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Review

Sustainable Value Chains in the Republic of the Congo: A Review of Challenges, Perspectives, and Implications for the Conservation of Tropical Forest Landscapes

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Abstract

Knowledge of agricultural and forestry value chains in the Republic of the Congo is scattered across scientific publications, technical reports, project studies, and institutional sources, with uneven coverage of territories, actors, periods, and indicators. This review examines which value chains have been documented, what is known about their economic performance and their social and environmental dimensions, and how far these results can be compared. A literature review covering January 1995 to 15 September 2026 was conducted in Scopus, Web of Science, Google Scholar, ScienceDirect, AGRIS/FAO, Agritrop/CIRAD, and institutional platforms, using explicit eligibility criteria supplemented by reference chaining. The protocol was not registered prospectively; to limit the resulting risk of reporting bias, the search strings, eligibility rules, and codebook were explicitly defined and applied consistently, and the credibility of each included study was appraised with criteria adapted from the Mixed Methods Appraisal Tool (MMAT) and the AACODS checklist for the gray literature. After screening, 23 independent studies were retained for the synthesis; the other documents consulted were used only for context and discussion. Data were extracted with a standardized form covering products, territories, actors, methods, and economic, social, and environmental indicators, and were then

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organized according to the dimensions of the Value Chain Analysis for Development (VCA4D) framework, which was used as an analytical grid rather than as a label attributed to the original studies. The corpus covers cassava, cocoa, safou, non-timber forest products, timber, wood energy, and vegetable farming. The studies are highly heterogeneous in units of observation, periods, and indicators, which limits direct comparison of volumes, prices, margins, incomes, employment, and value added. Historical cassava data (over 1.09 million tonnes in 2006–2009) and recent cocoa data (about 5204 tonnes of dry beans in 2024 on more than 10,700 ha) refer to different periods and methods and are not directly comparable. Safou is characterized by dispersed production and largely informal trade, and vegetable farming in Brazzaville remains geographically concentrated. Sex-disaggregated data, net incomes after costs and family labor, and environmental trajectories are the least documented dimensions, and the northern forest departments are the least covered territories. For the Odzala-Kokoua-Lossi landscape, the review shows the value of jointly analyzing agricultural and agroforestry value chains, rural incomes and employment, markets, sustainable practices, and biodiversity conservation, without transferring results obtained in neighboring landscapes. It proposes a prioritized research agenda based on VCA4D to harmonize methods, strengthen data, and produce territory-specific analyses that can inform local development, food security, and the conservation of tropical forest landscapes.

Keywords: value chain; Republic of the Congo; knowledge synthesis; sustainability; VCA4D; forest landscapes; Odzala-Kokoua-Lossi

1. Introduction

Agricultural and forestry value chains play an important role in rural development, food security, job creation, and poverty reduction, particularly in low- and middle-income countries, where they can help integrate producers into markets and contribute to the structural transformation of rural economies [1–6]. A value chain can be defined as the set of actors and activities involved in the production, processing, marketing, and distribution of a product, together with the relationships, flows, and governance mechanisms that structure them [7,8]. In tropical contexts, value chain analysis therefore goes beyond production to examine how the whole chain functions and how its actors and functions interact.

Value chain analysis distinguishes several complementary dimensions. Functional analysis describes the functions, actors, and their roles, and the flows of products, services, and information; economic analysis examines value creation, costs, revenues, margins, and competitiveness; and distributional analysis examines how the value created is shared among actors. These dimensions can then be linked to social inclusion and to social and environmental sustainability, including living conditions, food security, natural resource use, biodiversity, and greenhouse gas emissions [7,9].

The Value Chain Analysis for Development (VCA4D) approach adopts this multidimensional perspective and addresses four framing questions: the contribution of the chain to economic growth, the inclusiveness of that growth, its social sustainability, and its environmental sustainability [7]. Analyzing a value chain must, however, be distinguished from labeling it "sustainable": VCA4D assesses these dimensions on the basis of empirical data rather than assuming the sustainability of the chain under study. It thus provides decision-makers with evidence to guide public policies and investments towards more inclusive and sustainable value chains [7,10]. VCA4D is primarily a field-based method that requires primary data collected along the chain; in a literature review based on

secondary sources, it can only be used as an analytical grid to organize and compare what the original studies report.

These issues are particularly important in sub-Saharan Africa, given the large number of smallholders, the informality of many markets, and the still considerable potential for local processing and value creation [3,7,10–12]. Value chain analysis helps identify constraints and opportunities related to market access, processing, job creation, and value distribution [7]. In Central Africa, integration into global value chains remains largely driven by the primary sector. For the Republic of the Congo, the OECD reports that raw materials accounted for 61.4% of total exports, mainly mineral products and hydrocarbons [13]. This figure describes the overall structure of the export economy but does not, on its own, characterize the level of processing in the agricultural and forestry sectors. A specific analysis of these value chains is therefore needed to assess their economic performance, value distribution, and social and environmental dimensions [7].

This question is particularly relevant in the Congo Basin, the world's second-largest tropical forest region after the Amazon. Rural populations depend heavily on subsistence agriculture, non-timber forest products (NTFPs), hunting, and other natural resources for food and income. Research on agricultural and forestry value chains shows that these activities are largely informal, underreported in national statistics, and governed by a combination of formal, customary, and market rules [14,15]. These value chains also have a strong gender dimension: the roles of men and women vary across products, chain segments, and rules of access to resources, and women often remain less visible in marketing and value creation [4,14].

Reconciling economic development and conservation is a central challenge in the Congo Basin, where agricultural and forestry activities support livelihoods while also driving changes in forest landscapes. Regional analyses highlight the difficulty of developing downstream processing, integrating the different links of the chains, and enabling local economies to retain a larger share of value added [4,16,17]. At the same time, small-scale agriculture is a major driver of forest change in several parts of the basin. At the regional level, Shapiro et al. [18] show that the rural complex, which combines small-scale agriculture, settlements, and roads, accounted for a large share of the clearing and degradation observed in fragmented forests between 2015 and 2020. The engagement of local land users in conservation also depends on how they perceive the incentives offered, as shown for participants in payments for ecosystem services schemes in southeastern Mexico [19]. At the local level, Ngouhouo-Poufoun et al. [20], using data from 1035 households in the TRIDOM landscape, report an association between cocoa-based livelihood strategies and deforestation, while emphasizing the role of market access and land-use planning. These results show why productive activities, incomes, markets, and forest dynamics should be analyzed together, without attributing all forest loss to agriculture. Recent work on forest loss and recovery also shows that small-scale clearing accounts for a large share of forest loss in the Congo Basin and is concentrated near settlements, but that spatial patterns alone are insufficient to attribute these changes to agriculture [21]. A better understanding of the interactions between value chains, livelihoods, and conservation is therefore essential to identify the conditions under which agricultural and forestry activities can create value while limiting pressure on forest ecosystems [17,22–26].

In the Republic of the Congo, several studies have progressively documented agricultural and agroforestry value chains, and recent work on cocoa and safou illustrates a shift towards more integrated analyses [27,28]. The cocoa value chain is concentrated mainly in the Sangha and Likouala departments, relies on agroforestry production systems, and is closely linked to regional markets [27]. The safou study describes production dispersed across the country, largely informal trade flows, and governance based mainly on family and informal relationships, which limits the structuring of the sector [28]. In

addition, a VCA4D analysis covering both the bean and safou value chains was launched in 2025 following a call for experts issued by Agrinatura [29,30]; its final report was not accessible at the time of the search (Section 3.5).

Despite these advances, knowledge of value chains in the Congo remains fragmented across sectors, regions, institutions, and analytical methods. This is a particular concern for local and Indigenous communities, whose livelihoods depend largely on natural resources and on agricultural and forestry activities [31–33]. The economic, social, environmental, and institutional dimensions, as well as the roles of women, smallholders, and informal actors, remain unevenly documented [34]. Better-structured value chains appear necessary to meet the needs of a growing population [35], by strengthening production, market access, value added, and incomes for local and Indigenous communities while promoting sustainable natural resource management and integrated territorial development.

The Odzala-Kokoua-Lossi landscape is a relevant setting for studying the interactions between productive activities and conservation. Three perimeters must be distinguished [36–39]. The UNESCO World Heritage property "Odzala-Kokoua Forest Massif", inscribed in 2023, covers 1,179,376 ha, which corresponds to the core and buffer zones of Odzala-Kokoua National Park defined in the park management plan [39]. The World Heritage buffer zone covers a further 4,206,860 ha (5,386,236 ha in total) and includes the Lossi Gorilla Sanctuary, forest concessions, and part of the ETIC landscape; about 40,000 people live in it [37,39]. The operational area of the AGROVAL project, which is the reference area of this review, consists of the Sangha and Cuvette-Ouest departments around the park, with intervention localities in Ouesso, Pokola, Ngombé, and Mokeko (Sangha) and in Mbomo, Etoumbi, and Kellé (Cuvette-Ouest) (Figure 1). These perimeters overlap only partly, so results obtained in one of them cannot be transferred automatically to another. The coexistence of conservation, production, and settlements justifies a territorial approach to the interactions between value chains and conservation.

Research around Odzala-Kokoua National Park shows that the livelihoods of surrounding communities combine agriculture, forest products, hunting, and trade, and that market access strongly influences household incomes and economic strategies [39,40], in particular incomes derived from agriculture, cocoa, and forest products. These studies, however, analyze livelihoods and natural resource use rather than the overall performance of value chains from production to end markets.

There is therefore a scientific and operational need to document the agricultural and agroforestry value chains of the Odzala-Kokoua-Lossi landscape by considering actors, flows, costs, margins, value added, markets, social inclusion, and environmental impacts together. Such an analysis would show to what extent value chains can improve the incomes and food security of local populations, while examining their effects on forest resources and the conditions under which they can promote agroecological and agroforestry practices. Higher profitability and better market access can either reduce or increase pressure on forests, depending on land-use trade-offs, producer strategies, and governance. Within the AGROVAL framework, VCA4D could help organize comparable data collection on the value chains of the landscape. This application context does not prejudge either the gaps identified by the review or the effects of future interventions.

This review addresses three questions: (i) Which agricultural and forestry value chains in the Republic of the Congo have been documented, in which territories, and for which actors? (ii) What economic, social, and environmental results are reported, and with what methodological robustness? (iii) Which gaps in coverage and comparability can be identified in the selected studies, and which of them should be addressed first? VCA4D is used as a framework to organize the dimensions under study. The implications for Odzala-Kokoua-Lossi are discussed separately, taking into account the limits to the transferability of national and regional results.

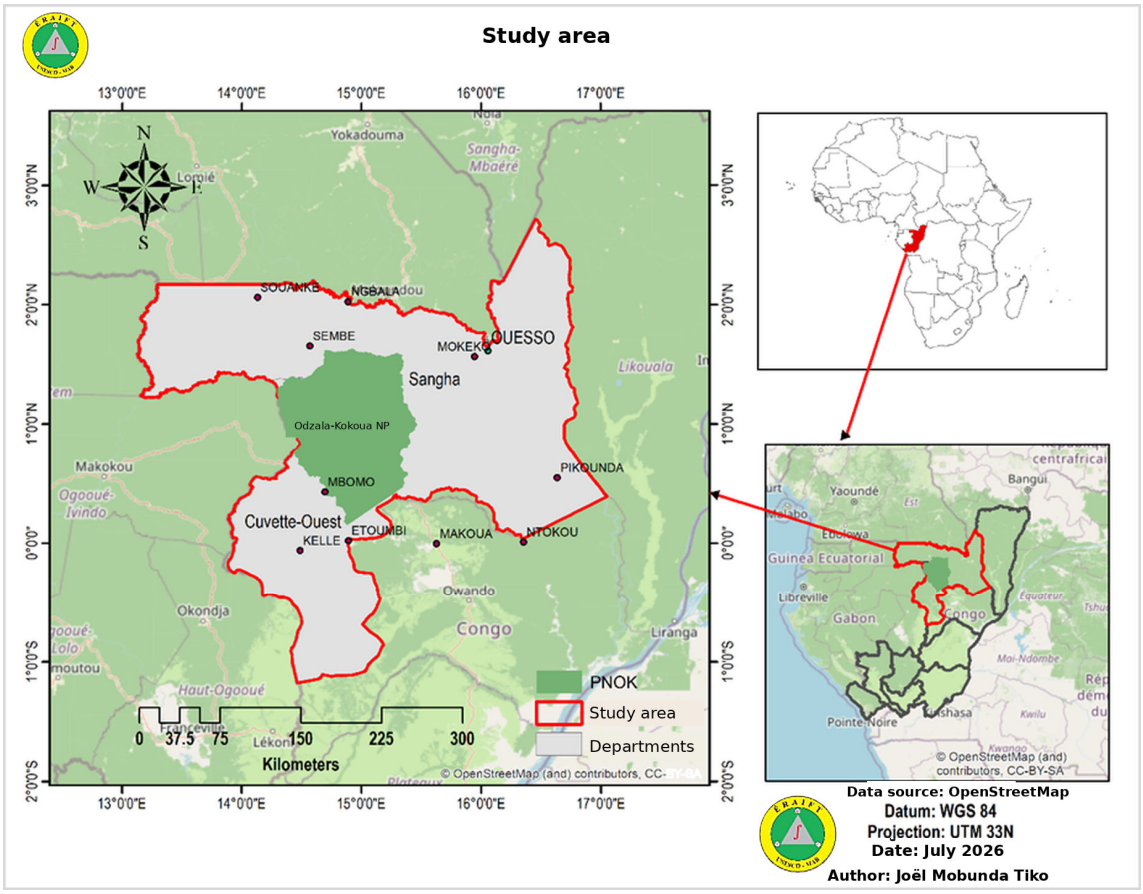


Figure 1. Location of the AGROVAL operational area (Sangha and Cuvette-Ouest departments, outlined in red) and of Odzala-Kokoua National Park (PNOK, green) in the Republic of the Congo. The UNESCO World Heritage property (1,179,376 ha) corresponds to the core and buffer zones of the park defined in its management plan [39]; the World Heritage buffer zone (4,206,860 ha), which extends beyond the park over forest concessions, the Lossi Gorilla Sanctuary, and part of the ETIC landscape, is not delineated. Intervention localities: Ouesso, Pokola, Ngombé, and Mokeko (Sangha); Mbomo, Etoumbi, and Kellé (Cuvette-Ouest). Dots mark the main localities. Map: J. Mobunda Tiko (QGIS v4.2); base map © OpenStreetMap contributors.

2. Materials and Methods

2.1. General Approach

This study reviews the literature on agricultural, agroforestry, and forestry value chains in the Republic of the Congo. It characterizes the available studies, compares their approaches and main findings, and identifies geographical, thematic, and methodological gaps. The review followed a protocol defined by the authors before screening and is reported according to the PRISMA 2020 and PRISMA-S guidelines [41,42], which promote transparent and reproducible reporting. It is a narrative review rather than a systematic review; PRISMA 2020 is used as reporting guidance. No protocol was registered or publicly deposited before the review was conducted (for example in PROSPERO, which does not accept reviews of this type, or on the Open Science Framework). This is a major limitation: readers cannot verify that the eligibility criteria, the rules for handling the gray literature, and the coding categories were fixed before the studies were screened, and post hoc decisions cannot be excluded. To mitigate this limitation, the protocol elements actually applied (research questions, databases, search strings, eligibility criteria, and rules for the gray literature and for grouping publications from the same survey, extraction form,

and codebook) are reported in full in Tables S1–S3, so that each decision can be audited and the search can be reproduced or updated. Given the heterogeneity of the studies in products, regions, samples, indicators, and methods, a narrative and comparative synthesis was preferred over a statistical meta-analysis. The synthesis is structured around the VCA4D framework, which combines functional, economic, social, and environmental analyses to examine the contribution of value chains to economic growth, their inclusiveness, and their social and environmental sustainability [7].

2.2. Spatial and Temporal Scope

The core dataset consists of studies that report identifiable results for the Republic of the Congo on value chains of timber, wood energy, NTFPs, bushmeat, and cultivated or gathered agricultural products. Fisheries and livestock were handled with explicit rules (Table 1): studies were included only when a fish or animal product was analyzed as a wild-harvested forest product (bushmeat, caterpillars, honey) or as one component of a crop, agroforestry, or forest value chain; studies whose main object was capture fisheries, aquaculture, or domestic livestock (production, marketing, or processing of fish, meat, milk, or eggs) were excluded. Multinational studies were included when Congolese data could be extracted separately; studies from other countries were used only for discussion. Overlapping publications, particularly on safou, were counted only once. Odzala-Kokoua-Lossi was analyzed as an explicit geographical subset (Figure 1).

Table 1. Eligibility criteria applied at the full-text stage.

Criterion	Included	Excluded
Geography	Studies on the Republic of the Congo; multinational studies when Congolese data are reported separately	Studies on other countries only, or multinational studies without separable Congolese data (used only for discussion)
Object	A value chain, or a marketed agricultural, agroforestry, or forest product (timber, wood energy, NTFPs, bushmeat, cultivated or gathered crops)	Exclusively agronomic, ecological, or nutritional studies without a market or value chain dimension
Fisheries and livestock	Fish or animal products analyzed as wild-harvested forest products (bushmeat, caterpillars, honey) or as one component of a crop, agroforestry, or forest value chain	Studies whose main object is capture fisheries, aquaculture, or domestic livestock (production, marketing, or processing of fish, meat, milk, or eggs)
Evidence	At least one verifiable piece of empirical information (primary or secondary) on actors, functions, markets, flows, costs, prices, margins, revenues, value added, inclusion, or environmental impacts	Opinion, journalistic, or promotional texts; documents whose methodology or origin cannot be verified
Period and language	Published January 1995–15 September 2026, in French or English	Outside the period or in other languages
Document type	Peer-reviewed articles, books, theses, technical and institutional reports, project studies, and datasets	Administrative correspondence, calls for tenders, and documents without results (recorded as context or as reports not retrieved)
Duplication	One empirical study per survey; derived publications grouped with the original study (Table S3)	Duplicate records and secondary publications of a survey already included

The search covered publications from January 1995 to 15 September 2026. The start date was chosen according to the availability of documents on supply chains and value chains in the Republic of the Congo, and relevant earlier references were checked so that foundational works were not missed; 15 September 2026 is the date of the last search. Publications in French and English were included. All co-authors involved in screening and extraction work in French and read English; English-language documents were read in the original language, and machine translation was used only as a reading aid for long passages. To ensure terminological consistency, key economic and ecological terms were

checked against a bilingual French–English glossary based on the French and English versions of the VCA4D methodological brief (for example, valeur ajoutée/value added, résultat net d'exploitation/net operating income, filière/value chain, and PFNL/NTFP); this glossary is provided in Table S5. The VCA4D framework was chosen for its ability to structure the economic, social, and environmental analysis of value chains.

2.3. Literature Search

The search was conducted in Scopus, Web of Science, Google Scholar, AGRIS/FAO, and Agritrop/CIRAD, supplemented by targeted searches of ScienceDirect and of the websites of FAO, the European Union/VCA4D, international organizations, research institutions, universities, and Congolese institutions. The gray literature (technical reports, project studies, theses, and institutional documents) was also searched to reduce publication bias. The search terms are reported below in accordance with PRISMA-S [42].

The searches combined geographical and thematic terms with terms for the main agricultural and forestry products, in French and English: synonyms for the Republic of the Congo ("Republic of Congo", "Congo-Brazzaville", "République du Congo", Brazzaville); terms for value and marketing chains ("value chain*", "commodity chain*", "filière*", "chaîne* de valeur", "market*", "commerciali*"); and terms for the sectors and products studied (agricultur*, forest*, agroforest*, manioc/cassava, cacao/cocoa, safou, haricot/bean*, maraîch*/vegetable*, horticultur*, timber, wood energy, PFNL/NTFP). For example, the Scopus search was run in the title, abstract, and keyword fields as follows: TITLE-ABS-KEY (("Republic of Congo" OR "Republic of the Congo" OR "Congo-Brazzaville" OR "République du Congo" OR Brazzaville) AND ("value chain*" OR "commodity chain*" OR filière* OR "chaîne* de valeur" OR market* OR commerciali*) AND (agricultur* OR forest* OR agroforest* OR cassava OR manioc OR cocoa OR cacao OR safou OR "Dacryodes edulis" OR bean* OR haricot* OR vegetable* OR maraîch* OR horticultur* OR timber OR "wood energy" OR fuelwood OR charcoal OR NTFP* OR "non-timber forest product*" OR PFNL)) AND PUBYEAR > 1994. The equivalent strings for each database, with the search date and the number of records retrieved, are given in Table S2. The strings were adapted to the syntax of each database and supplemented by reference chaining [42].

2.4. Eligibility Criteria

A study was included if it (i) concerned the Republic of the Congo; (ii) focused on a value chain or on a marketed agricultural, agroforestry, or forest product; and (iii) provided at least one verifiable piece of empirical information on actors, functions, markets, flows, costs, prices, margins, revenues, value added, inclusion, or environmental impacts. Publications without relevant Congolese data, and publications that were exclusively agronomic or ecological, journalistic, or promotional, were excluded (Table 1). Publications derived from the same survey were grouped as a single empirical study to avoid double counting [43]; the correspondence between each grouped publication and its original study is given in Table S3.

2.5. Data Selection, Extraction, and Analysis

Study selection followed the PRISMA steps: identification, removal of duplicates, title and abstract screening, full-text assessment, and final inclusion [41,42]. Reasons for exclusion at the full-text stage were recorded, and the number of records at each stage is shown in the PRISMA 2020 flow diagram (Figure 2). Six reports could not be retrieved in full text before the cut-off date. They are listed in Table S4 with the reason why they could not be obtained; they were not included in the synthesis, and their possible influence on the conclusions is discussed in Section 2.6.

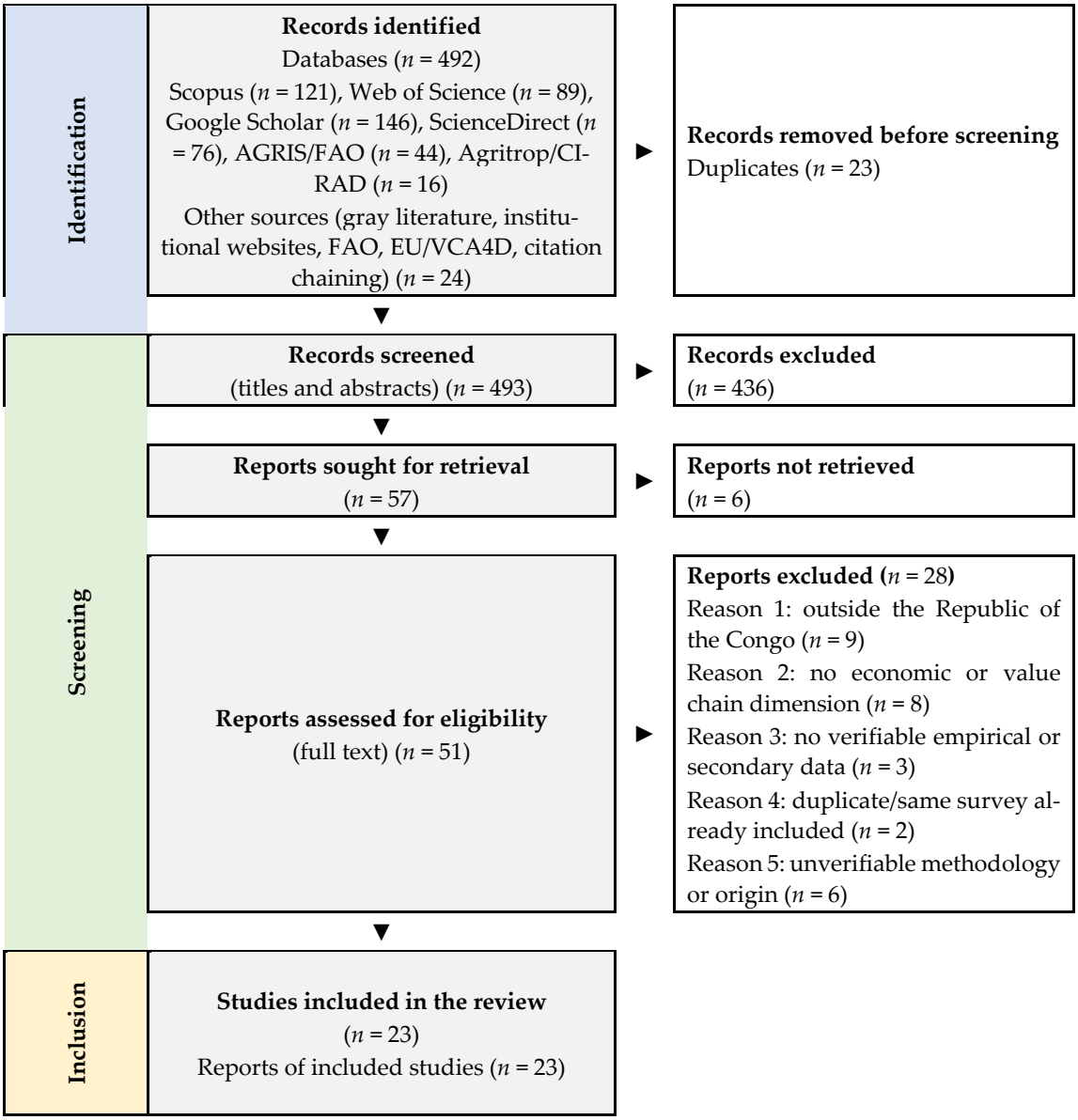


Figure 2. PRISMA 2020 flow diagram of the identification, screening, and inclusion of studies on agricultural, agroforestry, and forest value chains in the Republic of the Congo (January 1995–15 September 2026). Adapted from Page et al. [41].

A standardized form was used to extract, for each study, the year, territory, product, actors, sample, data collection and analysis methods, and functional, economic, social, and environmental information. Screening, full-text assessment, and data extraction were carried out by the authors identified in the Author Contributions section. Economic indicators were recorded with the definitions used by each study. To avoid confusion between distinct concepts, value added (VA) is used in this review only in its accounting sense, that is, the value of output minus intermediate consumption; VA remunerates labor, capital, land, and the State, and is therefore distinct from net operating income (VA minus wages, taxes, rents, financial charges, and depreciation), from gross sales revenue, and from the share of the final consumer price received by an actor. A share of VA generated by a segment is never interpreted as the income of that segment or as evidence of an equitable distribution. Monetary values are reported in the currency and reference year of each source and were not deflated or converted; values from different years (for example

2006–2009 and 2024) are therefore not directly comparable, because of inflation, changes in prices, survey samples, and methods.

Instead of a risk-of-bias assessment designed for intervention studies, the credibility of each included study was appraised with five criteria adapted from the Mixed Methods Appraisal Tool (MMAT) [44] and from the AACODS checklist for the gray literature (authority, accuracy, coverage, objectivity, date, significance) [45]: (C1) explicit objective and scope; (C2) data source and collection period reported; (C3) sampling strategy and sample size reported; (C4) indicators and calculation methods defined; and (C5) independent quality control (peer review, thesis jury, or identifiable institutional authorship) and absence of self-evaluation of an intervention by its own implementer. Each criterion was scored as met (1), partly met (0.5), or not met (0); studies scoring 4–5 were rated high, 3–3.5 moderate, and below 3 low. The appraisal was not used to exclude studies, but results from studies rated moderate or low are flagged in the synthesis (Section 3.9). No formal assessment of the certainty of the evidence (e.g., GRADE) was undertaken, because the synthesis is narrative and produces no pooled estimates.

The studies were then coded according to their coverage of the functional, economic, social, and environmental dimensions of VCA4D. This coding does not retrospectively qualify the studies as "VCA4D studies". The coding matrix therefore distinguishes (i) the studies whose authors explicitly applied the VCA4D methodology and (ii) the studies that were only assessed against VCA4D dimensions by the authors of this review (Section 3.9). A dimension coded "NR" means that it was not reported in the source; it indicates a gap in the available evidence for the Congo, not a shortcoming of studies that were designed for other purposes. The coding assesses the degree of integration of the studies and their capacity to document the interactions between economic performance, social inclusion, and environmental sustainability [7].

Finally, a comparative narrative synthesis identified the most studied value chains, the best-documented territories and actors, the dominant methods, the main bottlenecks, and the knowledge gaps [43]. Gaps were grouped into four categories (geographical, thematic, methodological, and integration gaps) and then ranked by priority according to three criteria: the importance of the chain for livelihoods and land use, the extent of the missing evidence, and the relevance for conservation (Section 4.9). A specific analysis of the Odzala-Kokoua-Lossi landscape assessed the current state of knowledge on value chains and their links with livelihoods and conservation.

2.6. Limitations of the Study

This review has several limitations. The first is the absence of prospective registration of the protocol (Section 2.1), which increases the risk that eligibility, coding, and reporting decisions were influenced by knowledge of the studies; the publication of the full protocol, search strings, and codebook (Tables S1–S3) allows these decisions to be audited but does not remove this risk. The second concerns the availability of data: part of the work conducted in the Congo is contained in project reports, institutional documents, or academic theses that are poorly indexed in international databases. The search cut-off date (15 September 2026) is close to the date of submission, and several 2025–2026 reports, including the VCA4D report on beans and safou, were not yet publicly available. The six reports that could not be retrieved (Table S4) were excluded. Because they include recent analyses, such as the VCA4D report on beans and safou, their exclusion may lead the review to underestimate the recent progress of integrated analyses for the products concerned, although it does not change the results reported for the studies that were retrieved. The gaps identified for beans and safou should therefore be regarded as provisional.

The third limitation concerns the gray literature, which, including theses, accounts for more than half of the included studies (Section 3.9). Reports commissioned or

produced by development projects may emphasize positive results, use non-standard indicators, or present unpublished data that cannot be checked; they are rarely peer-reviewed. The credibility appraisal (criterion C5) and the systematic indication of the source type in the appraisal table (Section 3.9) are intended to make this bias visible, and quantitative results from project reports are presented as reported by their authors, without generalization. The literature may also be affected by language, publication, and funding biases, by an overrepresentation of recent work on cocoa, and by uneven geographical coverage. The fourth limitation is the methodological heterogeneity of the studies, particularly in samples, units of observation, and measurement methods, which prevents direct quantitative comparison of costs, margins, revenues, or value added. Measurement of informal activities, flows, and revenues also varies across methods and contexts, and some extrapolations may limit the representativeness of the results; for example, results based on small samples, such as 35 artisanal timber operators or nine cocoa-farming households, cannot be generalized to the whole sector.

Finally, existing studies focus mainly on the functional and economic dimensions of value chains, while social and environmental dimensions receive explicit and structured attention in only some of them (Section 3.9). This uneven coverage limits any integrated assessment of sustainability. Because VCA4D was designed for field studies based on primary data, the review cannot assess the included studies against all four VCA4D dimensions in the way a VCA4D study would; it can only report what the studies document. This review should therefore be regarded primarily as a critical mapping of the state of knowledge, intended to identify research priorities and to inform the development of territorial, multi-chain analyses using a VCA4D approach.

3. Results

3.1. Territorial Distribution of Production and Resources Mentioned in the Sources

Table 2 presents the territorial groupings used in this review, their main agricultural specializations and flagship crops, and the associated timber and non-timber forest products (NTFPs). It highlights the spatial diversity of production systems and of the resources that are exploited at the national level.

Table 2. Territorial groupings, agricultural production, and forest products in the Republic of the Congo.

Territorial Group	Documented Crops and Specializations	Timber and Non-Timber Forest Products (NTFPs)	Key Observations
South: Bouenza, Niari, Lékoumou	Cassava; peanuts and corn in Bouenza; bananas/plantains and beans in Niari; cocoa sporadically documented in Lékoumou [34,46,47].	Timber from the Mayombe and Chaillu forests; edible and medicinal NTFPs, including *Gnetum* [31,46].	Sources primarily document cassava and food crops; cocoa in Lékoumou is associated with local initiatives [46].
Brazzaville Pool and Belt	Cassava; peri-urban vegetable farming; maize, groundnuts, and other food crops [47–49].	Energy wood and charcoal; edible NTFPs, including *Gnetum* and caterpillars [31,46].	Studies on the Brazzaville supply basin document the role of cassava and vegetable farming, as well as the importance of wood energy [50].
Plateaux and documented areas of the Western Basin	Cassava, corn, peanuts, beans; potatoes and yams in the Plateaux [46,51].	Food, medicinal, and artisanal non-timber forest products (NTFPs); resources from savannas and wooded areas [31,46].	Available sources specifically document potatoes and yams in the Plateaux department [51].
Forest North: Sangha, Likouala, Cuvette, and Cuvette-Ouest	Cocoa; cassava, bananas/plantains, and other food crops; rice in certain hydromorphic areas [27,52].	Timber; *Gnetum*, honey, caterpillars, and other non-timber forest products [31,46].	Cocoa cultivation is particularly well documented in this region. A recent CIRAD study identified 6531 farmers in Sangha, Likouala, Cuvette, and Cuvette-Ouest during the period under consideration in 2024 [27].
Coastal Region: Kouilou	Cassava, food crops, and vegetable farming; fishing and aquaculture as diversification activities [46,51].	Coastal timber and non-timber forest products (NTFPs); palm products and other foraged resources [46].	Cocoa is documented there primarily in the context of experimental initiatives rather than as an established production system [46].

Table 2 shows a marked spatial differentiation of agricultural systems and forest resources in the Republic of the Congo: cassava dominates in the south and in the Pool department, whereas cocoa is concentrated in the forested north, particularly in Sangha and Likouala. The Plateaux department is characterized by potatoes, yams, and other food crops, and all zones show a diversity of NTFPs and timber products. This territorial structure, documented by FAO [46], Ndao et al. [51], and recent studies on cocoa [27], highlights the value of territorial approaches for analyzing complementarities between agriculture, forest resources, and value chains.

3.2. The Cassava Value Chain: A Long-Standing, Important, Yet Still Weakly Structured Sector

Cassava is a major food crop in the Republic of the Congo. The figures available come from two types of sources that must be distinguished. Recent national estimates from the FAOSTAT database (FAO, accessed on 15 September 2026) put production at about 1.62 million tonnes in 2023 and 1.71 million tonnes in 2024, and the average yield is estimated at 10.3 t/ha [53]; these are model-based national estimates rather than survey measurements. Departmental figures are historical baselines (the 2018 departmental statistical yearbooks provide no comparable production series [54,55]): the most recent FAO estimates, for 1998, are 12,200 tonnes in Sangha and 99,500 tonnes in the former Cuvette region [56]. The lack of recent and comparable departmental statistics prevents any assessment of current production and cultivated areas, particularly in Sangha and Cuvette-Ouest [54,55]. The last general agricultural census dates from 2014–2015 [34]; a new national agricultural census, with departmental production and area statistics, is urgently needed to analyze the current performance of the cassava value chain.

Cassava is one of the best-documented agricultural value chains in the Congo from a historical perspective. The available studies cover several sub-chains (fresh roots and dried chips, processed products such as foufou, chikwangue, and retted paste, and leaves), each with its own products, units of observation, and markets (Table 3). The OTF Group study [57], conducted for the World Bank, remains a key reference on the organization of the chain: it covers the markets of Brazzaville and Pointe-Noire and the producing regions of Pool and Plateaux, and analyzes actors, marketing channels, costs, and value added [57].

Other studies complement this literature. Mabossy-Mobouna et al. [58] analyze the prices and margins of cassava chips in Brazzaville, and Mabossy-Mobouna and Malaissé [59] document the uses and consumption of cassava leaves. A more recent study on the Nsah-Ngo Plateau analyzes the marketing of cassava and yams on the basis of a survey of 420 households in 21 villages of the Ngo and Gamboma districts [60]. Together, these studies describe a value chain structured around production, artisanal processing, and supply channels linking rural areas to the main urban markets.

Table 3. Reported results and limits to the comparability of studies on the cassava value chain in the Republic of the Congo.

Dimension	Documented Findings	Sources and Scopes	Limitations on Comparability
Scope and Territories	The sector is documented across several production basins and urban markets, notably Brazzaville, Pointe-Noire, Pool, Plateaux, and the Nsah-Ngo Plateau.	OTF Group [57]; Ndey Ngandzo [60].	The study areas, time periods, and units of observation vary across studies.
Varietal diversity and temporal dynamics	59 local varieties were recorded in Oyo and Odziba, with overall stable diversity between 2007 and 2012, but significant dynamics in adoption and abandonment linked in particular to yield, availability	Otabo et al. [47]	The study focuses primarily on the diversity and dynamics of cultivated agrobiodiversity, rather than on economic performance or the functional structure of the value chain; its results are therefore complementary to, but not directly

	of planting material, and early maturity.		comparable with, studies centered on markets, prices, and stakeholders.
Products and Sub-Chains	The studies cover cassava roots, dried chips, starch, foufou, chikwangue, and cassava leaves.	OTF Group [57]; Mabossy-Mobouna et al. [58]; Mabossy-Mobouna & Malaissé [59].	These products correspond to different levels of processing, markets, and units of measurement and are not directly comparable.
Production and Consumption	OTF estimates domestic production at over 1.09 million tonnes per year and highlights the importance of cassava in the food supply.	OTF Group [57], data mainly from 2006–2009.	Historical baseline (2006–2009); it cannot be equated with recent data or compared directly with local surveys.
Marketing and Distribution Channels	Several supply chains connect producers, processors, traders, transporters, and consumers. In the Nsah-Ngo Plateau, four supply chains have been identified: direct, short, semi-long, and long; seven transshipment points have been identified in Brazzaville.	OTF Group [57]; Ndey Ngandzo [60].	The supply chains are described at different geographical scales and are not based on the same samples.
Prices and Chips	The prices of cassava chips in Brazzaville are examined in relation to several socioeconomic and commercial factors.	Mabossy-Mobouna et al. [58].	The results focus on cassava chips and the Brazzaville market; they do not allow for inferences about the prices of fresh roots or processed products.
Value Creation and Distribution	OTF estimates that producers, processors, transporters, and retailers receive 36%, 30%, 24%, and 10% of the final consumer value, respectively (shares of the final price, not of value added or net income).	OTF Group [57], 2006–2009 data.	These percentages relate to the scope and calculation methods of this study; they are not directly comparable to the prices or margins reported in subsequent studies.
Losses and Processing	OTF identifies losses during production and processing and describes several methods for processing the roots into paste, chips, foufou, and chikwangue.	OTF Group [57]	The loss figure must be interpreted according to the product, the stage of the chain, and the calculation basis; it is not a national average. Physical losses must be distinguished from the mass reduction caused by processing (water loss, peeling), which is accounted for by conversion coefficients (see text below).
Stakeholders and Organization	The main stakeholders are producers, processors, wholesalers, semi-wholesalers, retailers, transporters, and other intermediaries.	OTF Group [57]; Ndey Ngandzo [60].	A single actor may perform multiple functions, and their importance varies depending on the distribution channels and regions.
Cassava leaves	The leaves constitute a distinct food sub-chain. In Brazzaville, consumption is reported at 98%, with a frequency generally three times a week or less; their marketing and uses are also documented.	Mabossy-Mobouna et al. [58]; Mabossy-Mobouna & Malaissé [59].	The results pertain to the consumption and uses of the leaves and cannot be equated with the economic indicators for the roots and processed products.
Methods and Robustness	The studies use various approaches: literature review, statistical data, field surveys, interviews, market observations, and economic analyses. Ndey Ngandzo [60] surveyed 420 households in 21 villages.	OTF Group [57]; Ndey Ngandzo [60]; Mabossy-Mobouna et al. [58]; Mabossy-Mobouna & Malaissé [59].	Differences in sampling, units of observation, time periods, definitions, and methods limit direct quantitative comparisons.
Social and Environmental Dimensions	The available studies primarily provide information on economic functions, marketing, and certain aspects of consumption; social and environmental dimensions are much less well documented in supply chain analyses.	All selected studies.	The lack of harmonized indicators limits an integrated assessment of sustainability across the various dimensions.

Table 3 shows that the OTF Group study [57] remains an important historical reference on the cassava value chain in the Congo. Its figures describe the situation in 2006–2009 and are reported here as a historical baseline, not as a description of the current chain. For that period, the study estimated national production at more than 1.09 million tonnes

and urban consumption at 402,101 tonnes per year, mainly in the form of chikwangue, foufou, chips, and paste. It identified Pool, Bouenza, Plateaux, and Niari as supply basins and reported constraints related to losses, seasonality, drying, transport, and infrastructure. It estimated that producers, processors, transporters, and retailers received 36%, 30%, 24%, and 10% of the final consumer value, respectively [57]; these are shares of the final price, which include costs, and not shares of value added or net incomes. Ndey Ngandzo [60] identifies four marketing channels between Nsah-Ngo and Brazzaville, and Mabossy-Mobouna et al. [58] show how chip prices vary with several socioeconomic factors. Mabossy-Mobouna and Malaissé [59] report that 98% of Brazzaville households consume cassava leaves, generally three times a week or less.

The figures on losses must also be read with care, because cassava processing involves a large expected reduction in mass that is not a loss. Fresh roots contain a high proportion of water, which is removed during retting, pressing, and drying; producing one tonne of dried chips typically requires about 2.5–2.6 tonnes of fresh roots [61], and the conversion ratios of wet products (paste, chikwangue) depend on the process. A loss rate is therefore meaningful only if it refers to physical waste (rotten, damaged, or discarded roots and products, unsold perishable products) expressed on a stated basis, such as fresh or dry weight and a given stage of the chain, while the mass reduction due to water loss and peeling is accounted for by conversion coefficients. The studies reviewed do not systematically make this distinction; future analyses should report conversion coefficients, ideally checked by a dry-matter balance, separately from physical losses at each stage.

Overall, the studies on cassava mainly analyze production, marketing, prices, and consumption, and they differ widely in products, regions, and periods. The age of some data, particularly those of OTF Group [57], limits their current relevance, while the VCA4D analysis of cassava in the Democratic Republic of the Congo (DRC) provides a relevant methodological framework without replacing empirical data from the Congo [4]. These results support the case for a VCA4D analysis of cassava in the Odzala-Kokoua-Lossi landscape, for which no value chain data were found.

3.3. Cocoa and Available National and Regional Analyses

Recent studies analyze the cocoa value chain at different scales (Table 4). Using 2024 data and a VCA4D approach, Tridon and Lescuyer [27] analyze producers, traders, and exporters, as well as the economic performance and environmental dimensions of the sector. They estimate national dry cocoa production at 5204 tonnes on more than 10,700 ha, with about 76% of the output exported to Cameroon. They also report large differences in economic performance among categories of producers and traders and a strong tension between cocoa expansion, profitability, and forest conservation. At the national level, the cocoa sector accounts for about 0.4% of non-oil gross domestic product (GDP) and 2.2% of agricultural GDP [27].

In the ETIC landscape, Ngo Ndebi and Lescuyer [52] estimate dry cocoa production at 3900 tonnes in 2024, produced by about 1730 producers, with a value added of 15.6 billion CFA francs, 66% of which is generated at the producer level. This share of value added is not the net income of producers, which also depends on wages paid, family labor, and other costs. The study also highlights a major environmental issue: nearly 50% of the plantations studied were established on former forest land, and many orchards are aging. At a different scale, Ngouhouo-Poufoun et al. [20] surveyed 1035 households in the Cameroonian and Gabonese parts of the TRIDOM landscape in 2013–2014 and estimated the area cleared for agriculture over the previous decade with spatial autoregressive models. Controlling for household characteristics, financial assets, the share of self-consumption, crop damage by wildlife, and country, they found that a marginal increase in income from cocoa-based livelihood portfolios was associated with six to seven times more

deforestation than other livelihood strategies. The models did not include distance to roads or initial forest cover, and the survey did not cover the Congolese part of TRIDOM; this result is therefore an association conditional on these controls, not a causal effect, and it cannot be transferred directly to the Congo. These results, summarized in Table 4, concern specific territories, and the ETIC landscape only partly overlaps the World Heritage buffer zone of Odzala-Kokoua (Section 1). Their relevance for other value chains and for Odzala-Kokoua-Lossi requires additional data and an explicit delineation of territories.

Table 4. Key findings from studies on the cocoa value chain in the Republic of the Congo.

Dimension	Reported Results	Source and Scope
Production and Agricultural Systems	Dry cocoa production is estimated at 5204 tonnes in 2024, across more than 10,700 hectares. The systems are predominantly agroforestry-based.	Tridon & Lescuyer [27], national analysis, 2024 data.
Stakeholders and Marketing	The main stakeholders are producers, traders, and exporters. Approximately 76% of the trade flows to Cameroon.	Tridon & Lescuyer [27], 2024 data.
Economic Performance	The sector accounts for approximately 0.4% of non-oil GDP and 2.2% of agricultural GDP. Economic performance varies by category of producer and trader.	Tridon & Lescuyer [27], 2024 data.
Regional Analysis—ETIC	Production is estimated at about 3900 tonnes of dry beans in 2024 and the value added of the chain at 15.6 billion CFA francs, 66% of which is generated at the producer level (share of value added, not producer income).	Ngo Ndebi & Lescuyer [52], 17 villages and 4 districts.
Stakeholders in ETIC	Four types of producers and four types of traders have been identified; the majority of trade flows are directed toward Cameroon.	Ngo Ndebi & Lescuyer [52].
Environmental Dimension—ETIC	Nearly 50% of the plantations studied are reported to have been established on former forest land; a significant proportion of the orchards are aging.	Ngo Ndebi & Lescuyer [52].
Cocoa and Deforestation—TRIDOM	Household survey (n = 1035) in the Cameroonian and Gabonese parts of TRIDOM (2013–2014), analyzed with spatial autoregressive models and household-level controls: a marginal increase in cocoa income is associated with six to seven times more deforestation than other livelihood strategies. This is an association, not a causal effect; distance to roads and initial forest cover were not controlled.	Ngouhouo-Poufoun et al. [20], TRIDOM landscape.
Overall Findings	Recent studies primarily document production, stakeholders, trade flows, economic performance, and certain environmental issues at different territorial scales.	Tridon & Lescuyer [27]; Ngo Ndebi & Lescuyer [52]; Ngouhouo-Poufoun et al. [20].

Table 4 shows the scope of the cocoa studies available for the Republic of the Congo. Their results are presented separately according to their scope and are not aggregated, because the independence of the data and the comparability of the indicators could not be verified; monetary values refer to 2024.

3.4. Safou and the Analysis of Its Trade Channels in the Republic of the Congo

Safou (*Dacryodes edulis*) is an agroforestry resource that remains poorly documented in the Congo. Inkari and Lescuyer [28] analyze its value chain on the basis of surveys of the main actors conducted in 2025 and describe dispersed production and largely informal supply chains. Silou et al. [62] measure postharvest losses caused by the natural softening of the pulp in Brazzaville. Earlier studies on safou marketing in the DRC [63] and Cameroon [64] concern other countries and are used only for comparison. The main findings on actors, supply chains, markets, and economic performance in the Congo are summarized in Table 5.

Table 5. Key findings from studies on the safou value chain in the Republic of the Congo.

Dimension	Reported Findings	Markets and Distribution Channels	Identified Stakeholders	Source
Production and cultivation systems	Production occurs in all departments, in the form of trees scattered around homes, mixed orchards, or single-species plantations.	Local, urban, and interurban markets.	Producers.	Inkari & Lescuyer [28]
Stakeholders and Governance	The sector includes producers, middlemen, retailers, and consumers; technical services and support institutions are also involved. Commercial relationships rely heavily on family and informal networks.	Primarily informal distribution channels.	Producers → intermediaries → retailers → consumers.	Inkari & Lescuyer [28]
Marketing	Trade flows are largely informal and not well reflected in official statistics or specific tax systems.	Primarily domestic and urban markets.	Producers, collectors/intermediaries, merchants, retailers.	Inkari & Lescuyer [28]
Economic Performance	The study analyzes the economic performance of the sector and value creation along the chain; volumes, margins, and value added are not reported in a form that allows comparison.	Marketing is primarily domestic.	Producers, intermediaries, and retailers.	Inkari & Lescuyer [28]
Informality and the Institutional Environment	The sector is evolving without any specific legal framework dedicated to safou; trade remains largely informal.	Distribution channels are largely unregistered.	Commercial actors and supporting institutions.	Inkari & Lescuyer [28]
Logistics and Storage	The fruit's perishability is a well-documented constraint on marketing and storage.	Distribution channels subject to transportation and storage conditions.	Producers, collectors, wholesalers, retailers.	Inkari & Lescuyer [28]; Silou et al.[62]
Summary	The studies reviewed primarily document the sector's structure, key players, marketing channels, informality, and certain economic and logistical aspects.	Domestic and urban markets constitute the main documented outlets.	The main links in the supply chain are identified.	Inkari & Lescuyer [28]

Table 5 shows that the studies mainly document the actors, marketing channels, and some economic and logistical aspects of safou. According to these studies, production and sales volumes, margins, value added, interregional and cross-border flows, and contributions to GDP and employment are either not measured, not reported, or not comparable. Silou et al. [62] show that these softening losses are a major constraint on the marketing of the fruit. In the DRC and Cameroon, safou has been reported to generate substantial income and to supply urban and export markets where producers are organized, losses are reduced, and marketing channels are structured [63,64]. These experiences are presented here only as hypotheses that could be tested in the Congo; they are not evidence of the performance of the Congolese chain, for which no comparable quantitative data are available. In the Congo, the high level of informality, the absence of a specific regulatory framework, and the dispersion of production are major constraints. Conclusions on the Congolese chain are therefore limited to its structure and constraints; a VCA4D analysis would be needed to quantify value creation and distribution, measure the contribution of safou to the national economy, and identify options for formalization, organization of actors, processing, and market access.

3.5. Beans: A VCA4D Study Not Yet Accessible

A joint VCA4D study on beans and safou is part of the VCA4D portfolio for the Republic of the Congo. The final report was sought through the VCA4D platform on Capacity4dev, but only an administrative notice confirming the approval of the final report on 3 June 2026 [65] was accessible by the search cut-off date; the scientific report itself could not be obtained. This document establishes the administrative status of the study but

provides no information on its methods, samples, or results. The study was therefore excluded from the synthesis and is listed among the reports not retrieved (Table S4). No conclusion is drawn about volumes, margins, or environmental results, and the lack of access to the report must not be interpreted as an absence of empirical results [10]. The approval date does not indicate the date of public release; the report should be included when the review is updated.

3.6. Non-Timber Forest Products: Socioeconomic Importance and Predominance of Informal Channels

Studies on NTFPs in the Republic of the Congo mainly document their contribution to livelihoods, food security, and trade, while integrated value chain analyses remain scarce. Loubelo [31] is the national study most directly focused on the economic dimension of NTFPs, through an analysis of actors, marketing channels, and incomes for several products. The results are summarized in Table 6.

Table 6. Key findings from studies on non-timber forest products in the Republic of the Congo.

Dimension	Reported Results	Products/Scope	Source
Contribution to Households	NTFPs contribute to household food security, income, and diversification of activities.	NTFPs, national total	Loubelo [31]
Marketing	Marketing channels involve, in particular, producers/collectors, wholesalers, retailers, and consumers.	NTFPs, national total	Loubelo [31]
Gnetum	Approximately 1890 tonnes of *Gnetum* leaves are traded annually in the three main cities studied; profit margins are estimated for traders (collectors' costs and labor are not deducted).	*Gnetum* spp.; Brazzaville, Pointe-Noire, Dolisie, and other markets	Loubelo [31]
Supply	The Plateaux department is a major source of supply for the Brazzaville markets in the sample studied.	Mainly *Gnetum*	Loubelo [31]
Uses and Local Importance	NTFPs are used for food, healthcare, and income generation.	NTFPs, Djoumouna periurban forest	Kimpouni et al. [66]
Product Diversity	The study identifies and characterizes the NTFPs used by communities around the Djoumouna forest.	NTFPs, 143 household heads	Kimpouni et al. [66]
Gender and value chains	Across the Congo Basin, participation and benefits vary depending on the product, the segment of the value chain, and the rules governing access to resources.	13 NTFP value chains, Cameroon, DRC, and Gabon	Ingram et al. [14]
Smallholder Participation	Experiences in Cameroon and the DRC document interventions related to production, harvesting, postharvest handling, organization, and market access.	Tree-based products/NTFPs	Degrande et al. [67]

Table 6 shows that NTFPs in the Congo are documented mainly from economic, food, commercial, and ethnobotanical perspectives. Loubelo [31] provides quantitative data on the trade and margins of some products, notably *Gnetum*, whereas Kimpouni et al. [66] focus on the local uses and importance of NTFPs. The regional studies by Ingram et al. [14] and Degrande et al. [67] provide complementary insights but cannot be equated with national results for the Congo. The economic results must also be interpreted with caution. Most NTFP studies report quantities sold, prices, or sales revenues, and margins are estimated for traders rather than for collectors; the costs of collection and transport, the time spent harvesting, and the value of family labor are rarely deducted. Gross receipts therefore do not correspond to the net income actually received by collectors and smallholders, and the economic contribution of NTFPs to rural households remains largely unknown.

3.7. The Timber Supply Chain: Coexistence of Industrial and Artisanal Segments and Importance of the Domestic Market

The literature on the timber value chain in the Republic of the Congo distinguishes mainly between industrial logging, oriented towards processing and export, and artisanal sawmilling, which supplies mainly domestic markets. Table 7 summarizes the available findings.

Table 7. Key findings from studies on the timber value chain in the Republic of the Congo.

Dimension	Reported Findings	Scope/Segment	Source
Forest Resources	The state-owned forest area covers 22.5 million hectares, of which 12.7 million are allocated to timber production by concessionaires.	National Forest Estate	WTO [68]
Industrial logging	Industrial logging is dominated by large companies and geared toward processing and export markets.	Industrial lumber	WTO [68]
Domestic market	The domestic market is supplied by artisanal and industrial lumber.	Brazzaville, Pointe-Noire, and supply areas	Lescuyer & Cerutti [69]
Artisanal sawmilling	Artisanal sawmills supply a significant portion of the domestic market's needs and employ operators in several rural areas.	Domestic market	Lescuyer & Cerutti [69]
Employment	The 2009 study identified at least 600 permanent direct jobs and 300 temporary jobs in the two main cities studied.	Artisanal sawmilling, Brazzaville and Pointe-Noire	Lescuyer & Cerutti [69]
Recent developments	Fifteen years after the 2009 study, artisanal logging remains active in the six departments studied; 35 artisanal operators were surveyed, 46% of whom have been engaged in this activity for more than 10 years. This sample is too small to be representative of the sector.	Artisanal timber harvesting	Lescuyer & Mboulafini [70]
Formalization	The artisanal operators surveyed primarily operate in an informal setting; access to logging permits is a key aspect of how the domestic sector functions.	Artisanal logging	Lescuyer & Mboulafini [70]
Local Processing	Institutional data indicate a policy aimed at increasing local wood processing and developing processing and carpentry activities.	Industrial Sector and Processing	WTO [68]; PRCCE II [71]

Table 7 shows the coexistence of two main segments of the timber chain: industrial logging, mainly export-oriented, and artisanal sawmilling, which supplies mainly domestic and regional markets. The domestic artisanal market remains largely informal and poorly covered by official statistics [69,72]. The 2024 study confirms the persistence of this segment and updates data on its operation and degree of formalization [70]. However, it is based on interviews with 35 operators, which is too small a sample to estimate the size, employment, or incomes of the sector at the national level; future studies should use stratified random sampling across several supply basins and repeated observations over time. Wood energy is a distinct segment. Studies conducted in 2024–2025 document the fuelwood and charcoal chains of the Brazzaville and Pointe-Noire supply basins, including flows, actors, and volumes. For Brazzaville, the supply basin covers about 4.07 million ha, and annual demand is estimated at 1.41 million tonnes of wood equivalent, including urban and rural consumption [73]. Data on timber and wood energy therefore refer to distinct segments, actors, products, and markets and should not be aggregated as a single chain.

3.8. Value Chains and Livelihoods Around Odzala-Kokoua-Lossi

Studies on communities adjacent to Odzala-Kokoua National Park mainly analyze livelihoods, agriculture, cocoa, forest products, and hunting. They rely on household surveys, monitoring of resource use, or value chain analyses, and only the national cocoa study follows the VCA4D approach [27]. Most local information comes from sites around

the park and from the neighboring ETIC landscape, whose limits only partly coincide with those of the AGROVAL operational area (Figure 1); results from one site are therefore not transferred to the whole landscape.

Overall, Table 8 reveals highly diversified livelihoods across the Odzala-Kokoua-Lossi landscape, where agriculture, cocoa, hunting, fishing, livestock, trade, and NTFPs are combined in different ways depending on households and areas [27,40,74–76]. This diversification reflects close links between agricultural activities, market income, and natural resource use. Cocoa is an important economic activity in some villages, and hunting still plays a significant role for both food and income. However, these studies focus on households and resources: relationships between actors, value creation, costs, margins, and trade flows are poorly quantified at the local level, and the sites studied (37 villages around the park, two villages on its northern edge, and the Mielekouka area) do not represent the whole landscape.

Table 8. Key findings from studies on value chains and livelihoods in the Odzala-Kokoua-Lossi landscape.

Dimension	Reported Findings	Source and Scope
Livelihoods and markets	In 2013–2014, 28% of known households in 37 villages were surveyed. Income-generating activities include hunting, agriculture, cocoa farming, fishing, small-scale trade, livestock raising, and the collection of non-timber forest products (NTFPs). Income came primarily from hunting (22–34%), agriculture (13–28%), and cocoa farming (10–49%), depending on the village group.	Mavah et al. [40], 37 villages surrounding the PNOK.
Bushmeat	Game was present in 38–48% of meals, and 20–30% of households derived monetary income from hunting in most villages. Income from the sale of game was higher in villages with better market access.	Mavah et al. [40].
Hunting and Harvesting	In the Mielekouka area, 20 hunters were monitored between November 2009 and April 2010. A total of 260 individuals belonging to seven orders were recorded; Artiodactyla accounted for 152 captures and Primates for 51. About three-fifths of the captures were recorded in the transition zone and about two-fifths in the buffer zone.	Mbete et al. [74], Mielekouka, buffer and transition zones of the PNOK.
Agriculture, Cocoa, and Food	A study of nine cocoa-farming households in two villages showed that all derived a significant portion of their income from the sale of plantains; in some households, this income exceeded that from cocoa. Cocoa accounted for more than 20% of the income of four households. Non-timber forest products (NTFPs) contributed little to monetary income, but some were important for subsistence consumption.	Verheye [75], two villages on the northern outskirts of the PNOK.
Agroforests and Food Security	The households studied consumed more fish than bushmeat; the majority of the animal protein consumed was purchased. One-third of the households were considered food secure according to the HDDS, while the others experienced periods of food stress.	Verheye [75].
Livelihoods and Conservation	A 2018 survey of 180 households at the two study sites showed that more than 65% of respondents reported farming as their primary activity, 20% reported hunting, and 4.6% reported livestock raising. The average cultivated area was 0.9 ha per household.	Yousefpour et al. [76], PNOK and Akagera National Park; separate analysis of Congolese data.
Cocoa and the Value Chain	The 2024 national study on cocoa describes the initiative to develop sustainable cocoa around Odzala-Kokoua and reports challenges related to competitiveness, prices, and local processing. The initiative's effects on income are not measured using a causal framework.	Tridon & Lescuyer [27], national study.

3.9. Comparative Summary of the Methods Used

The studies differ widely in survey design, units of observation, and indicators. To compare their content without equating thematic coverage with methodological quality, the functional, economic, social, and environmental dimensions were coded separately into four categories: NR (not reported), Q (addressed qualitatively), Qn (quantified using

an explicit method), and NA (not applicable). Coverage was assessed on the basis of the information actually reported in each source, and the matrix indicates separately whether the authors of each study explicitly applied the VCA4D methodology (Table 9). Only the two cocoa studies were explicitly conducted with VCA4D; for the other 21 studies, the coding reflects an assessment by the authors of this review against VCA4D dimensions.

Table 9. Coverage of the VCA4D dimensions in the included studies. VCA4D applied: whether the authors explicitly applied the VCA4D methodology (Yes) or whether the study was only assessed against the VCA4D dimensions in this review (No). Q = addressed qualitatively; Qn = quantified using an explicit method; NR = not reported; NA = not applicable.

Study	VCA4D Applied	Functional	Economic	Social	Environmental	Main Methods/Methodological Findings
Tridon & Lescuyer [27], domestic cocoa	Yes	Qn	Qn	Q	Q	Surveys of stakeholders, functional analysis, microeconomic and macroeconomic analysis; data from 2024.
Ngo Ndebi & Lescuyer [52], cocoa–ETIC	Yes	Qn	Qn	Q	Qn	Surveys in 17 villages and 4 districts, institutional data, and functional, economic, and environmental analyses.
Inkari & Lescuyer [28], safou	No	Qn	Qn	Q	NR/Q	Surveys of producers, intermediaries, retailers, and consumers, supplemented by interviews with institutional representatives.
Mavah et al. [40], Livelihoods around Odzala-Kokoua	No	Q	Qn	Qn	Q	Household surveys in 37 villages and analysis of income, assets, activities, and perceptions.
Mbete et al. [74], hunting around Odzala-Kokoua	No	Qn	Q	Q	Qn	Monitoring of hunters and quantification of harvests in different areas of the park.
Ameller, Maba Ngouloubi & Moustier [50], fresh vegetables–Brazzaville	No	Qn	Qn	Q	NR	Survey of 216 wholesalers and 1109 retailers in Brazzaville's main markets; quantification of volumes, values, prices, origins, and flows of 16 vegetables during the dry and rainy seasons.
Berdegué, Trivelli & Vos [11], Agri-Food Systems	No	Qn	Qn	Qn	NR	Review of available data on the effects of agri-food system innovations and policies on employment, income, small-scale producers, SMEs, and workers.
Pirard [16], Sustainable Value Chains in the Congo Basin	No	Qn	Qn	Qn	Qn	Comparative analysis of three case studies focusing on timber certification, zero-deforestation commitments, and trade policies; value chain approach and policy analysis.
Dubiez, Vautrin & Akodewou [73], wood energy–Brazzaville	No	Qn	Qn	Qn	Qn	Identification of supply flows, delineation of the supply basin, analysis of supply and demand, land use, and estimation of exploitable biomass. A basin covering 4,065,835 ha and 19 supplier districts.
Dubiez, Robain & Mialoundama Bakouetila [77], wood energy–Brazzaville	No	Qn	Qn	Qn	Qn	Characterization of stakeholders and supply chain flows, analysis of consumption by households and productive users, estimation of wood-energy volumes and supply basins.
Loubelo [31], NTFPs—Republic of the Congo	No	Qn	Qn	Qn	Q	Quantification of NTFP production and consumption, analysis of their contribution to household income, food security, and marketing chains.
Lescuyer & Cerutti [69], artisanal sawmilling—Republic of the Congo	No	Qn	Qn	Qn	Q	Tracking of lumber flows in Brazzaville and Pointe-Noire and 62 interviews with lumberjacks; estimates of production, sales, consumption, employment, and income.
Mabossy-Mobouna & Malaissé [59], cassava leaves—Brazzaville	No	Qn	Qn	Qn	NR	Socioeconomic study of consumption, focusing on distribution channels, key players, consumption practices, prices, and the socioeconomic characteristics of consumers.

Mabossy-Mobouna, Koya-Lobouaka & Malaissé [58], cassava chips—Brazzaville	No	Qn	Qn	Qn	NR	Socioeconomic survey and analysis of factors determining cassava chip prices; focus on market actors and price formation mechanisms.
OTF Group [57], cassava—Republic of the Congo	No	Qn	Qn	Qn	Q	Assessment of cassava marketing and domestic private investment; analysis of the sector's production, markets, stakeholders, constraints, and opportunities.
Robain, Dubiez & Matsoumbou [78], wood energy–Pointe-Noire	No	Qn	Qn	Qn	Qn	Characterization of supply chains and flows, analysis of consumption by households and productive users, and estimation of overall wood-energy demand.
Silou et al. [62], postharvest losses of safou	No	Q	Qn	NR	Qn	Experiments on the natural softening of safou, identification of physical causes, and measurement of losses and preservation; postharvest losses are estimated to be significant.
Ndey Ngandzo [60], cassava and yam marketing–Nsah-Ngo Plateau	No	Qn	Q	NR	NR	Survey of 420 households in 21 villages (Ngo and Gamboma districts); identification of four marketing channels to Brazzaville.
Otabo et al. [47], cassava varietal diversity–Oyo and Odziba	No	NR	NR	Q	Qn	Recording of 59 local varieties and of their adoption and abandonment between 2007 and 2012.
Verheye [75], cocoa agroforests and livelihoods–Odzala-Kokoua	No	Q	Qn	Qn	Q	Study of nine cocoa-farming households in two villages; income sources and food security (HDDS).
Yousefpour et al. [76], livelihoods and conservation–Odzala-Kokoua	No	NR	Q	Qn	Q	2018 survey of 180 households (separate analysis of Congolese data); main activities and cultivated area.
Kimpouni et al. [66], NTFPs–Djoumouna forest	No	Q	Q	Q	NR	Survey of 143 household heads; identification and characterization of NTFPs used by communities.
Lescuyer & Mboulafini [70], artisanal logging–six departments	No	Qn	Q	Q	NR	Survey of 35 artisanal operators; persistence of the activity, informality and access to logging permits.

The credibility appraisal (Table 10) rated 20 of the 23 studies as high, two as moderate, and one as low. Twelve studies are gray literature (institutional, consultancy, or project reports, technical papers, and datasets) and two are academic theses. The most frequent weaknesses were incomplete reporting of the sampling strategy and sample size (criterion C3) and the absence of external peer review (criterion C5). The low rating concerns a global evidence review whose Congolese data cannot be separated from those of other countries, and the moderate ratings concern studies whose samples or indicators are only partly described. Quantitative results from these studies are used in the synthesis only as reported by their authors.

Table 10. Appraisal of the credibility of the 23 included studies (criteria adapted from MMAT [44] and AACODS [45]). C1: explicit objective and scope; C2: data source and period reported; C3: sampling strategy and sample size reported; C4: indicators and calculation methods defined; C5: independent quality control. Here, 1 = met; 0.5 = partly met; 0 = not met; and NA = not applicable. Rating: high (4–5), moderate (3–3.5), low (<3).

Study	Source Type	C1	C2	C3	C4	C5	Rating	Main Concern
Tridon & Lescuyer [27], cocoa	Institutional report (CIRAD)	1	1	0.5	1	0.5	High	Not peer-reviewed
Ngo Ndebi & Lescuyer [52], cocoa–ETIC	Institutional report (CIRAD)	1	1	0.5	1	0.5	High	Not peer-reviewed; ETIC only
Inkari & Lescuyer [28], safou	Institutional report (CIRAD)	1	1	0.5	1	0.5	High	Volumes and margins not reported
Mavah et al. [40], livelihoods	Peer-reviewed article	1	1	1	1	1	High	Data from 2013–2014
Mbete et al. [74], hunting	Peer-reviewed article	1	1	1	0.5	1	High	20 hunters, one area

Ameller et al. [50], vegetables	Dataset and report (CIRAD)	1	0.5	1	1	0.5	High	Brazzaville markets only
Berdegué et al. [11], agrifood systems	Technical paper (IFPRI)	1	0.5	NA	0.5	0.5	Low	Global review; Congolese data not separable
Pirard [16], Congo Basin chains	Institutional report	1	0.5	0.5	0.5	0.5	Moderate	Case studies; few Congolese data
Dubiez et al. [73], wood energy	Institutional report (CIRAD)	1	1	1	1	0.5	High	Not peer-reviewed
Dubiez et al. [77], wood energy	Institutional report (CIRAD)	1	1	0.5	1	0.5	High	Not peer-reviewed
Loubelo [31], NTFPs	Doctoral thesis	1	0.5	0.5	1	1	High	Gross revenues; costs rarely deducted
Lescuyer & Cerutti [69], sawmilling	Institutional report (CIFOR)	1	1	1	1	0.5	High	Data from 2009
Mabossy-Mobouna & Malaissé [59], leaves	Peer-reviewed article	1	0.5	0.5	1	1	High	Brazzaville only
Mabossy-Mobouna et al. [58], chips	Peer-reviewed article	1	0.5	0.5	1	1	High	Brazzaville only
OTF Group [57], cassava	Consultancy report (World Bank)	1	1	0.5	1	0.5	High	Data from 2006–2009
Robain et al. [78], wood energy	Institutional report (CIRAD)	1	1	0.5	1	0.5	High	Not peer-reviewed
Silou et al. [62], safou losses	Peer-reviewed article	1	0.5	1	1	1	High	Laboratory conditions
Ndey Ngandzo [60], cassava–yam	Academic study	1	0.5	1	0.5	0.5	Moderate	Economic indicators not defined
Otabo et al. [47], varietal diversity	Peer-reviewed article	1	1	1	1	1	High	No economic indicators
Verheye [75], cocoa agroforests	Master's thesis	1	1	1	1	0.5	High	Nine households, two villages
Yousefpour et al. [76], livelihoods	Peer-reviewed article	1	1	1	1	1	High	Not a value chain study
Kimpouni et al. [66], NTFPs	Peer-reviewed article	1	0.5	1	1	1	High	Uses, not incomes
Lescuyer & Mboulafini [70], artisanal timber	Institutional report (CIRAD)	1	1	1	0.5	0.5	High	35 operators; not representative

Comparison of the studies shows a gradual shift from mainly descriptive approaches focused on actors, products, and markets towards more integrated value chain analyses. Recent research on cocoa, fresh vegetables, and wood energy places growing emphasis on quantifying flows, volumes, prices, revenues, and relationships among actors [27,50,52,73]. This shift is consistent with the VCA4D approach, which aims to analyze the functional, economic, social, and environmental performance of value chains together [79].

Cassava is a relative exception: research in the Republic of the Congo remains focused mainly on actors, marketing, consumption, and price formation [47,57–59], without a joint analysis of the economic, social, and environmental performance of the whole chain. This gap contrasts with the more systemic approaches recently developed for cocoa and wood energy [16,17,52,77].

Studies on wood energy illustrate a recent methodological diversification that combines the characterization of actors and flows, supply and demand analysis, spatial data, and land use [73,78], thus linking the economic functioning of the sector to urban supply and pressure on forest resources. Overall, Table 9 shows a shift towards multidimensional and quantitative approaches, but also persistent gaps in the joint treatment of economic, social, and environmental dimensions, particularly for agricultural chains such as cassava [7].

3.10. Key Trends and Gaps Revealed by the Synthesis

The synthesis highlights five major trends, followed by a cross-cutting gap concerning gender.

First, documentation of value chains remains uneven. Cassava has a relatively large and diverse body of literature, focused on production, marketing, prices, consumption, and varietal diversity [47,57–59]. Research on cocoa has developed more recently, particularly through VCA4D analyses [27,52]. Vegetable farming and wood energy have also

been studied recently, mainly in terms of urban supply flows, actors, and supply basins [50,73,78]. Safou, NTFPs, and some other chains remain much less documented.

Second, informality is a recurring feature of several chains, notably safou, NTFPs, artisanal sawmilling, and part of the cross-border cocoa trade. It complicates the measurement of volumes, prices, incomes, and the value actually captured by the different actors [16,28,31,69]. As shown in Section 4.5, informality covers different situations across chains, from legal but unrecorded activities to activities conducted without the permits required by law.

Third, economic analyses are becoming more common but remain heterogeneous. Studies on cocoa show that production accounts for a large share of the value added of the chain: in the ETIC landscape, producers generate about 66% of the estimated value added [52]. This result should not be equated with producer income or with an equitable distribution of value, which depend on costs, family labor, risks, and units of analysis. Studies on cassava and wood energy also document prices, flows, incomes, and relationships among actors, but with different methodological frameworks [57,73,77], and their monetary values refer to different years (2006–2009 for cassava, 2024–2025 for wood energy) and cannot be compared without deflation.

Fourth, urban and cross-border markets strongly shape the chains studied. Cameroon is a major outlet for Congolese cocoa, while Brazzaville is the destination of large flows of fresh vegetables and fuelwood from several supply basins [27,50,73]. These patterns highlight the importance of marketing networks and intermediaries, and the difficulty of monitoring informal flows.

Fifth, the environmental dimension remains poorly integrated and unevenly documented. Research on wood energy is an exception, as it explicitly links the functioning of the sector, supply and demand, supply basins, and pressure on forest resources [73,77,78]. In the cocoa sector, studies highlight the interactions between agroforestry and land-use change: in the ETIC landscape, all the plantations studied are agroforestry systems, but about half were established on former forest land [52]. These results show the need to distinguish between observed environmental states, land-use changes, and their trajectories over time.

Gender is a cross-cutting gap. Although the role of women is emphasized in the introduction of most studies, sex-disaggregated data on the Congo are available mainly at the national level, through the gender module of the 2014–2015 general agricultural census [34]. In the included value chain studies, the roles of women are described mostly qualitatively, and we found no Congolese study reporting sex-disaggregated incomes, margins, employment, or access to land and credit along an entire value chain. The detailed analyses of the gender implications of forest product chains in the Congo Basin concern Cameroon, the DRC, and Gabon [14] and cannot be transposed to the Congo. Sex-disaggregated evidence is therefore a priority gap for all the chains reviewed (Section 4.9).

3.11. The Need for Comparisons Between Value Chains at the Landscape Scale

The main finding of this review is therefore not an absence of value chain studies in the Republic of the Congo. On the contrary, recent work shows a growing interest in value chain analysis, driven in particular by CIRAD, VCA4D/Agrinatura, and development programs.

The studies reviewed do not yet allow a harmonized comparison of several value chains within the same conservation landscape. The extent of this gap should be confirmed when the reports that could not be retrieved (Table S4) become available.

This gap is particularly evident in the Odzala-Kokoua-Lossi landscape, where research on livelihoods, hunting, cocoa, markets, and natural resources remains scattered across disciplines and scales. The study of cocoa in the ETIC landscape illustrates the value of a territorial approach: it shows a significant economic contribution of cocoa at the local level, whereas its weight appears limited at the national level [52]. This result cannot, however, be transferred to Odzala-Kokoua-Lossi: ETIC and the AGROVAL operational

area overlap only partly and differ in the markets served, accessibility, production systems, land tenure, institutions, and observation periods (Figure 1).

The available literature therefore supports an approach that jointly analyzes actors, flows, costs, margins, value added, jobs, social inclusion, governance, agroecological practices, pressure on forests, and biodiversity, while taking into account the interactions between value chains and conservation.

4. Discussion

4.1. Heterogeneity of Knowledge and Limitations of Its Integration

This review reveals a fragmentation of knowledge rather than a general lack of studies on agricultural and forestry value chains in the Republic of the Congo. The literature covers cassava, cocoa, vegetable farming, safou, NTFPs, timber, and wood energy, but with different periods, spatial scales, units of analysis, and indicators. The studies therefore cover actors, flows, prices, incomes, markets, and natural resources unevenly, without systematically linking them to value creation and distribution, employment, social inclusion, and environmental externalities. These conclusions should be read in light of the absence of a registered protocol and of the weight of the gray literature in the corpus (Section 2.6).

This situation reflects a broader challenge in the African literature. Feyaerts et al. [80] show that local and global value chains have been studied in largely separate bodies of research, although they may compete for the same land, labor, water, and other resources. Research on the transformation of African agrifood systems also shows a shift towards analyzing the relationships between production, markets, standards, processing, and incomes [12,81]. The Congolese case is thus characterized less by a uniform lack of data than by a lack of integration and comparability of the available data.

Studies conducted elsewhere in Central and West Africa illustrate this methodological evolution. The VCA4D portfolio includes analyses of cotton and cocoa in Cameroon [82,83], cassava in Cameroon [84], cassava and cashew in Côte d'Ivoire [85,86], and cassava in the DRC [4]. These studies are not directly comparable with the Congolese dataset, as they differ in scope, objectives, years of observation, and data availability. Their value for this review is methodological only: they show that the four dimensions can be integrated in a single analysis and provide indicator definitions and accounting procedures, but their performance levels, prices, and income shares are not benchmarks for the Congo, where land tenure, cross-border trade conditions, and market structures differ.

4.2. Vegetable Farming: Scope of the Studies and Need for Updates

Vegetable farming illustrates this distinction. Research conducted in Brazzaville over several decades has documented the main actors, marketing channels, prices, and relationships between producers, traders, transporters, and consumers. Recent data on fresh vegetable supply extend this knowledge by characterizing the origins, volumes, values, prices, and intermediaries of the flows supplying Brazzaville [50]. The gap therefore lies less in the existence of studies than in their timeliness, geographical coverage, and integration of economic, social, and environmental dimensions.

Similar patterns have been observed in other African food systems. In Senegal, horticultural chains have been analyzed in terms of the relationships between trade, standards, incomes, and employment [87], and in Kenya and Madagascar, studies have documented the relationships between smallholders, modern markets, standards, and export chains [81,88,89]. These studies show that the effects observed depend strongly on the type of market and on how the chain is organized: in Senegal, for example, stricter standards changed the way rural households benefit from export chains, by shifting part of the gains from product markets to labor markets. These West and East African cases concern

export-oriented chains governed by private standards and supermarkets, whereas the vegetable chains supplying Brazzaville are oriented towards the domestic urban market, with mainly informal transactions and no comparable standards. The comparison is therefore not evidence that the Congo is lagging behind; it only indicates that the type of market served and the mechanisms of producer integration must be explicitly considered.

4.3. Cassava: A Relative Abundance of Studies, but Limited Integration of Supply Chain Functions

Cassava is one of the oldest and most diverse cropping systems in the Congo. Studies focus on marketing and investment [57], prices and consumption in Brazzaville [58,59], and varietal diversity and its dynamics [47]. They therefore document several components of the chain, but rarely their interactions with processing, value added, employment, inclusion, and environmental externalities.

The comparison with West Africa is instructive. A regional analysis of cassava in five countries (Côte d'Ivoire, Ghana, Sierra Leone, Nigeria, and Liberia) combined a literature review with surveys of the different segments of the chain and collected socioeconomic and trade data from actors [90]. In Ghana, the analyses also covered marketing channels, actors, and opportunities for upgrading the chain. This work shows that cassava analysis can go beyond production and prices to include processing, marketing, and relationships among actors; it is cited here as a methodological reference, not as an indication of the performance that could be expected in the Congo.

The VCA4D studies of cassava in the DRC [4] and Cameroon [84] provide a geographically closer comparison, as they apply an integrated analysis to the chain, particularly in the Kinshasa supply basin. They confirm that functional, economic, social, and environmental dimensions can be integrated, but they do not allow direct inferences about the performance of the Congolese chain, because production, territorial, and institutional contexts differ.

4.4. Value Creation, Distribution, and Inclusion: A Key Distinction

The review shows progress in economic analyses, particularly in recent studies on cocoa, but value added must be interpreted with caution. As defined in Section 2.5, value added is not income: a high share of value added generated by a segment implies neither a high income for producers nor an equitable distribution of value. Net income depends on intermediate costs, wages paid, family labor, capital, losses, risks, prices, and bargaining power, and these elements are reported in only a few of the studies reviewed. This distinction is well documented in the African literature. The VCA4D study of cotton in Cameroon estimates the value added of the chain at 95.9 billion CFA francs for the 2017–2018 season, 42.5% of which was generated by producers, while explicitly distinguishing value creation, governance, and distribution [82]. Research on cashew in Côte d'Ivoire also shows that governance and price-setting mechanisms can change the distribution of value among producers, processors, traders, and exporters [86,91,92].

Work on South Kivu, in the eastern DRC, likewise treats agricultural development as a lever against poverty, an outcome that depends on how much of the value created reaches farm households [93]. These findings reinforce an important caveat for Congolese cocoa: estimates of value added must be distinguished from net income and from the remuneration of labor. Future analyses should specify the units of comparison and take into account family labor, capital, risks, and losses before interpreting differences between categories of actors.

4.5. Informality, Intermediaries, and Supply Chain Governance

Informality is a recurring feature of several chains studied in the Congo, notably safou, NTFPs, artisanal sawmilling, and part of the cross-border agricultural trade. Research on artisanal sawmilling highlights the importance of the domestic market and of intermediary networks [69], and studies on NTFPs emphasize their contribution to household income and food security [31,94]. The term, however, covers different situations, which this review distinguishes as follows. (i) For safou, informality means legal but unrecorded activity: the trade is not prohibited, but it is not covered by any specific legal framework, statistics, or taxation [28]. (ii) For NTFPs, collection under customary use rights is legal, but commercial flows are largely unrecorded, and the commercial harvesting of some products is subject to authorizations under the forest code [31,95]. (iii) For artisanal timber, operating without the permit required by the forest code is illegal; artisanal sawmilling therefore includes both legal and illicit supply [69,70,95]. (iv) For cocoa, the flows exported to Cameroon are largely unrecorded in Congolese statistics; they may not comply with export procedures, but the available studies do not establish whether they are illicit [27,52]. (v) For bushmeat, hunting of protected species and hunting outside authorized periods and areas are illegal under wildlife legislation, whereas other hunting under customary rights is legal but unrecorded. Indicators of informality should therefore specify, for each chain, whether they refer to the absence of registration or statistics, or to non-compliance with a legal obligation.

The African literature shows that informality is not only a statistical problem: it shapes trade, prices, and the distribution of value. Research on smallholder market participation highlights the role of transaction costs, collective organization, and access to productive assets [96], and analyses of global supply chains show that market power and governance relationships influence the distribution of rents among actors [97].

In the Congolese context, value chain analyses should therefore document not only formal flows but also intermediaries, informal transactions, transaction costs, and the power relations that structure markets.

4.6. Cocoa: The Importance of a Territorial Perspective and Caution Regarding Transferability

Cocoa illustrates the recent progress of integrated analyses in the Republic of the Congo. The available studies now document the structure of the chain, producers, markets, and cross-border relations, and the ETIC study offers a more territorial perspective.

This development is consistent with research in West Africa, which accounts for most of the world's cocoa production and where the evolution of the sector has been linked to the expansion of cultivated areas, aging plantations, low yields, and replanting difficulties [98]. In Ghana, Deans et al. [99] show that cocoa value chain analysis benefits from being linked to actors outside the chain and to food security, poverty, and landscape sustainability. These similarities concern the issues to be analyzed; they do not mean that West African results, or the ETIC results, can be applied to the Odzala-Kokoua-Lossi landscape. Cocoa in the Congo is grown on a much smaller scale, mainly in forest agroforestry systems, with most of the output exported informally to Cameroon, under land tenure and marketing conditions that differ from those of Ghana or Côte d'Ivoire. The two Congolese study areas must also be compared by taking into account their partial overlap, the markets actually served, accessibility, land tenure, farming systems, institutions, and observation periods. The comparison is therefore useful for identifying common issues, but not for transferring performance levels or causal relationships.

4.7. Environmental Sustainability: From Resource Description to Trajectory Analysis

The environmental dimension is one of the least systematically integrated components of the Congolese literature. Some studies link value chains to forest resources or agroforestry systems, but indicators, system boundaries, and spatial scales are

inconsistent. This limitation matters because an environmental state observed at a given time does not reveal the trajectory that led to it.

African research on cocoa illustrates this point. Agroforestry can maintain some carbon stocks and biodiversity, but its presence alone does not reveal past land use or rule out earlier forest conversion or future expansion. Research on West African cocoa highlights the interactions between area expansion, plantation aging, yields, and land availability [98], and the landscape approach developed in Ghana underlines the need to look beyond the boundaries of the chain to its interactions with other land uses [99].

Within the VCA4D environmental analysis, this gap can be addressed by adding a set of longitudinal indicators measured on the same territorial units as the value chain accounts: (i) annual tree cover loss from the Global Forest Change series [100] and the annual states of undisturbed, degraded, and deforested humid forest from the Tropical Moist Forest dataset of the Joint Research Centre [101], computed for the production basins, around protected areas, and in buffer rings; (ii) land-cover maps for at least two dates, validated with independent reference points and area estimates corrected for classification errors following good-practice guidelines [102]; (iii) the location of new plots recorded by GPS during household surveys, with the age of the vegetation cleared, to estimate the share of openings in old-growth forest; and (iv) the conversion of these areas into carbon emissions and habitat loss per unit of product. These indicators would allow future applications of VCA4D to link the economic performance of a chain to the trajectory of the landscape in which it operates.

Environmental approaches are also becoming more integrated in some African value chains. In Kenya, Odhiambo et al. [103] quantified and monetized the environmental, health, and social externalities of the green bean value chain, including greenhouse gas emissions, water use and pollution, pesticide exposure, decent income gaps, and child labor. This example shows the value of looking beyond economic performance, but the same indicators or orders of magnitude cannot be applied to the Congo: system boundaries, functional units, available data, and biophysical contexts must be defined explicitly.

4.8. Comparison of Central and West Africa: What Is Transferable

The regional comparison highlights a methodological convergence: in several African countries, value chain analyses increasingly take into account actors, markets, governance, value added, employment, inclusion, and the environment together [12,80,81,88]. The experiences of Cameroon, Côte d'Ivoire, and the DRC show that such integrated approaches are feasible in Central and West Africa. Their performance levels, however, are not directly comparable, because accessibility, infrastructure, land tenure, production systems, governance, markets, and observation periods differ. What can be transferred to the Congo is therefore methodological: the framing questions, indicator definitions, accounting procedures, the social profile grid, and the environmental system boundaries. What cannot be transferred are performance levels, price and income shares, cross-border trade patterns, and causal relationships observed elsewhere. Methodological harmonization does not imply automatic aggregation: monetary values must be compared in constant prices of a stated year and in the same currency and product units; margins must account for family labor and capital; and environmental analyses must specify their boundaries and functional units.

4.9. General Implications

The main contribution of this review is to show that the knowledge gap on value chains in the Republic of the Congo is selective and multidimensional, rather than a simple lack of studies. The challenge lies mainly in integrating existing knowledge, ensuring the comparability of indicators, and improving the still uneven treatment of economic,

social, and environmental dimensions. African experiences point to the value of more integrated analyses, but their relevance depends on context. For the Congo, the scientific challenge is to link, within explicit territorial and temporal units, the structure of value chains, value creation and distribution, incomes and employment, governance, inclusion, and environmental trajectories, without aggregating incompatible indicators or extrapolating local results to the national level.

To make these conclusions operational, the gaps identified were ranked by priority (Table 11). The highest priorities combine an important chain for livelihoods and land use, a near absence of integrated data, and a direct link with forest conservation: an integrated VCA4D analysis of cassava in the northern forest departments, particularly in the Odzala-Kokoua-Lossi landscape; sex-disaggregated data on incomes, employment, and access to resources for all chains; and land-use trajectories linked to cassava and cocoa expansion around protected areas. Second-order priorities concern the quantification of volumes, margins, and net incomes for safou, beans, and NTFPs, and a representative survey of artisanal timber. Updating the data on vegetable farming outside Brazzaville and harmonizing the existing wood-energy studies are third-order priorities.

Table 11. Prioritization of the knowledge gaps identified by the review.

Priority	Gap	Evidence from the Review	Recommended Research
1	Integrated analysis of cassava in the northern forest departments (Sangha, Cuvette-Ouest, Likouala)	No value chain data for these departments; latest departmental production figures from 1998; national value chain data from 2006–2009 (Section 3.2)	VCA4D study of cassava in the Odzala-Kokoua-Lossi landscape, with weighed yields, conversion coefficients, and losses
1	Sex-disaggregated data for all chains	Gender data mainly national (2014–2015 census); no Congolese chain with sex-disaggregated incomes or employment (Section 3.10)	Sex-disaggregated accounts, labor time, and access to land and credit in every new value chain study
1	Land-use trajectories of cassava and cocoa around protected areas	Environmental dimension the least integrated; plantation history known only for ETIC cocoa (Sections 3.10 and 4.7)	Longitudinal remote sensing indicators and GPS mapping of new plots linked to value chain accounts (Section 4.7)
2	Volumes, margins, and net incomes of safou and beans	Safou chain described qualitatively; bean–safou VCA4D report not accessible (Sections 3.4 and 3.5)	Update the review when the VCA4D report is released; quantify flows and margins by segment
2	Net income from NTFPs	Gross sales and trader margins only; collection costs and labor rarely deducted (Section 3.6)	Collector-level accounts including labor time, transport, and collection costs
2	Representative data on artisanal timber	Latest survey based on 35 operators (Section 3.7)	Stratified random sampling across several supply basins, repeated over time
3	Vegetable farming outside Brazzaville and harmonization of wood-energy studies	Recent data limited to the Brazzaville foodshed; wood-energy studies use different basins and units (Sections 3.7 and 4.2)	Extend surveys to secondary cities; harmonize units and reference years

From this perspective, AGROVAL may serve as a context for applying the approach, but it does not validate the review. Future studies should start from the gaps clearly identified in Table 11, define a testable research question, specify the scale of observation and the necessary indicators, and then assess the costs and feasibility of data collection.

5. Conclusions and Future Perspectives

This review shows that agricultural and forestry value chains in the Republic of the Congo are documented for several products and regions, but with varying degrees of integration. Cassava has the most diverse body of historical data, focused mainly on production, marketing, prices, consumption, and varietal diversity. Recent studies on cocoa, vegetable farming, and wood energy show a shift towards more structured analyses of actors, flows, markets, and economic and environmental performance, and cocoa is now among the best-documented chains, with both national and regional data. By contrast, information on volumes, margins, value added, employment, and environmental externalities remains fragmented for safou, NTFPs, and several other chains. The main finding

is therefore not so much a lack of studies as a fragmentation of knowledge and a limited comparability of results.

This fragmentation stems from differences in periods, regions, units of analysis, definitions, and indicators. Studies document the functions of value chains, revenues, prices, markets, and relationships among actors to varying degrees, while social inclusion, value distribution, and environmental trajectories remain unevenly analyzed. Volumes, margins, revenues, jobs, and value added therefore cannot be aggregated or compared without first harmonizing units, periods, scopes, and methods. The weight of informal activities and intermediaries further complicates the measurement of flows and of the value captured by each actor. Because the protocol was not registered and a large part of the evidence comes from the gray literature, these conclusions describe the state of the available evidence rather than definitive results. The review thus provides a critical mapping of the state of knowledge rather than a consolidated estimate of the performance of value chains at the national level.

For the Odzala-Kokoua-Lossi landscape, these results call for structured comparative analyses rather than the extrapolation of data obtained elsewhere, including in the neighboring ETIC landscape. A VCA4D framework would help harmonize the analysis of value chains and move beyond the juxtaposition of sectoral studies, by integrating their functional, economic, social, and environmental dimensions and documenting actors, flows, costs, margins, revenues, jobs, value distribution, inclusion, and environmental impacts. Future analyses should also harmonize spatial and temporal units and, for value chains in forest landscapes, link economic performance to land-use trajectories and pressure on natural resources, using the longitudinal indicators proposed in Section 4.7 and following the priorities set out in Table 11. VCA4D should thus serve as a common framework for producing comparable, integrated, and territory-specific analyses of Congolese value chains, without being regarded as a guarantee of sustainability. The scientific challenge is to move from scattered knowledge to a structured understanding of the relationships between value chains, local development, inclusion, and the sustainability of forest landscapes.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/conservation6040142/s1, Table S1: Protocol elements actually applied (research questions, databases, eligibility criteria, rules for the gray literature and for grouping publications from the same survey, extraction form, and codebook); Table S2: Search strings for each database, with search dates and numbers of records retrieved; Table S3: Correspondence between grouped publications and original studies; Table S4: Reports that could not be retrieved in full text and reasons; Table S5: Bilingual French–English glossary of key economic and ecological terms.

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Data Availability Statement: The review followed a protocol defined by the authors before screening and is reported in accordance with the PRISMA 2020 and PRISMA-S guidelines. No protocol was registered prospectively. The protocol elements actually applied, the search strings for each database, the correspondence between grouped publications and original studies, the list of reports not retrieved, and the bilingual glossary are provided in Tables S1–S5. The final dataset comprises the empirical studies selected according to the criteria described in Section 2, after grouping publications from the same survey to avoid double counting. The selection, extraction, and synthesis tables, as well as the scripts used for data processing and analysis, will be deposited in a long-term repository associated with the publication, provided that the terms of use of the sources allow it. Documents subject to access restrictions will not be redistributed; their references, metadata, and the information needed to trace the selection process will be documented.

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