed in Marketing Channel 1 of the cocoa value chain in Kumba Municipality. This credit-output interlinkage significantly weakens farmers' bargaining power and limits their ability to benefit from favorable market prices, thereby compressing their profit margins. Similar patterns have been reported in other cocoa-producing contexts, where middlemen use seasonal loans to secure produce at discounted prices and lock farmers into disadvantageous trading relationships (Bagal et al., 2013).

Table 3.3: Profit margin per kg and the gross marketing margin per kg of Cocoa bought and sold by Coaxers (Middlemen) in FCFA

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Coaxers	Mean annual quantity bought and sold in kg	Mean buying price per kg	Mean selling price per kg	Gross marketing margin per kg	Marketing cost per kg	Net profit margin per kg
Coaxers in Kumba I	34,876	883	945	62	32	30
Coaxers in Kumba II	33,728	855	964	109	43	66
Coaxers in Kumba III	37,963	853	952	99	32	67
Total	**106,568**	**2591**	**2861**	**270**	**107**	**235**
Average Coaxer	**35,523**	**864**	**954**	**90**	**36**	**55**

Further results presented in **Table 3.3** show that, between January and December 2021, **middlemen (coaxers)** earned an average profit margin of **55 FCFA per kilogram of cocoa sold**. This margin is notably higher than that obtained by farmers, but remains lower than the margins captured by formal market intermediaries and exporters. The relatively higher profitability of middlemen compared to farmers can largely be explained by their strategic position within the value chain. Middlemen commonly provide seasonal credit to farmers at the beginning of the cropping period, either in cash or in kind, to support farm operations. This financial support effectively binds farmers to sell their cocoa to the lending middlemen during the harvest season, often at prices below prevailing market rates. Such credit-linked trading arrangements allow middlemen to capture additional value at the expense of producers, a finding consistent with earlier studies highlighting the role of informal finance in shaping unequal exchange relationships in cocoa markets (Bagal et al., 2013, Kamdem et al., 2013). In contrast, the lower profit margins earned by middlemen relative to formal market intermediaries and exporters reflect constraints imposed by informal contractual arrangements. In many cases, middlemen enter into agreements with licensed buying agents (LBAs) or other formal buyers to supply specified quantities of cocoa within a defined time frame. These agreements often fix delivery conditions irrespective of short-term price fluctuations in local markets, thereby limiting the ability of middlemen to respond to favorable price changes. Such contractual obligations reduce the profit-maximizing flexibility of middlemen. This finding aligns with the conclusions of Bagal et al. (2013), who note that coaxers are frequently

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required to deliver agreed quantities of cocoa within stipulated periods, regardless of market dynamics.

Table 3.4: The profit margin per kg and the gross marketing margin per kg of Cocoa bought and sold by Formal market intermediaries in Kumba Municipality

Intermediary	Mean annual quantity bought and sold per kg	Mean buying price per kg	Mean selling price per kg	Gross marketing margin per kg	Marketing cost per kg	Net profit margin per kg in FCFA
Intermediaries in Kumba I	492,000	939	1027	88	21	67
Intermediaries in Kumba II	339,500	945	1052	107	30	77
Intermediaries in Kumba III	415,750	956	1013	57	19	38
Total	**1,247,250**	**2840**	**3092**	**252**	**70**	**230**
Average intermediary	**415,750**	**947**	**1031**	**84**	**23**	**61**

From January to December 2021, formal market intermediaries recorded a profit margin of 61 FCFA/kg of cocoa sold (Table 3.4), which was higher than that of both farmers and middlemen. This relatively higher margin can be attributed to the strategic services provided by formal intermediaries, particularly Licensed Buying Agents (LBAs) and Licensed Buying Companies (LBCs), who offer farmers access to transportation and other logistical support for moving cocoa from farms to collection points or warehouses. By providing these services at subsidized rates, formal intermediaries effectively attract farmers with large harvests to sell directly to them, often bypassing informal middlemen (coaxers). While this arrangement benefits farmers by reducing transport costs and ensuring timely sales, it can also limit their bargaining power, as farmers may feel obliged to accept prices offered by the LBAs who provide the service. This mechanism aligns with findings by Bagal et al. (2013), who reported that formal intermediaries use such value-added services to secure direct access to cocoa supply, increasing their own margins while simultaneously influencing price formation within the chain. The results further illustrate the structural advantages held by formal market intermediaries in the Kumba cocoa value chain, confirming unequal value capture and the pivotal role of logistics and service provision in shaping market dynamics (Kamdem et al., 2013).

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Table 3.5: Profit margin per kg and the gross marketing margin per kg of Cocoa bought and sold by Exporters in Kumba Municipality in FCFA

Exporter	Mean annual quantity bought and sold in kg	Mean buying price per Kg	Mean selling price per Kg	Gross marketing margin per kg	Marketing cost per kg	Net profit margin per kg
ACHANYI AND SONS	3,500,000	975	1055	80	11	69
CAMACO	5,000,000	975	1055	80	12	68
TELCAR COCOA	10,000,000	975	1055	80	15	65
Total	**18,500,000**	**2925**	**3165**	**240**	**38**	**202**
Average exporter	**6,166,667**	**975**	**1055**	**80**	**13**	**67**

From January to December 2021, exporters recorded the highest profit margin of 67 FCFA/kg of cocoa sold (Table 3.5), exceeding the margins of farmers, middlemen, and formal market intermediaries. This higher profitability can be attributed to the structured relationships exporters maintain with formal market intermediaries, including LBAs and cooperatives, often formalized through contracts. These contracts typically include the provision of credit, vehicles, and other logistical support, which obliges intermediaries to sell the agreed quantity of cocoa at the pre-determined price, regardless of fluctuations in local market prices. This arrangement not only secures a reliable cocoa supply for exporters but also reinforces their market dominance, allowing them to capture the largest share of value within the chain. These results are consistent with Lenou (2007), who reported that exporters engage in formal agreements with buyers to deliver specified quantities of cocoa within defined periods, ensuring both supply stability and margin protection. The findings highlight how contractual arrangements and service provision along the value chain shape profit distribution, contributing to the concentration of economic benefits at the upper end of the cocoa market, while farmers and middlemen capture comparatively lower returns (Bagal et al., 2013;).

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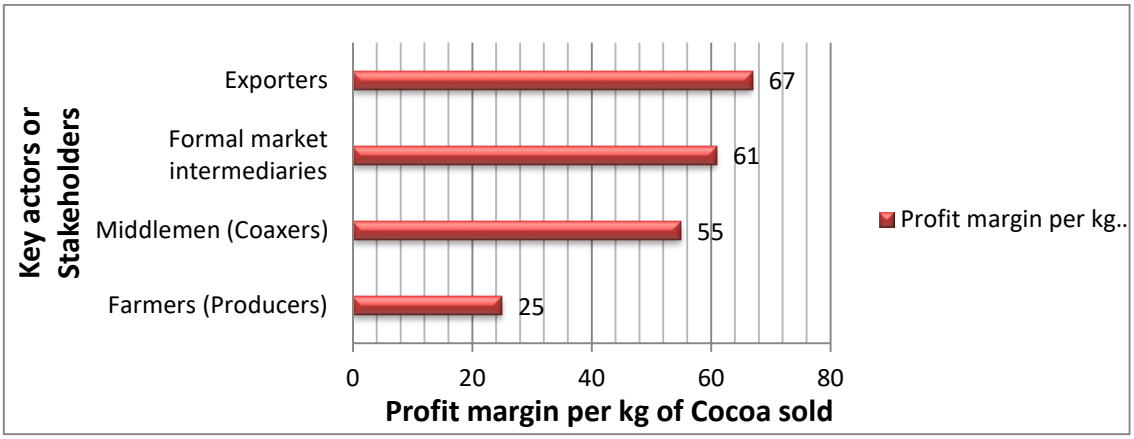

Figure 3.1: A bar chart comparing the profit margins per kg of cocoa sold by key actors

The comparison of profit margins per kilogram of cocoa sold (Figure 3.1) indicates a clear hierarchy among actors in the Kumba cocoa market chain. Exporters recorded the highest margin at 67 FCFA/kg, followed by formal market intermediaries at 61 FCFA/kg, middlemen (coaxers) at 55 FCFA/kg, and farmers with the lowest margin of 25 FCFA/kg. This pronounced disparity in profit distribution highlights the unequal capture of value along the chain and reflects structural inefficiencies in the Kumba cocoa market. Such differences in margins among actors are indicative of an imbalanced and inefficient marketing system, consistent with Fama (1991), who noted that significant variations in returns among market participants typically signal inefficiency within a value chain. The results also corroborate other studies, emphasizing that farmers, the primary producers, receive the smallest share of profits despite bearing production risks, while exporters and intermediaries capture the largest portion of economic benefits (Bagal et al., 2013).

Table 3.6: Paired sample T test for actors of the Cocoa market chain in Kumba Municipality

Actor Group	***t-value***	***df***	***p-value***	**95% Confidence Interval (FCFA)**
Farmers	0.56	59	0.580	–185,438 to 328,553
Coaxers (Middlemen)	3.98	14	0.001	717,367 to 2,391,966
Formal Market Intermediaries	4.27	14	0.001	13,948,992 to 42,086,341
Exporters	3.69	2	0.066	34,606,112 to 454,272,779

Note: df = degrees of freedom. FCFA = Franc CFA.

The paired sample t-test (Table 3.6) was used to assess the contribution of cocoa sales to the annual income of key actors in the Kumba cocoa market chain. Results indicated that for farmers, there was no significant difference between net annual profit from cocoa and income from other activities ($t(59) = 0.557$, $p = 0.580$, 95% CI: −185,438 to 328,553). This suggests that cocoa alone does not substantially contribute to household

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income, and farmers are compelled to engage in additional income-generating activities to meet household needs, access healthcare, and maintain living standards during periods of low cocoa sales. In contrast, middlemen (coaxers) showed a significant difference between net annual profit from cocoa and other income sources ($t(14) = 3.982$, $p = 0.001$, 95% CI: 717,367 to 2,391,966), indicating that cocoa is the primary and most lucrative source of income for these actors. Similarly, formal market intermediaries (LBAs and cooperatives) had a significantly higher income from cocoa compared to other activities ($t(14) = 4.271$, $p = 0.001$, 95% CI: 13,948,992 to 42,086,341), highlighting the profitability of cocoa trading as their main income-generating activity. For exporters, the analysis showed no significant difference between income from cocoa and other activities ($t(2) = 3.694$, $p = 0.066$, 95% CI: 34,606,112 to 454,272,779), suggesting that while cocoa trading is profitable, exporters diversify into other activities to meet household and operational needs during periods of market fluctuations or limited cocoa supply.

3.3 Constraints Faced by Cocoa Value Chain Actors in Kumba

3.3.1 Constraints Faced by Cocoa Farmers

Table 3.7: Constraints faced by Farmers in Kumba Municipality

Constraints	Frequency (Count)	Valid percent (%)	Cumulative frequency
Insecurity	47	78.3	47
Price fluctuation	47	78.3	94
High cost of agrochemicals	47	78.3	141
Very bad state of farm to market roads	47	78.3	188
Poor state of ovens	8	13.3	196
High cost and scarcity of labour	8	13.3	204
Wrong weighing scales of buyers	5	8.3	209
lack of capital	5	8.3	214

The study revealed that cocoa farmers in Kumba Municipality face multiple challenges along the value chain (Table 3.7). The majority of farmers (78.3%) reported insecurity arising from the socio-political crisis in the South West Region, fluctuations in cocoa prices, high costs of fertilizers and agrochemicals, and poor condition of farm-to-market roads. A smaller proportion (13.3%) experienced difficulties in properly drying their cocoa beans due to inadequate drying ovens and also faced labor scarcity and high labor costs. Additionally, 8.3% of farmers reported issues with inaccurate weighing scales used by buyers (middlemen or coaxers) and insufficient capital to

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purchase essential farm inputs. These findings are consistent with Bloomberg (2010), who highlighted labor scarcity, inadequate drying facilities, and high input costs as major constraints in the cocoa supply chain.

Constraints Faced by Middlemen (Coaxers)

Table 3.8: Constraints faced by Middlemen or Coaxers in Kumba Municipality

Constraints	Frequency (Count)	Valid Percent (%)	Cumulative frequency
Insecurity	12	80.0	12
Market competition	12	80.0	24
Very bad state of farm to market roads	12	80.0	36
High cost and scarcity of labour	2	13.3	38
Prize fluctuation	1	6.7	39

The study showed that the majority of middlemen or coaxers (80%) in Kumba Municipality faced challenges related to insecurity, intense market competition, and poor farm-to-market road conditions (Table 3.8). A smaller proportion (2%) reported difficulties due to high labor costs and scarcity of labor, while 1% experienced challenges coping with price fluctuations. These findings align with Karibu (2012), who identified transportation issues and market competition as key constraints affecting local cocoa coaxers.

3.3.2 Constraints Faced by Formal Market Intermediaries

Table 3.9: Constraints faced by Formal market intermediaries in Kumba Municipality

Constraints	Frequency (Count)	Valid Percent (%)	Cumulative Frequency
Insecurity	12	80.0	12
Market competition	12	80.0	24
Bad state of farm to market roads	12	80.0	36
High cost and scarcity of labour	2	13.3	38
Prize fluctuation	1	6.7	39
Small ware houses inappropriate for cocoa conservation	1	6.7	40

The results revealed that 80% of formal market intermediaries in Kumba Municipality faced challenges related to insecurity, market competition, and poor condition of farm-to-market roads. Additionally, 13.33% reported difficulties due to high labor costs and scarcity of labor, while 6.67% encountered issues with price fluctuations and inadequate warehousing for cocoa storage (Table 3.9). These findings are consistent

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with Coyle et al. (2009), who highlighted insufficient storage facilities as a major supply chain constraint for market actors.

3.3.3 Constraints Faced by Exporters

Table 3.10: Constraints faced by Exporters in Kumba Municipality

Constraints	Frequency (Count)	Valid Percent (%)	Cumulative Frequency
Market competition	2	66.7	2
Bad state of farm to market roads	2	66.7	4
Very high of transportation	2	66.7	6
Prize fluctuation	1	33.3	7
Shortage of Jute bags for packaging	1	33.3	8

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The study revealed that 66.7% of exporters in Kumba Municipality faced challenges related to market competition, poor road conditions, and high transportation costs. Additionally, 1% of exporters reported difficulties due to price fluctuations and shortages of "jute" bags for cocoa packaging (Table 3.10). These results align with Bloomberg (2010), who identified inadequate packaging materials as a key supply chain challenge for cocoa actors.

3.4 Environmental Implications and Sustainable Pathways

3.4.1 Between Value Chain Inequity and Deforestation

The stark inequity in profit distribution highlighted in this study is more than an economic concern, it has tangible environmental consequences. With farmers earning just 25 FCFA per kilogram of cocoa, they find themselves trapped in a cycle of low returns that pushes them toward extensification rather than sustainable intensification. Unable to afford better inputs or invest in long-term farm improvements, many farmers respond by clearing new forest plots to boost production. This pattern mirrors findings from recent studies of Cameroon's cocoa-growing regions, which show that financial vulnerability among smallholders remains a key driver of forest loss (Ingram et al., 2025; Maluh et al., 2025; Aleman et al., 2018). The widespread reliance on informal credit from coaxers deepens this problem. These credit arrangements often force farmers to sell their harvest at discounted prices, leaving them with less income to reinvest in their farms. As a result, many prioritize short-term survival over sustainability, choosing to expand into forested areas rather than improve existing cocoa plots. This is especially troubling in South West Cameroon, where remaining forest patches are increasingly fragmented (Ordway et al., 2017). Recent satellite monitoring confirms that cocoa farming continues to drive deforestation across the continent, particularly where market structures are weak and farmers have few economic alternatives (Vancutsem et al., 2021). Other constraints identified in the study also worsen environmental outcomes. Poor roads and insecurity, for example, make it harder for farmers to access markets, transport goods, or receive training, all of which limit their ability to adopt more sustainable practices.

3.4.2 Agroforestry-Based NTFP Systems as a Sustainable Pathway

One promising way to break this cycle is by integrating cocoa with non-timber forest products through agroforestry. Systems that combine cocoa with useful timber species, fruit trees, or medicinal plants can boost farm incomes, improve resilience, and help conserve biodiversity (Nadege et al., 2025; Dago et al., 2024; Jagoret et al., 2018). When farmers have multiple sources of revenue, they are less dependent on cocoa alone and less likely to clear forest when prices fall. Research from other parts of Cameroon shows that diverse cocoa agroforests can store significant amounts of carbon and support considerable biodiversity—in some cases resembling natural forests more than monocultures (Jagoret et al., 2012a; Gockowski et al., 2013). In Kumba, promoting complementary products such as bush mango (*Irvingia gabonensis*),

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njansang (*Ricinodendron heudelotii*), or traditional medicines could provide extra income during the off-season, improving household food security and financial stability. To make these systems work at scale, several steps are needed. Farmers require training in how to establish and manage agroforestry plots. Cooperatives or farmer groups could help develop markets for NTFPs, ensuring better prices and more reliable sales. Policymakers should consider incentives for shade-grown cocoa, perhaps through certification or payments for ecosystem services. Finally, clarifying land and tree tenure would give farmers the confidence to plant trees and invest in long-term agroforestry systems (Dinh et al., 2023). By tackling both economic inequality and ecological decline, this integrated approach offers a realistic path toward more sustainable cocoa production in Kumba.

4 Conclusion and Recommendations

This study reveals an inefficient and inequitable cocoa value chain in Kumba, where farmers earn very little despite taking on most of the production risk. Low incomes, combined with insecurity, bad roads, and high input costs, leave farmers with few options other than expanding their farms into forest areas. While middlemen and exporters profit significantly from cocoa, smallholders struggle to make ends meet, a situation that threatens both rural livelihoods and forest conservation. These findings point to clear priorities for action. First, efforts are needed to rebalance the value chain, perhaps by strengthening farmer cooperatives and regulating informal lending to prevent exploitation. Second, improving rural roads would cut transport costs, reduce post-harvest losses, and help farmers reach better markets. Third, sustainability programs, including those linked to the EU's new deforestation regulation, must ensure that farmers receive fair prices; without this, certification could become a burden rather than a benefit. Traceability systems should be designed to include, not exclude, smallholders, and must be paired with support that makes sustainable farming financially viable. This research adds to the literature in several ways. It offers the first detailed, municipal-level portrait of the cocoa value chain in Kumba, showing exactly who earns what and why. It provides evidence that market structure itself, not just farming practices, can drive deforestation. And it suggests that agroforestry with NTFPs should be seen not only as an agronomic option but as a way to reshape value chains, diversify incomes, and ease pressure on forests. Several questions remain for future study. Longitudinal research could track how agroforestry adoption affects incomes and forest cover over time. A gender-focused analysis would help us understand how men and women experience value chain inequities differently. Assessing the carbon and biodiversity value of cocoa agroforests in South West Cameroon could open doors to carbon finance or payments for ecosystem services. Finally, research is needed on which policies, subsidies, tenure reforms, extension approaches, work best to scale up equitable and sustainable cocoa production.

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