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Assessing the Potential for Private Sector Engagement in Integrated Landscape Approaches: Insights from Value-Chain Analyses in Southern Zambia

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Abstract: Agricultural and forested landscapes in Africa are changing rapidly in response to socio-economic and environmental pressures. Integrated landscape approaches provide an opportunity for a more holistic and coordinated resource management strategy through the engagement of multiple stakeholders. Despite their influence as landscape actors, participation of private businesses in such initiatives has thus far been limited. This study focuses on the Kalomo District in southern Zambia, which provides an example of a rural landscape characterized by high levels of poverty, low agricultural productivity, and widespread deforestation and forest degradation. The study applied a value-chain analysis approach to better understand how the production of four locally important commodities (maize, tobacco, cattle, and charcoal) impacts land use, local livelihoods, and environmental objectives in this landscape, focusing on the role and influence of private sector actors. Data were collected through focus group discussions and key informant semi-structured interviews. Qualitative content analysis was employed to analyze the data and contextualize the findings. Results indicate three key potential entry points for increased private sector engagement: (1) improving water security for smallholders; (2) empowering small and medium-sized enterprises (SMEs) as private sector actors; and (3) collective planning for sustainable landscape activities with deliberate measures to involve private sector actors. We discuss options for optimizing benefits from the identified entry points.

Keywords: integrated landscape approaches; value-chain analysis; private sector; deforestation; Kalomo; Zambia

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1. Introduction

Agricultural land expansion has been identified as a key driver of tropical deforestation, accounting for 55–80% of deforestation globally [1,2]. In Africa, agricultural commodity production has a considerable social and economic footprint [3,4], and agricultural expansion is the primary driver of forest loss, responsible for 92% of deforestation [5]. The influence and impacts of agriculture and commodity production in Africa represent a clear conflict of interest for stakeholders, land-use allocation, and biodiversity. Many countries are faced with attempting to balance economic development (often through improved

agricultural performance), biodiversity, and climate commitments (that demand a reduced impact of agriculture on biodiverse ecosystems) while supporting human livelihoods and societal well-being.

Population growth on the continent, coupled with rising incomes, has led to increased demand for agricultural products. Given the low agricultural productivity, mainly due to the limited adoption of improved technologies and practices, agricultural land expansion is increasingly considered an option to increase agricultural production and respond to rising agricultural commodity demand. In Africa, recent research shows that the bulk of agricultural production increase observed is driven by land expansion rather than productivity growth [6]. Notwithstanding the low productivity, the agricultural sector remains the main employer in Africa, with well over half of the population employed in the sector, and yet food security remains a pressing developmental challenge.

Acknowledging the interconnectedness of the challenges facing landscapes undergoing rapid change, many global policy initiatives (for example, the United Nations conventions on biodiversity (UNCBD), climate change (UNFCCC), and sustainable development (UNSDGs)) now recognize a need for a more holistic, integrated approach to landscape management, i.e., [7]. As such, funding agencies have increased commitments toward integrated conservation and development approaches [8,9], and international conservation and development organizations and national governments are beginning to advocate and implement integrated landscape approaches (ILAs) that facilitate dialogue between multiple stakeholders to reconcile competing objectives at the landscape scale. Recently, there has been increasing interest from private sector actors and/or actor coalitions in engaging in or leading landscape or jurisdictional initiatives that seek to (potentially amongst other objectives) 'green' commodity supply chains [10–12].

The subsequent proliferation of ILAs has been considerable, e.g., [13–18]. However, research has shown that private sector engagement in ILAs remains very much the exception rather than the norm [19–22], despite the potential where global value chains intersect with production landscapes [11,23–26]. Hence, there are increasing calls for greater engagement of the private sector and recognition that doing so can help overcome some of the challenges associated with operationalizing ILAs. However, some key questions remain; for example, is there potential to align private sector objectives with ILA principles or those of other landscape stakeholders? Do government agencies fully understand the role and capacity of the private sector within their territories, and likewise, is the private sector aware of government-led or aligned conservation and/or development policies or initiatives? Are proponents of ILAs actively engaging with relevant private sector actors?

This study aims to contribute to the emerging evidence base on private sector involvement in ILAs by addressing the primary research question of "*What potential exists for meaningful engagement of the private sector within integrated landscape approaches?*". The paper seeks to better understand how commodity production impacts land use, local livelihoods, and environmental objectives in the Kalomo landscape of southern Zambia, focusing on the role and influence of private sector actors. Ultimately, the goal is to identify appropriate entry points for an ILA to enhance value chain sustainability through increased engagement with the private sector. In [27], the authors defined the identification of "*common concern entry points*" as one of the 10 principles for integrated landscape approaches, whereas [23] emphasized the importance of local embeddedness of such entry points. This paper particularly focuses on the latter, recognizing that ILAs will likely only succeed if local actors have an interest in the initiative and are willing to support it.

This study was conducted as a component of the broader COLANDS Zambia initiative (*Collaborating to Operationalize Landscape Approaches for Nature, Development and Sustainability*), implemented by the Center for International Forestry Research (CIFOR) in partnership with the Forestry Department and the Community Based Natural Resources Management Forum (CBNRMF). Through the design and testing of ILAs, COLANDS will influence the effective implementation of local, national, and global policies that leverage positive change in the sustainable supply of forest-related goods and services in line with nationally defined priorities.

One of the targets is to secure 300,000 ha of land under sustainable management across the three project countries of Ghana, Indonesia, and Zambia, 100,000 ha of which is in Kalomo, Zambia.

1.1. The Concept of Integrated Landscape Approaches

Integrated landscape approaches are attempts to improve the use and governance of land and natural resources at the landscape scale through the iterative engagement of multiple stakeholders. While there is no agreed definition for ILAs [27], there has been considerable discussion over the constituent components of the concept. For example, the term 'landscape' is certainly open to interpretation [28], but it is increasingly considered to be a spatial scale of some degree at which socio-economic, cultural, and environmental issues intersect and, therefore, provides a workable unit for intervention, management, and analysis [29–32]. Despite the relative ambiguity of landscape, the European Landscape Convention has provided a reasonably useful and now widely applied definition that considers a landscape to be "part of the land, as perceived by local people or visitors, which evolves through time as a result of being acted upon by natural forces and human beings". Therefore, landscapes are social-ecological systems of varying sizes that are complex, dynamic, susceptible to stochastic change, and inherently context-specific [33].

It, therefore, follows that while there is no correct or ideal scale for an ILA [34], they are typically implemented at a scale of over 10,000 hectares, contain a mosaic of land uses and land-cover types, and often correspond with an administrative or biophysical boundary. Such approaches aim to reconcile local socio-cultural, national economic, and global environmental commitments by identifying common concerns and synergies between actors operating within (and beyond) the landscape of concern [27]. This requires taking a holistic perspective, considering the landscape system as a whole, and building an understanding of how it is impacted and affected by the various capital components (i.e., natural, social, cultural, economic, political) that encompass both fast and slow drivers of landscape change [35,36]. Such an approach contrasts with the recently dominant colonial approach to land management that aims to separate people and nature in pursuit of optimizing outputs on discrete land units [37]. While such sectorial approaches have received significant support, particularly for their supposed biodiversity conservation benefits, they are increasingly criticized given their apparent failure to address system dynamics and trade-offs and potential to inflict human rights abuses on local and indigenous communities [37–39]. By adopting a systems approach rather than a sectorial approach, it is anticipated that enhanced stakeholder dialogue and negotiation can help build trust, respect, and enhance cooperation for a future landscape that is more resilient, equitable, and sustainable—that is, "landscapes that work for both people and nature", see [40–43].

ILAs must be highly contextualized in order to confront specific place-based challenges [23]. Therefore, they take various forms with varying degrees of integration [44] and are—perhaps therefore—variably described [45]. Nevertheless, scholars suggest that ILAs typically share certain key characteristics. They are fundamentally strategies that attempt to enhance landscape governance and are therefore concerned with interactions of people, power, and politics across multiple scales of influence [21,46–48]. For example, ILAs tend to have multiple objectives and lean towards enhancing landscape multifunctionality through regular stakeholder engagement, often through a dedicated multi-stakeholder platform [49–52]. By spanning sectorial and governance levels, ILAs also aim to be more inclusive with an emphasis on collective action, participatory monitoring, and regular reflection of progress and continual learning through the application of adaptive co-management [27,49,53].

As sectorial approaches are increasingly deemed insufficient to address interconnected social-ecological challenges, more holistic approaches such as ILAs have gained prominence in landscape research, policy, and practice. In recent years there has also been increasing interest from conservation organizations to engage the private sector in ILAs and—albeit slightly less evident—the enthusiasm from the private sector to indeed engage [16,22,54,55].

However, ILAs remain beset by several challenges that have hindered their application and evaluation. These include a lack of engagement of key stakeholders, poor coordination, power differentials, and limited financial resources, among others [21,22,55,56]. Due to the extent of its operations and wealth of resources, the private sector is often a major influence in tropical landscapes with the potential to significantly contribute to overcoming (or further obstructing) the above challenges.

1.2. Private Sector Engagement at the Landscape-Scale

The private sector often exercises a major influence on land use, livelihoods, and ecosystems in production landscapes [57,58]. Companies are increasingly cognizant of the global issues related to food production, global warming, and ecological degradation [57], as well as potential local-level operational risks related to water and communities, among others [59]. Nevertheless, effective engagement of companies as landscape partners in many parts of the world has so far been insignificant [13,14,16]. In Africa, [60] found that private agribusiness partners were represented in only 8% of ongoing integrated landscape initiatives.

The business sector is becoming increasingly conscious of the fact that to effectively address such complex risks, it may need to explore cooperation beyond the scope of an individual farm or supply chain [58,59]. Company landscape decisions are influenced by anticipated cost reductions and mitigated risks, the abundance of the concerned natural resource and related competition, and the importance of the continued supply of ecosystem services for their operations [59].

The central challenge of involving business actors in landscape management revolves around the fact that companies need to produce a return on investment in the short to medium term [61], whereas it can take 10–20 years for investments in degraded landscapes to start generating financial profit [62]. From the perspective of company balance sheets, it is difficult to assess the value of social and environmental benefits stemming from landscape investments [62], measure the landscape risks, or calculate the overall monetary benefits of joining a landscape partnership, which is typically more than just the sum of avoided costs [59].

The need for a compelling business case is equally important for small and large private actors when considering joining a landscape partnership [57], and the specific type and nature of the commercial activity can dictate a company's appropriate entry point [58]. However, financially attractive opportunities around landscape activities may be challenging to construct, while company commitment also depends on an enabling legal, policy, and institutional environment [57,62].

Other common obstacles from the companies' side to participating in landscape activities include a lack of in-depth understanding of the inter-connections between commercial operations and natural resources [62], inadequate employee skills to manage such landscape-level risks [59], difficulties in making commitments with potential implications on internal business decisions, time and resource limitations, as well as anticipated risks related to data sharing and progress monitoring [63]. Equally, landscape managers may find it difficult to mitigate power imbalances or lack skills in business-style communication, further hampering effective business engagement [57].

Benefits of engagement for the private sector in ILAs include [21,22,64–66]:

- Engaging with a wider set of stakeholders. Fulfilling sustainable sourcing commitments might require a broader coalition of actors, e.g., government, local producers, NGOs, CSOs, etc. Exposure to these wider stakeholders may also reveal potentially advantageous future collaborations.
- Involving local partners. Local people and communities can help ensure effective and equitable land allocation and conservation benefits.
- Sharing costs and access to public and private investment (beyond site level).
- Securing supply chains through protection/enhancement of natural ecosystems/ecosystem services and reducing risks (reputational, operational, ecosystem) within sourcing and production areas.
- Avoiding/resolving land conflicts.

- Helping to protect human rights and overcome gender, class, and other inequalities/inequities.

Despite some encouraging evidence elsewhere, see, e.g., [23], the COLANDS team has experienced limited interest from the private sector's side in sustainable landscape management in the project countries, some even considering such objectives as conflicting with their commercial operations [67]. In fact, low participation of the private sector in resource management is considered among the key constraints to operationalizing such landscape approaches in the Kalomo District [68]. Currently, even businesses with significant environmental impact, such as the tobacco sector, are absent from landscape dialogues [68].

2. Materials and Methods

2.1. The Study Site

This study was conducted in the Kalomo District, located in Zambia's Southern Province (see Figure 1). Zambia is a landlocked country in southern Africa, with a total land mass of 752,610 km^2, of which 32.1% is agricultural land [69] and about 66% forest cover, of which about 9% is state land [70]. Zambia is divided into 10 provinces which are subsequently divided into districts. The Southern Province is one of Zambia's key agricultural production regions, with crops such as maize, tobacco, cotton, and groundnut among the key products. The Southern Province is ranked number one in terms of cattle and goat production, contributing about 35% and 36% to the national cattle and goat population, respectively [71]. Kalomo is among the largest districts in the province, covering 8374 km^2 of land [72]. The district is representative of typical agricultural-dependent districts in Zambia, characterized by high rates of poverty and food insecurity coupled with low productivity, unsustainable natural resource use, and poor natural resource governance [73]. While agricultural commodity production has traditionally been, and remains, at the smallholder scale, as elsewhere on the continent, the extent of private sector activities is increasing.

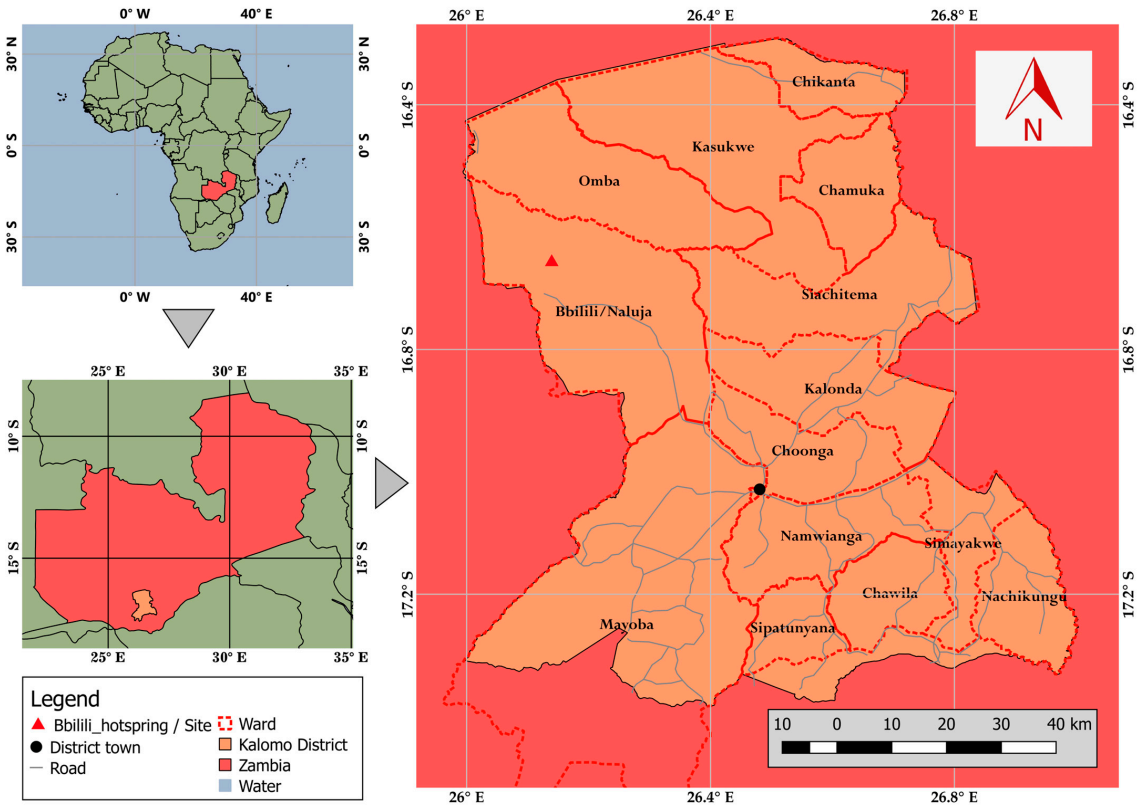

Figure 1. Location and administrative map of the Kalomo District in the Southern Province of Zambia (Source: Prepared by Bravedo M. Mwaanga/CIFOR).

Known as the "*Land of Maize and Cattle*" [73], the local economy of the Kalomo District relies strongly on agriculture, with key crops including maize, sorghum, groundnuts, millet, cotton, and tobacco [74]. The rapidly growing population and persistent poverty have increasingly put pressure on forests and land over time, and, for example, the Kalomo Hills Local Forest Reserve (KFR) has suffered from significant deforestation and degradation due to expanding cultivation of crops [73].

The Kalomo District is also referred to as the "*Farmer's Nest*" because of the commercial, medium- to small-scale livestock and crop farming enterprises that exist there. Sales of crops, livestock and fisheries products, as well as fruits and vegetables, contribute about 50% of local household incomes, with contributions of 34.4%, 9%, and 7.8% from crops, livestock and fisheries, and fruits and vegetables, respectively. Alternative incomes come from the collection of natural products (wild fruits, mushrooms, and honey) and the sale of fuelwood, charcoal, and handicrafts [73,74]. Livestock production consists of traditional (Indigenous) (50%) and commercial (50%) methods, with a total population of 411,765 animals [73]. This population gives a cattle/capita ratio of 0.44. Besides cattle, the rearing of goats, sheep, poultry, and pigs is also commonplace [73,75].

Crop production in the district is carried out at the subsistence level, complemented by limited semi-commercial and commercial farming. Maize is the primary staple crop and occupies 61% of the cultivated area. Both landraces and hybrid maize varieties are cultivated. The distribution of land area among crops in the district is Indigenous maize varieties (25%), groundnuts (26%), and hybrid maize (30%) [74]. Due to climate change, erratic rainfall, and issues pertaining to the procurement of inputs, a general decline in maize production has been noted in the district from 2009 to 2018. The average cropped area is about 3 ha per household. Gender plays a critical role in food production in the Kalomo landscape. In general, 1 ha of land supports, on average, two individuals, with female-headed households having smaller farm sizes of 3–5 ha of land. About 66% of men have access to land that is more than 5 ha [74]. This social order has implications for the implementation of ILAs in terms of participation and decision-making.

The Kalomo District was considered relevant for the private sector study on the basis that it had already been included as a COLANDS project landscape due to six key factors that resonate well with the salient principles of landscape approaches upon which the COLANDS initiative is based. The factors are landscape heterogeneity and dynamics, multiple stakeholders and platforms, history of engagement with landscape approaches, internal and external drivers of change, accessibility (security, logistics), as well as enabling conditions and applicability for scaling up. The social and biophysical diversity of a landscape is shaped by its history, migration, and ethnic composition and by physical and cultural attributes. These landscape elements influence social practices, and, in some cases, they form the basis for an assortment of actions by different livelihood sectors, including private. The mix of state and non-state actors within Kalomo dealing with forest, agriculture, and water landscape elements accords private sector entities space to leverage their investment, including in maize, tobacco, cattle, and charcoal commodity value chains. Kalomo District has a history of implementing policy interventions in these sub-sector value chains. The features of Kalomo proffer useful opportunities for the COLANDS initiative and, therefore, the private sector commodity value chain study.

Current environmental, socio-economic, and institutional contexts drive landscape evolution and dynamics in the district. Among the most prominent drivers of landscape change are population growth, agricultural expansion, declining land quality, widespread deforestation, and climate change. Examining these drivers and their contribution to the adoption of ILAs through the lens of the private sector in Kalomo provides an immense opportunity to reflect on the potential entry points for holistic landscape governance. Furthermore, invitingly, rural areas in Kalomo District are both socially and physically accessible throughout the year, which has made it possible for commodity chains such as the ones mapped in this study to flourish. The expected key constraint in executing the COLANDS initiative hinges on weak institutional coordination within and among the

actors. Several lessons from past integrated interventions are good to include in the interrogation of the applicability of ILAs principles as these could provide a robust framework for assessing ILAs scaling-up options that are sensitive to private sector involvement [73].

2.2. The Rationale for a Value-Chain Approach

A value chain, in general, depicts the various actors and activities on an input–output pathway needed to deliver a product or service from its inception to the end consumer [76]. The widely accepted global value-chain approach has traditionally focused on understanding the functional aspects and dynamics of a commodity chain, including the types of different actors, their positioning and connections, and where and how value is created along the chain [76–78]. This type of analysis, however, has usually been conducted in isolation of any social and environmental aspects closely interlinked with value-chain operations [77].

One of the key aspects of understanding the contextual dynamics of a commodity chain is to analyze the different stakeholders and their respective roles [76]. Agriculture is a sector dominated by private actors, with individuals and companies operating at different geographic scales [79]. The commodity chains for staple food crops, such as maize, cassava, and rice, tend to be complex with various small operators involved, whereas production of cash crops, like coffee or cotton, follows more organized structures, such as out-grower schemes [80]. In agricultural value chains, the upstream segment of a chain refers to, for example, a farmer acquiring production inputs, whereas the downstream chain comprises the markets where the final product is sold [81].

A value-chain analysis was deemed an appropriate method for data collection in this study considering the central role of agricultural commodity production in the Kalomo District, the initially limited amount of detailed information available on the local value chains and their functioning, as well as the presumably broad spectrum of various private sector actors operating in the Kalomo commodity sectors. By analyzing the functioning and the context of the selected value chains and mapping the different private entities, our aim was to identify new entry points for ILAs to engage the private sector more effectively for improved resource management and reduced deforestation in the Kalomo District.

2.3. Overall Research Structure

Research on value chains can take many forms, and a single approach applicable across different contexts does not exist [81]. We applied the stepwise but adjustable framework developed by [82] on value-chain research, focusing on Steps 1–5 (see Table 1), also drawing on the more detailed practical-level guidance document [83]. The framework is based on the concept developed by [77] to better incorporate the horizontal thematic aspects related to poverty, gender, labor, and environment into a value-chain analysis. To illustrate the value-chain maps in Step 4, we applied the canvas model by [81] (see Figure 2).

2.3.1. Identifying the Study Design, Commodities, Target Groups, and Thematic Issues (Steps 1–3)

The first steps in the value-chain research involve preliminary problem analysis and selecting the value chains, the geographic location, the local target groups, and the central horizontal themes for the specific study [82,83].

The way local resources are used for primary commodity production impacts the environment, especially through land-use change, which can alter the provision of ecosystem services and the environmental quality of the greater landscape [77]. The loss and degradation of forests in the Kalomo District are among the most acute land-use issues identified by local stakeholders during COLANDS consultations in February 2020 [84]. Between 1984 and 2018, the KFR lost 68.9% of its original tree cover at an annual rate of 2%, from 120,343 hectares down to 37,459 hectares [85]. Deforestation in the Kalomo District is a sum of various socio-economic and governance factors, such as rapid population growth coupled with heavy economic dependence on agriculture and depleting soil fertility, subse-

quently leading to the expansion of agricultural land in the absence of adequate monitoring and planning [85].

Table 1. The seven steps to design and implement research in value chains [82].

Action Research Step	Main Components of Step
1. Choice of overall research design	• Identify major issues to be addressed • Choose value-chain type and geographical focus
2. Identification and engagement of the target group (setting boundaries of the research)	• Define and select the target group • Identify local organizations with which to work • Agree on action research process and define roles and responsibilities • Agree on level of ambition and timeframe • Consider local 'political' issues arising from choice of target group and how to deal with them
3. Address poverty, gender, labor and environmental issues (horizontal aspects of chain)	• Conduct participatory and 'gendered' problem identification and prioritization • Place the prioritized problems in the broader value-chain context
4. Conduct value-chain analysis (vertical aspects of chain)	• Analyze and map the value chain • Identify the position of the target group within the chain • Identify the performance requirements, risks and rewards experienced by the target group • Quantify key elements of the value chain in each relevant node (including assessment of the target group's competitiveness) • Relate the problems identified in Step 3 to the detailed value-chain analysis. Then eliminate problems that cannot be addressed through a value-chain approach and prioritize problems to address
5. Choice of upgrading strategy	• Formulate promising upgrading strategies for *ex-ante* evaluation and select one 'best bet' strategy • Identify promising 'action points' where change can be stimulated • Establish a baseline for *ex-post* evaluation of the action research
6. Implementation of research and action (support activities)	• Develop a concrete plan of action • Implement research and strategy through support activities such as: collecting and analyzing data, building competences, mobilizing political and economic resources, organizing and creating alliances • Collect, analyze and disseminate information (research and documentation)
7. Evaluation and adjustment (or exit)	• Evaluate the results of the action research (*ex-post*). Distinguish between 'horizontal' impacts and immediate outcomes • Formulate new/adjusted strategy and start new cycle of action research, or end the action research (exit)

The commercial commodities selected for the study are maize, cattle, tobacco, and charcoal. As mentioned, maize and cattle reflect the central role of farming in the district [73]. The Virginia variety of tobacco is a controversial cash crop associated with deforestation [85], with production concentrated in the chiefdom of Siachitema [84]. Charcoal, on the other hand, is a relatively newly introduced but increasingly important commodity produced in the KFR [84,85].

This study focuses especially on the role and influence of the private sector in local commodity production and the associated deforestation and forest degradation or reconfiguration. The private sector can encompass a large variety of actors, from small-scale agents to national and global corporations [57], but thus far, the COLANDS initiative does not employ any single definition. In fact, the difference between small-scale and commercial production in the Kalomo District is often very subtle, and value chains are heavily influenced by smaller, informal private actors [86].

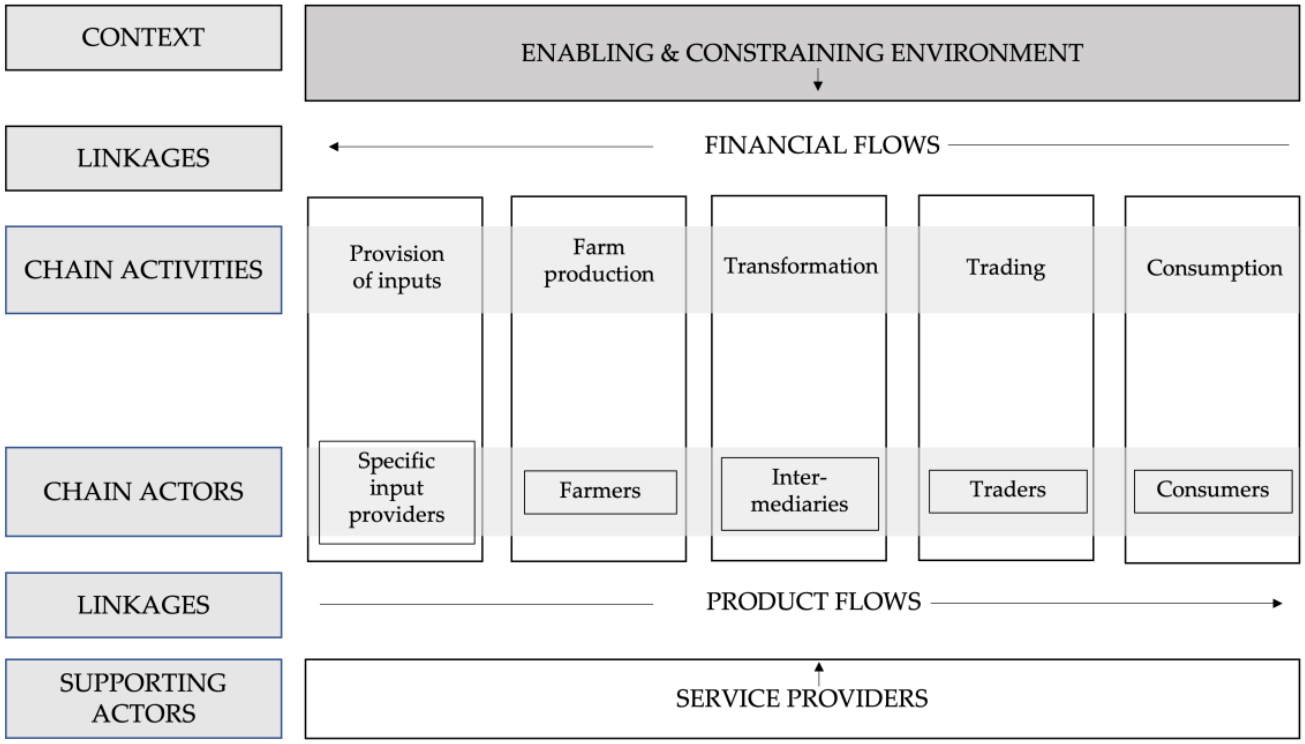

Figure 2. The structure of a value-chain mapping canvas [81].

2.3.2. Data Collection and Value-Chain Analysis (Step 4)

Step 4 of the value-chain research framework involves collecting data and analyzing and mapping the vertical value-chain structure and functioning but also relating the selected horizontal themes to the overall context [82,83].

The data for this study were collected using qualitative methods involving semi-structured key informant interviews and focus group discussions in the Kalomo District. Interviewing stakeholders familiar with the local circumstances is particularly useful in identifying context-specific features of value chains [81]. Semi-structured interviews are flexible and allow for interesting points and perspectives not necessarily considered initially by the interviewer to emerge [87].

Drawing from the example questions and overall guidance by [81,83], an interview guide was developed to formulate the broader questions and topics to be covered in each interview, see [87]. The interview guide is provided in Supplementary Materials (Document S1). In addition to the value chains' structure and environmental impacts, the questions also covered aspects related to the local institutional, economic, and environmental context that can impact value-chain operations, following the recommended approach by [77,81]. The guide also included some close-ended quantifiable questions to indicate costs, prices, and production volumes, for example. The data collection tools were reviewed with input from local researchers in Zambia to ensure the questions were tailored for each value-chain actor category.

In addition to the larger COLANDS initiative receiving an ethical clearance, the research team obtained informed consent from participants by first explaining to all interviewees the purpose of the study and only proceeding with the interviews after participants indicated their willingness to participate. This was in addition to the overall socialization of the project to stakeholders in project inception and launch events. Socialization had been undertaken at village and chiefdom levels to explain the aims of the project and how the landscape actors in these areas were expected to participate and co-benefit from the COLANDS initiative.

The interviews in Kalomo were conducted from 5 to 12 January 2022, with two additional interviews held in Lusaka later that month. A total of 19 face-to-face interviews were conducted with different government agencies, private companies, and farmers (more information on the interviewed stakeholders is provided in Supplementary Materials, Table S1). A total of 3 focus group discussions were organized, each group comprising 4–10 selected farmers and producers, with the target of a 50/50 gender ratio. The focus group discussions with farmers helped identify key upstream and downstream value-chain actors and thus guided the purposive sampling of other actors to be interviewed. A minimum of two interviews were held per value chain. Out of the 19 interviews, 15 were transcribed, while field notes were relied upon to capture information from 4 interviews because the audio recordings were not audible or the files were corrupted. The data for this study will be made available through the CIFOR data repository.

Based on the interview data, narrative descriptions and value chain maps following the canvas model shown in Figure 2 were constructed (see Section 3.1).

2.3.3. Data Analysis to Formulate Entry Points and Strategies (Step 5)

This step involves the identification and development of a potential strategy for improved value-chain performance with regard to the selected horizontal topics [82,83].

Several authors describe content analysis as a common methodology for qualitative data analysis, see, e.g., [88–90]. The purpose of such analysis is to reduce the initial amount of textual data and help categorize them in a way that enables building understanding and meaning around the topic [90]. In principle, the researcher reads through transcripts to collect examples from the data that represent the identified themes [89].

In this study, we applied a modified methodology using deductive coding based on a predetermined structure [89]. A manifest analysis approach was taken to reflect the literal meaning of the information as expressed by the interviewees [90]. As advised by [91], MS Excel and MS Word files were used to support the manual data structuring and analysis.

As the first step, all transcripts were copy–pasted in full from MS Word sheets to a clean MS Excel sheet. As most interviews focused on a single commodity, interview data on each commodity was pasted on a separate MS Excel tab to help create individual data files for each of the four value chains. The interviews that covered more than one commodity were pasted on a separate tab for further subdivision by commodity, together with the identification of general aspects cutting across all value chains.

Next, the interview guide was used to help with the initial coding of the data. In the guide, the interview questions were broadly divided into three groups describing the (1) value chain's structure, (2) the general context and power relations, and (3) environmental impacts and drivers. Using these three categories as broad deductive codes, all relevant responses were marked and highlighted in the MS Excel sheets with three different colors, respectively. After reviewing all interview responses, the marked text was copy–pasted back to clean MS Word sheets, a separate file for each commodity, and text grouped as per the three categories.

Based on these "zero draft" descriptions, further summarizing notes and sketches evolved iteratively to develop the value-chain descriptions and maps, and especially to help identify emerging themes where the three elements of deforestation, ILA, and potential private sector involvement converged in a practical and relevant way. In addition to the transcripts, the field researcher's report containing additional information based on field observations and interviews was also used to complement the findings.

3. Results

3.1. Value-Chain Descriptions and Maps (Step 4)

3.1.1. Maize

Based on the study findings, the maize value chain in Kalomo largely resembles a typical Zambian chain, as described by [92]. Small-scale farmers are the principal producers who buy farming inputs, such as seeds, fertilizers, and other agrochemicals, from local

agro-dealers, who may also provide transport services and share information with farmers. The Farmer Input Support Program (FISP), through which the government supplies smallholders with subsidized inputs [92], is also present but provides limited input services in the Kalomo District.

Farmers sell their produce to the government-run Food Reserve Agency (FRA), aggregators, or local private buyers (briefcase buyers), who further supply milling companies. In addition to milling and trading companies and export markets, FRA also supplies maize to the public sector, including hospitals and schools. At the downstream of the chain are the various maize processors who supply consumers through wholesalers and retailers.

Like elsewhere in Zambia, maize production in the Kalomo District is almost entirely rain-fed and characterized by credit and market access challenges. Other issues include low profitability due to high production costs and low selling prices and poor agronomic practices due to limited access to extension services, among others. The sector also strongly focuses on primary production with little local processing capacity available.

> *"The problem is that prices in rural areas are always low despite the amount of money we put in maintaining our products. We always make a loss".* (Focus group discussion, January 2022, Kalomo District)

According to the respondents, the main environmental impacts related to maize farming are deforestation caused by the expansion of cultivated land area and soil degradation due to plowing and the use of agrochemicals. Farming maize is, in fact, the most important activity causing deforestation in the KFR [84,85]. Forest removal is motivated by the creation of new crop fields, efforts to compensate for decreased soil fertility, as well as the acquisition of land-use rights [85]. The maize value chain and context are summarized in Figure 3.

3.1.2. Tobacco

Tobacco farmers in Kalomo are predominantly contracted smallholders, in addition to independent smallholders and some commercial farmers. The sponsored contract farmers who qualify based on specific company requirements become part of the highly organized out-grower schemes, in which the major tobacco merchant companies in the province (Tombwe Processing Limited, Alliance One Zambia) provide inputs and organize the tobacco sales in Lusaka. There are strict quality requirements that determine the price. After grading the produce, farmers receive their payments through account deposits, with inputs and other charges deducted from the final price.

> *"It's easy to access inputs through loans. Let me just say that there is a lot of support in tobacco. And it's also highly profitable".* (Focus group discussion, January 2022, Kalomo District)

Another key actor is the Tobacco Board of Zambia (TBZ) which controls and regulates the sector, registers all producers, issues transport permits, and monitors environmental impacts. Together with the Tobacco Association of Zambia, they specify the price, weight, and quality of tobacco. The main tobacco variety cultivated in Kalomo is the fire-cured Virginia [85].

Many interview respondents perceived tobacco farming as highly damaging to the environment because of the need for firewood used in curing, with some considering it more destructive than charcoal production. As a result, some residents call for tighter controls on tobacco production. The main drivers of deforestation are the initial clearing of land for planting and cutting down trees for the curing process, see also [85], while other negative impacts include the loss of soil health due to monocropping and the removal of plant stumps after harvesting. The tobacco value chain and context are summarized in Figure 4.

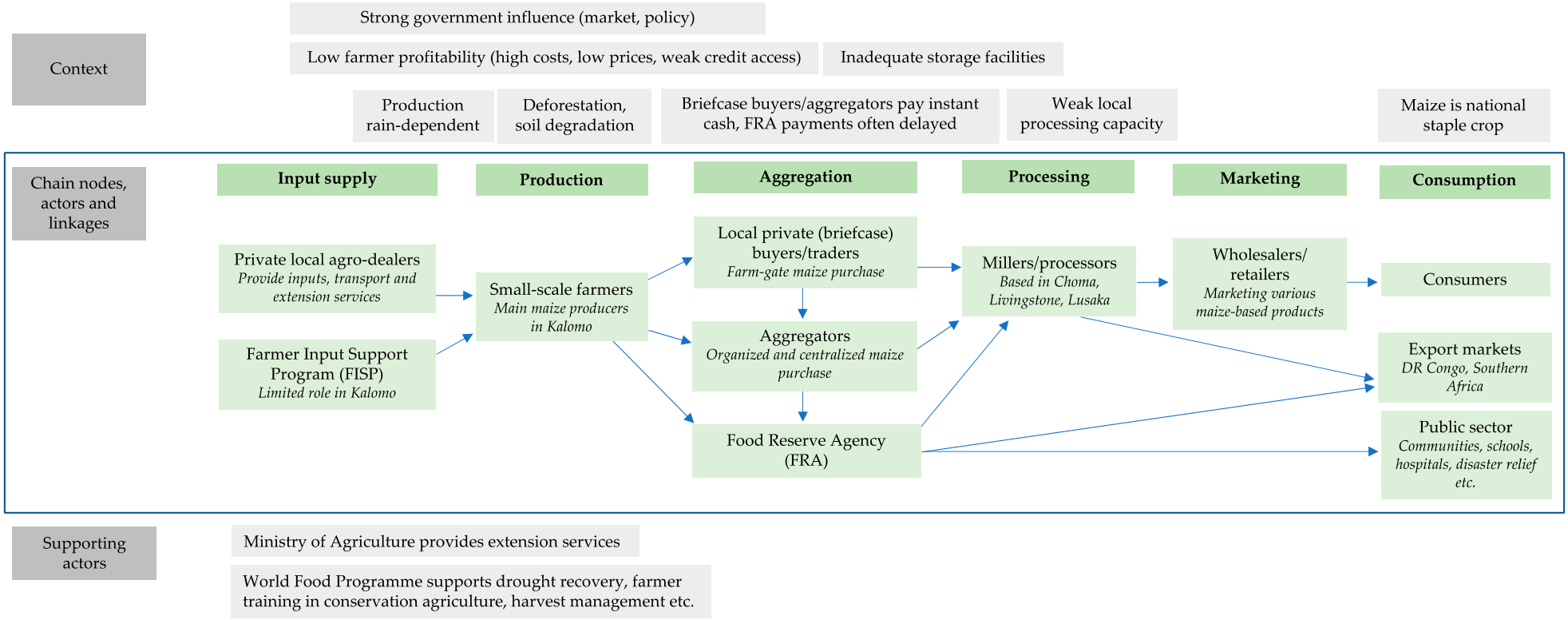

Figure 3. Maize value chain and context in Kalomo District (Source: Authors' construct based on field research data).

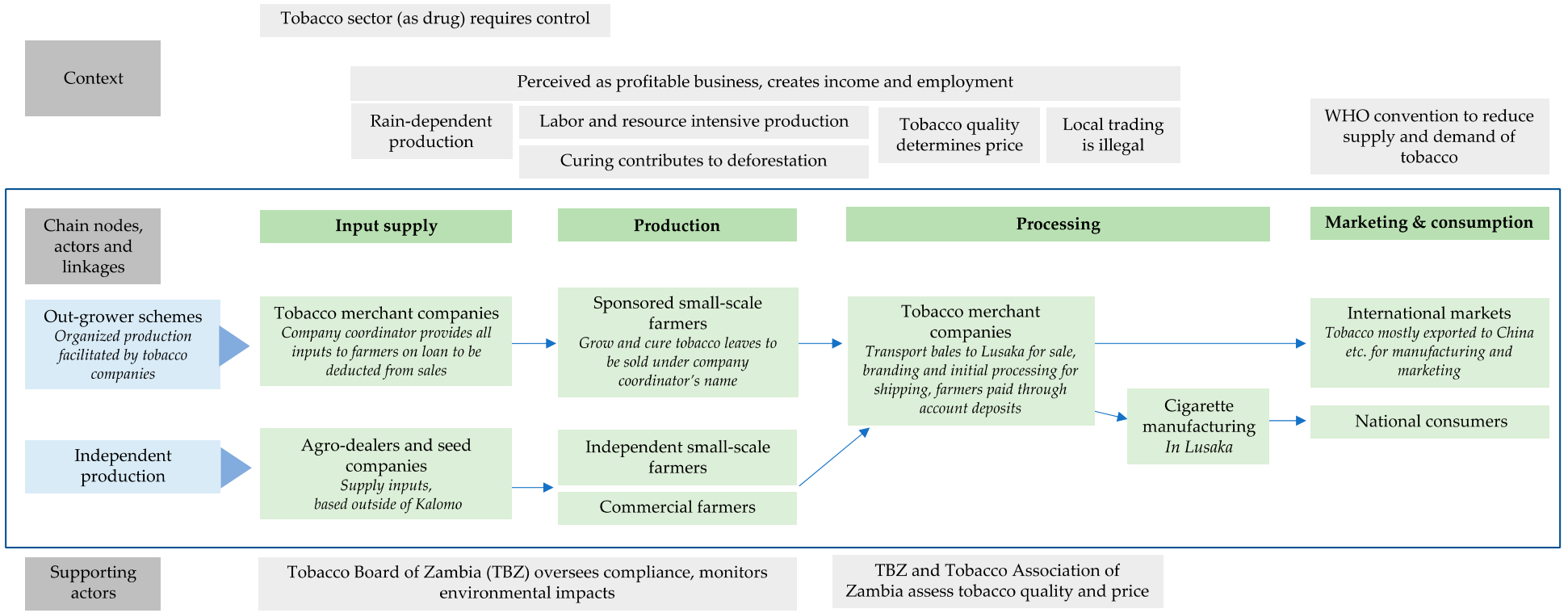

Figure 4. Tobacco value chain and context in Kalomo District (Source: Authors' construct based on field research data).

3.1.3. Cattle

Owning cattle is highly traditional for Kalomo communities; they are mainly used as draft animals in farming or for other traditional purposes such as payments for marriage, school fees, etc. Should a farmer decide to sell an animal, the buyers are often local traders/off-takers from the town of Kalomo, with middlemen or other agents connecting the two. There are a few commercial cattle farmers in the district. There is also one abattoir (slaughterhouse) in Kalomo town, namely Agro-Support Abattoir. In addition, beef supply companies buy animals from farmers to further supply butcheries and supermarkets or for export. A leather exporting industry is run in the Kalomo District by Somali traders who supply leather mainly as a protein supplement to West Africa.

On the government side, the Ministry of Fisheries and Livestock, the Ministry of Health, and the Ministry of Local Government and Rural Development together monitor animal health, abattoir processing conditions, meat quality, and zoonotic diseases. The Ministry of Fisheries and Livestock also provides cattle farmers with dipping chemicals and medicines for disease control.

Similar to maize production, access to credit for cattle farmers is limited, presenting a major challenge for enterprise growth. Furthermore, cattle farmers have low bargaining power and thus are price takers, usually offered lower prices, further limiting their enterprise growth potential. The high prevalence of animal diseases, such as Foot and Mouth disease, is a major challenge, exacerbated by inadequate or inappropriate veterinary services and disease control. The poor animal health services provision in the district has negative effects on cattle productivity.

> *"Of late, there have been a lot of cattle diseases that have led to many animals dying (Foot and mouth). We also lack dip tanks and places where animals can drink clean water from".* (Focus group discussion, January 2022, Kalomo District)

Cattle herding appears less directly associated with deforestation but instead is facing grazing land conflicts due to human population growth, reduced biodiversity in grazing areas, and contamination of water bodies shared with humans. Climate change impacts are felt in the sector through droughts, which reduce water availability and pasture for animals, and floods, which reduce pasture availability due to flooding of grazing lands. The cattle value chain and context are summarized in Figure 5.

3.1.4. Charcoal

Charcoal is produced by community members who bring it to the market in Kalomo town either themselves or through transporters. Alternatively, buyers come to collect it from villages. Driven by urban markets, buyers typically come from the towns and cities of Kalomo, Choma, Livingstone, Itezhi Tezhi, or as far as Lusaka, the capital city. There is a popular belief among the locals that charcoal is their own version of Automated Teller Machines, or ATMs [93].

The Department of Forestry is responsible for issuing production and conveyance permits to producers and transporters, respectively, but non-compliance is common, and the high fee levels have not discouraged production. The department also seeks to inform community members about more sustainable production practices, but this appears not to reach all producers. Worse, they are rarely heeded when they do reach the actors along the value chain.

Charcoal production directly causes forest degradation and deforestation, but whether the diminishing tree stocks already affect production is not clear. Other negative impacts are the drying up and siltation of water bodies, land degradation, greenhouse gas emissions during production, and direct health risks to producers. Some chiefdoms discourage production, but rather than being a respected livelihood, many engage in charcoal manufacturing strictly out of economic necessity to compensate for lost farming income or in the absence of viable options.

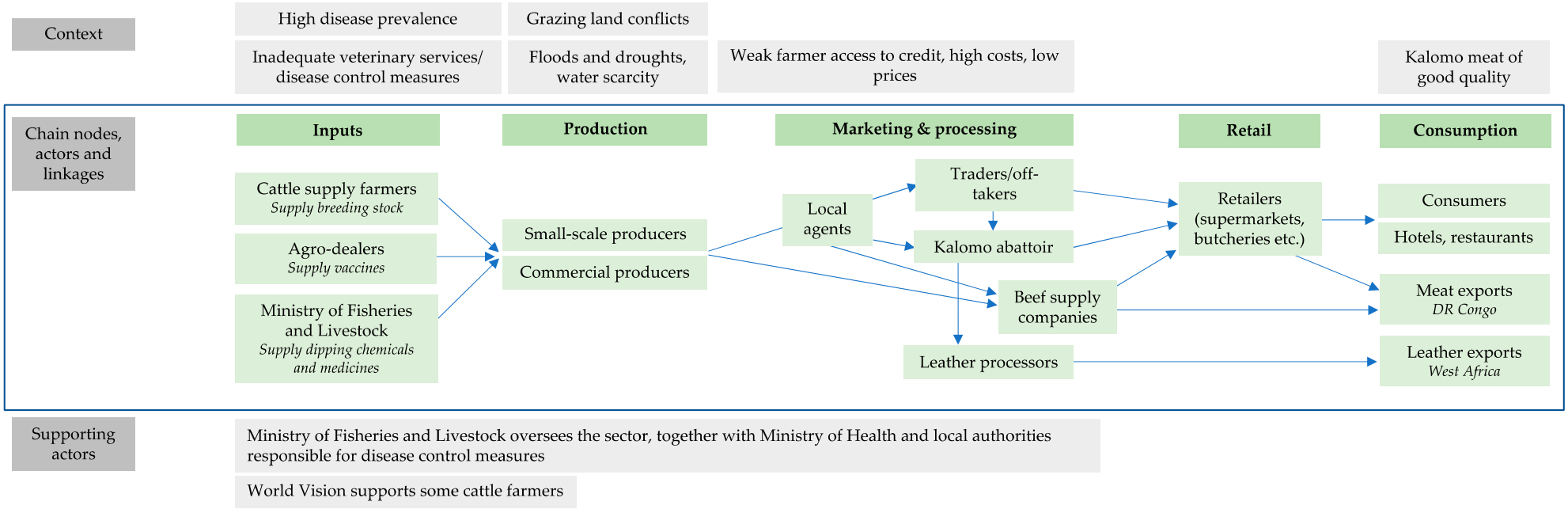

Figure 5. Cattle value chain and context in Kalomo District (Source: Authors' construct based on field research data).

> *"It's financial constraints we go through. For example, we need to pay school fees for our children and meet other family needs. So charcoal production helps us to meet some of our family needs".* (Focus group discussion, January 2022, Kalomo District)

The charcoal value chain and context are illustrated in Figure 6.

3.2. Potential Entry Points for Implementing Landscape Approaches (Step 5)

3.2.1. Entry Point 1: Improving Water Security for Smallholders

In the interview responses, water scarcity was a recurring theme as a major constraint to smallholder farming, also mentioned among the key land-use issues in the study by [84]. Improving water management in the Kalomo District, therefore, provides a potential entry point for an ILA to partner with agribusiness companies.

Kalomo is a naturally arid area where climate change impacts are increasingly felt, mainly through droughts and occasional floods. The heavy reliance on rainfall for maize and tobacco production makes the value chains highly vulnerable to climatic shocks, particularly droughts. Some farmers have resorted to direct harvesting of water from rivers and streams, which in turn is contributing to the drying up of these water bodies, further exacerbating water scarcity. Similarly, water scarcity during droughts affects cattle herding through reduced availability of pasture and drinking water, leading to deteriorated animal conditions and lower selling prices of the animals. Contamination is another problem where people share their source of drinking water with animals.

According to respondents, farmers typically resort to charcoal production to compensate for the lost income if farming and cattle rearing fail due to a lack of water. This is, however, considered harmful to the environment, and some charcoal producers are willing to return to farming if access to water can be improved. Respondents called for the building of boreholes or dams and investments by the private sector in smallholder agriculture.

3.2.2. Entry Point 2: Empowering Small and Medium-Sized Enterprises (SMEs) as Private Sector Actors

In Kalomo, local small-scale producers and other actors are strongly involved in all four value chains. Therefore, another potential entry point for an ILA is to strengthen the SMEs and empower them as value-chain actors.

Based on the interviews, maize production, in particular, suffers from low profitability in Kalomo District. The cost of farming inputs and transport are considered very high, while selling prices of maize fluctuate and are usually low, making smallholder farmers price takers. FRA pays a relatively higher price in most seasons compared to private traders, but due to payment delays, some farmers still prefer to sell to private traders for spot cash. However, the prices offered by these briefcase buyers are considered abusively low. On the other hand, the traders justify low prices as cost reflective on their part since they usually buy maize in remote areas, which increases their transport costs, see [94]. Cattle herders are in a similar situation with very little influence over the price paid by the traders while spending significantly on animal vaccines and transportation.

When agriculture becomes unprofitable, charcoal production again offers an alternative income source for many. Some farmers have also reduced their maize production to only cater for home consumption and started diversifying to soybeans and other crops for better income.

On the other hand, tobacco is perceived as a lucrative business but is also admittedly labor and resource intensive. According to the calculations of [95], the significant labor and input costs related to tobacco production can effectively cancel out the relatively high gross income, leaving many farmers at a net loss. It was also mentioned in interview responses that tobacco is graded and sold in the absence of farmers, creating an opaque environment over the pricing policy.

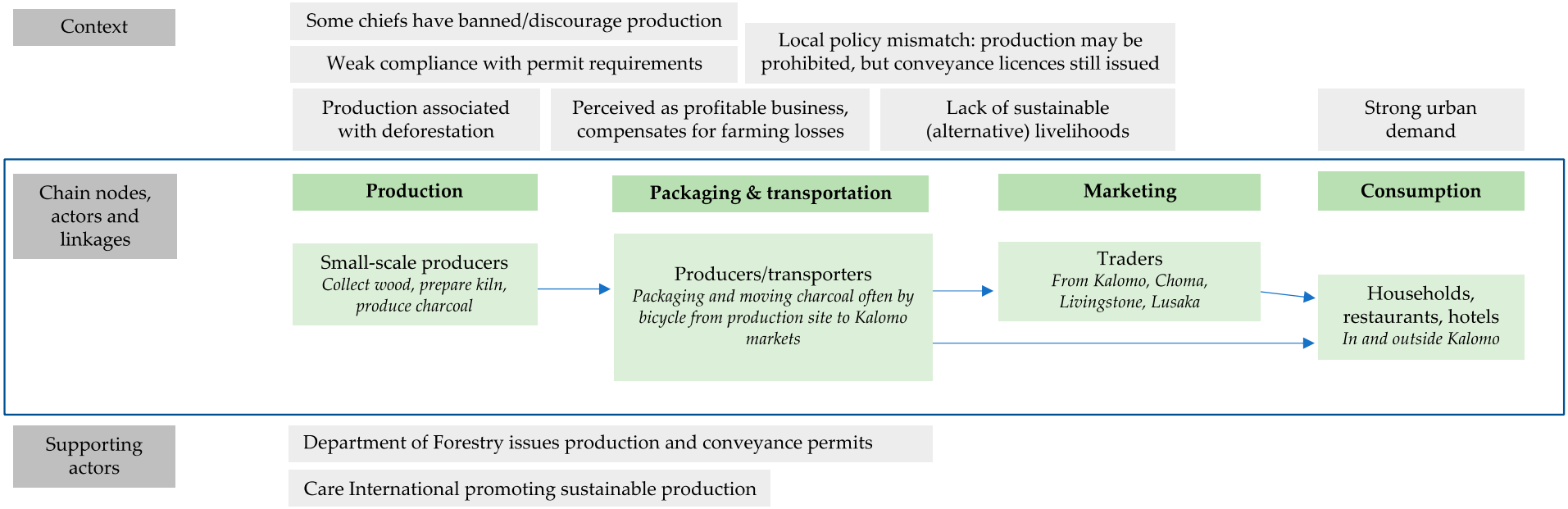

Figure 6. Charcoal value chain and context in Kalomo District (Source: Authors' construct based on field research data).

Related points raised by interview respondents included the need to build farmers' business capacity and skills, such as financial management, record keeping, and quantification of yields, in addition to attracting more processing and value addition capacity, as well as improved financial services into the district.

3.2.3. Entry Point 3: Collaborative Planning for Sustainable Landscape Activities

The final entry point revolves around the opportunity for an ILA to bring stakeholders, including private actors, together for joint landscape action planning.

In the responses, no single entity stands out as the primary agent in driving environmental sustainability in the Kalomo District. To summarize, the government is considered the key actor in setting the sustainability agenda and policy, convening stakeholders, and raising awareness. Communities have a role to play in the ground-level implementation, but at the same time, their ownership of and interest in the initiatives must be secured. On the other hand, the private sector (companies) could provide additional resources, such as funding and information, to advance longer-term sustainability goals.

Potential interventions mentioned to increase environmental sustainability in the landscape include crop diversification, crop rotation, and other sustainable farming practices that are easily accepted and adopted by the farmers. Others include forest restoration activities (tree planting, afforestation, reforestation) and developing regulations to mitigate deforestation. Such initiatives can also positively contribute to climate change adaptation and mitigation [96].

The respondents also invited the private sector to invest in small-scale farming and improved livelihoods. From the government, they hoped for closer consultations with the communities.

4. Discussion

Below we elaborate on the three entry points identified in the analysis. A simplified flow chart (Figure 7) summarizes the discussion.

4.1. Entry Point 1: Improving Water Security for Smallholders

African agriculture is largely dominated by smallholder farming that is highly dependent on regular rainfall, making it vulnerable to crop failures [97]. The established irrigation capacity in Sub-Saharan Africa is low, covering, on average, only 3.5% of farmlands, whereas in Zambia, 10% of the overall irrigation potential is being utilized [98].

Experience from Asia has shown that affordable irrigation solutions have been instrumental not only in enhancing farmers' food security but also in boosting productivity and income [97]. Enhanced irrigation can contribute to better yields, longer farming periods, improved effectiveness of other farming inputs, and a larger variety of suitable crops [98]. Using more effective and optimized irrigation and water harvesting techniques can improve farmers' adaptation capacity to climate change [96], which is especially important in Zambia, a country considered one of the African hotspots in the face of global warming [99]. Improved water security can also help farmers adopt a more business-oriented approach [97] and incentivize further agricultural investments by farmers themselves and financial service providers [98].

Regardless of the evident need for sustainable irrigation solutions to meet the global food demand in the face of growing environmental challenges, related funding and investments have decreased in the recent past [100]. Thus, there is an increasing call for stronger private sector involvement to address the funding gaps and other past challenges [98,100]. Participation of larger business actors can create co-funding opportunities and attract public-private collaborations [58].

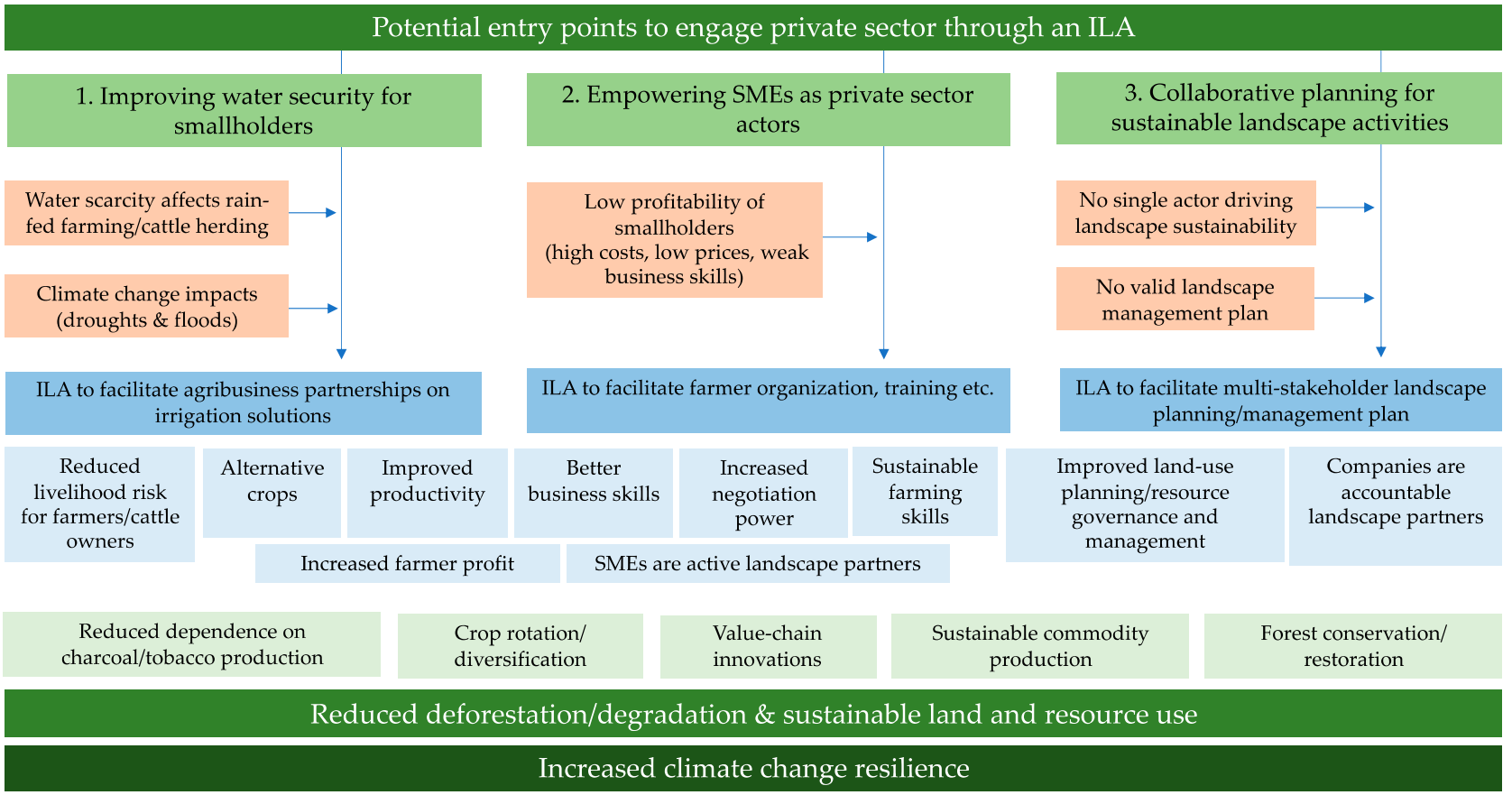

Figure 7. A flow chart summarizing the potential entry points for private sector engagement in Kalomo District (Source: Authors' construct).

Water management is a typical channel to form company partnerships at a landscape scale [63], but public-private partnerships (PPP) in the irrigation sector are still relatively new [98]. For a private company to commit funding to an irrigation scheme, it needs to assess the financial viability of the investment, where the value of the final agricultural output is key [100]. Therefore, the scheme must be built on a profitable commodity value chain to enable farmers to pay for the required water service fees [100].

Incentives for companies to join such landscape-level ventures include addressing operational risks created by water shortages and climate change, which may require collective action across the landscape [63]. In the case of a shared critical resource such as water, landscape-scale collaboration can help companies improve community relations and mitigate related conflicts [63]. In the case of contract farming of commercial crops, a company is directly motivated to secure farmers' access to a reliable water supply to guarantee the agreed delivery of agricultural produce [100].

A few examples have emerged in this nascent sector, including the Kaleya and Manyonyo irrigation schemes in the Kafue River Basin in Zambia [101]. Both arrangements are based on companies jointly owned by farmers who form water user associations and participate in financing the irrigation schemes [101]. This collective management scheme has helped ensure equal access to water as well as navigate the complex resource ownership and user rights structures [101].

When identifying suitable actors for a water partnership, an ILA could also consider newly prospecting companies in the Kalomo District and the larger area. For example, a Choma-based paprika farming company exploring the Kalomo market was mentioned in the interviews. Extending partnerships beyond the current commodity mix would further contribute to crop diversification, as desired by many interview respondents.

Developing PPPs around water management is not a silver bullet solution, as it is prone to a multitude of risks, conflicts, and other challenges [98]. For a maximal impact, improved water management should take place in conjunction with other farming support activities, such as enhanced extension services, market access, input provision, and financial services, working in close cooperation with small-scale farmers [98]. Nevertheless, based on the interviews, there is a clear demand for improved water security in the Kalomo District, and it provides an interesting opportunity to be explored.

One of the key characteristics of landscape investments is that they are synergistic, benefiting several objectives simultaneously [58,63]. Depending on the specific objectives for the Kalomo District, improved water security has the potential to contribute to forest conservation through reduced reliance on charcoal production, food security and crop productivity, human and animal health, and increased climate change adaptation capacity, among others.

4.2. Entry Point 2: Empowering Small and Medium-Sized Enterprises (SMEs) as Private Sector Actors

Achieving a viable income for small-scale producers can be challenging in agricultural markets characterized by subsidies and unjust trading connections [102]. The absence of market information systems and the unpredictability of rain-dependent farming also contribute to price instability [80]. Low market access places the local private sector in a vulnerable position, giving traders additional power to keep prices low and continue promoting a short-term planning horizon in resource management [62].

Private rural entities, no matter how small, ranging from producer groups to small traders and processors, are effectively enterprises practicing their own business models [80]. However, in many value chains, the upstream connection between the small-scale producer and the first buyer is the most inefficient one, affecting the overall performance of the chain [103]. Typically, small- and medium-sized business actors in rural Africa remain informal and unorganized, receiving inadequate support [104], prohibiting them from assuming a more dynamic position in landscape management [62].

Consolidation of highly fragmented value chains can materialize through the establishment of marketing cooperatives, formal or informal farmer groups, out-grower schemes, or producer associations, among others [103]. Although they may not correct all market distortions, stronger farmers' organizations can help them reduce transaction costs and gain negotiation power [80] or move primary producers further downstream towards increased value addition [104]. It can improve their status as legitimate landscape partners and increase their access to business opportunities and financial services [62].

Empowering SMEs facilitated by an ILA could contribute to many landscape objectives, such as increased farmer income and reduced power imbalances. As charcoal and tobacco production are considered harmful practices driving local deforestation, empowering farmers and creating more value in other agricultural value chains could contribute to forest conservation through diversified, more resilient livelihoods. Synergistically, the first entry point of improved water management can contribute to improved farming productivity and product quality.

Ultimately, successful business models connecting small actors with agribusiness are highly contextual and vary between diverse circumstances [105]. Farmer empowerment also requires a strengthened negotiation position based on stable tenure security, and access to reliable information and public institutions, among others [105]. Moreover, greater agricultural productivity does not automatically lead to environmental preservation through avoided land expansion but may require simultaneous governance measures and financial incentives for conservation [106].

In addition to exploring opportunities for increased farmer organization, an ILA in the Kalomo District could facilitate exchange between stakeholders concerning:

(1) Value addition opportunities to create employment and improve and diversify people's profits and livelihoods, for example, through other forest products, such as honey and wild fruits. There is also a need to encourage innovations linking different sectors together, such as making charcoal from maize husks, thus providing an alternative energy source to conserve forests. Another opportunity concerns strengthening the capacity to produce cooking gas from cow dung. This has the potential to reduce dependence on charcoal and improve livelihoods for the farmers who will supply the cow dung.

(2) Investments in the maize sector through improved storage facilities. Potentially collaborate with other business entities to provide better storage facilities for FRA and local farmers in need of such facilities. With proper storage facilities at the farmers' disposal, they can use some of their produce as collateral to access loans and invest in value addition. This will help improve their livelihoods, invest in their farming activities, and possibly reduce their dependence on charcoal production. See the example by [107].

(3) Insurance packages for smallholder farmers. In case of drought or floods, farmers could be covered and continue with sustainable production practices. An example of scaling potential is provided by the weather index insurance under the Farmer Input Support Program, including WFP and the private sector as collaborators, see [108].

4.3. Entry Point 3: Collaborative Planning for Sustainable Landscape Activities

Apart from tobacco, the Kalomo commodities studied here are primarily produced for domestic or regional (neighboring countries) consumption. Agricultural SMEs isolated from international markets are not exposed to the same sustainability demands as many global operators [64]. Commodities targeted at developed country markets, such as coffee and cocoa, are more often produced under sustainability certification schemes compared to national staple crops like maize [102]. However, the overall demand for deforestation-free commodities rarely exceeds supply, providing a weak market-based incentive for more sustainable production [64]. Locally driven initiatives and ambition to advance sustainable landscape objectives are therefore crucial [62].

One of the challenges in reducing deforestation in the Kalomo District is the absence of regional and catchment management plans to guide appropriate and sustainable land use and resource management practices [85]. Ideally, landscape management should be based on a shared vision and collaborative planning by all stakeholders who generally agree on the common issues, objectives, activities, and responsibilities [27,109]. When planning for landscape objectives and financing mechanisms, close collaboration between public and private actors, including the local SMEs as experts and contributors, is important to secure joint agreement and ownership [62]. Therefore, an ILA provides an ideal opportunity to bring all stakeholders together and facilitate the development of a management plan to incentivize sustainable landscape management in the Kalomo District.

Developing viable business activities that generate a financial return in addition to social and environmental benefits is difficult but essential to motivate the private sector, examples including regenerative agriculture, agroforestry, or sustainable intensification of farming [62]. Indeed, the best chance to scale landscape restoration is expected when a shift from environmentally harmful agricultural practices to more sustainable but financially viable production is incentivized by market forces [61]. Identifying and designing activities of material importance to business can further help secure company commitment [110].

However, systematic transformation to more sustainable production requires a stable and predictable operating environment [64]. Governments need to create enabling administrative and legal structures that also benefit the local landscape actors and users, such as SMEs [62].

The depth of landscape cooperation can vary from informal arrangements with weak accountability to more regulated frameworks with effective enforcement and monitoring measures in place to change the status quo [109]. Ref. [110] recommends formalizing a landscape partnership to ensure that respective rights and responsibilities are understood by all parties. A landscape management plan can provide a vehicle for this.

4.4. Study Limitations and Other Remarks

As noted by [90], researchers will face uncertainty about whether their data collection methods ultimately succeed in conveying the true contextual meaning of the study subject. For instance, there may be differences in the intended meaning of certain words [90]. In our interviews, one such word with an ambiguous meaning was "*sustainability*", which can be understood differently depending on the particular perspective (environmental, financial, etc.). For future studies, pilot testing the interview questions beforehand, as instructed by [87], is highly recommended to avoid similar situations.

Tobacco is a controversial commodity for sustainable landscape management. Zambia ratified the Framework Convention on Tobacco Control (FCTC) of the World Health Organization (WHO) in 2008 [111] and is committed to its objectives. By enforcing its provisions, the FCTC aims to reduce both the demand and supply of tobacco to curb related negative socio-economic, health, and environmental impacts and create alternative livelihoods for those involved in the tobacco business [112]. To support the commitment of the Zambian government to implement the FCTC, this study focuses on landscape activities alternative to tobacco production.

By following the value-chain research approach of [82], the study covered Steps 1–5, but the final two steps of implementation and evaluation are beyond its scope. To continue the work, landscape managers should develop an action plan elaborating on how the proposed entry points can be further materialized in practice, together with securing financial resources, building required capacity, collecting and managing related information, and other such activities [82].

5. Conclusions

This study has demonstrated the use of the value-chain analysis approach as an optional framework to analyze private sector activity and engagement in the Kalomo District. There is considerable interest and evidence available on strengthening the involvement of

the private sector in agricultural landscapes. However, much of this effort is focused on globally operating companies. The Kalomo District provides an example of a rural African landscape, where an ILA offers significant potential to improve local resource governance and achieve multiple sustainability objectives but—with the exception of tobacco—is not connected to global commodity value chains. Rather, the Kalomo private sector is more organic in the sense that local farmers and SMEs play an important role in the production of commodities mainly targeted at domestic or regional markets. In order to consider the true potential of the private sector in this type of context, the role of the small actors needs to be recognized and considered when designing landscape activities.

In this study, we identify the key challenges and benefits of engaging the private sector within ILAs in Kalomo. Furthermore, we formulate initial ideas on how to improve private sector involvement within the district by identifying three key entry points. We suggest that efforts to enhance water security, empower small and medium-sized enterprises, and incentivize active engagement in collaborative landscape planning can serve as viable entry points to increasing private sector engagement of cattle, maize, tobacco, and charcoal actors in ILAs in the Kalomo District.

Locally appropriate specifications regarding each entry point need to be carefully considered and formulated together with stakeholders to ensure that they benefit the landscape objectives in the given context in the best possible way. These findings hold particular relevance for Kalomo and the COLANDS Zambia initiative, but the methods employed and recommendations provided will likely complement ILA application efforts elsewhere. Consistent with other research performed within the broader COLANDS Zambia initiative, e.g., [84,113], the analysis of private sector involvement provides another example of a dynamic landscape element. The entry points and related action plans should be revisited and amended as required on a regular basis as part of ongoing negotiation processes to ensure that they remain valid and relevant.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/land11091549/s1. The field interview guide (Document S1) and a table of interviewed stakeholders (Table S1) are provided as Supplementary Material.

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Institutional Review Board Statement: The COLANDS initiative has received ethical approval as per CIFOR-ICRAF ethical research guidelines. The study was conducted in accordance with the Declaration of Helsinki, and approved by the CIFOR-ICRAF Research Ethics Review Committee (protocol code RER2022/001, 8th September 2022).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data for this study will be made available through the CIFOR data repository.

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