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Central Kalimantan's Oil Palm Value Chain: Opportunities for Productivity, Profitability and Sustainability Gains

Skye Glenday
Yusurum Jagau
Suharno
Agnes Safford

November 2015

A CPI, PILAR & GreenWorks Asia Working Paper

Descriptors

Sector	Land Use, Agriculture	
Region	Indonesia	
Keywords	Landscape management, land use, oil palm, production - protection	
Related CPI Reports	CPI, Unilever & IDH: Achieving a high productivity, sustainable palm oil sector in Indonesia: a landscape management approach (June 2015)	
	PILAR: Opportunities for increasing productivity and profitability of oil palm smallholder farmers in Central Kalimantan (April 2015)	
Contact	Tiza Mafira	tiza.mafira@cpi-indo.org
	Randy Rakhmadi	randy.rakhmadi@cpi-indo.org

About

Palangkaraya Institute for Land and Agricultural Research (PILAR) is a research foundation that supports local experts, researchers, and students at the University of Palangkaraya to conduct analysis on land use optimization in Central Kalimantan. PILAR has a particular focus on supporting the development of high-productivity, sustainable oil palm, while conserving valuable ecosystems in Central Kalimantan. The results of PILAR analyses are used to develop recommendations for local policymakers and business investors.

GreenWorks Asia (GWA) is an Indonesian based financial and business advisory group with expertise in renewable energy, sustainable agriculture, risk management and low carbon business. GWA strives to bridge private sector knowledge, analysis and experience with public policy and the complexity of risk management of the environment, community and stakeholders. We research, facilitate and improve sound business decisions relative to the demands of multiple stakeholders.

Climate Policy Initiative (CPI) works to improve the most important energy and land use policies around the world, with a particular focus on finance, through in-depth analysis on what works and what does not. CPI works in places that provide the most potential for policy impact including Brazil, China, Europe, India, Indonesia, and the United States. In Indonesia, CPI partners with the Ministry of Finance and Palangkaraya Institute for Land-use and Agricultural Research at the University of Palangkaraya in Kalimantan. CPI is supported by a grant from NORAD for the Central Kalimantan PALM project.

Acknowledgements

First and foremost the authors would like to highlight the guidance and contributions provided by members of the Central Kalimantan Production – Protection Working Group established by the Governor of Central Kalimantan Decree number 188.44/265/2013: Lugi Kaeter, Plantation Agency; Adhiyaksa, Environment Agency; Halind Ardi, Executive Secretary of GAPKI Central Kalimantan; Bismart Ferry Ibie, Lecturer,University of Palangka Raya; Farinthis Sulaiman, MADN; Erman P. Ranan, DAD; Nurhanudin Achmad, Sawit Watch and Andi Kiki, Kemitraan.

Similarly we thank business and expert informants who participated in informal interviews and dialogues, and the survey respondents from smallholder farmer communities for their valuable inputs and participation in the PILAR smallholder farmer study.

Finally, the authors would like to make special acknowledgement of the analytical contributions of Arief Atmojo (GreenWorks Asia), and the support and inputs of the following CPI staff: Leela Raina, Randy Rakmadi, Gianleo Frisari, Tiza Mafira, Jane Wilkinson, Mia Fitri, Elysha Rom-Povolo and Tim Varga. Funded by the Norwegian Development Agency (Norad).

Executive Summary

The Central Kalimantan Provincial Government has ambitious goals to deliver inclusive and sustainable regional development. Given the region's high reliance on agriculture, more efficient management of land and natural resources offers a promising pathway to transform the local economy and achieve development goals.

This working paper provides a first overview of Central Kalimantan's oil palm value chain and the business actors involved throughout. It aims to identify how business investment can be optimized to support socially inclusive development, delivering productivity, profitability, and sustainability gains.

Opportunities to Increase the Economic Value of Central Kalimantan's Oil Palm Value Chain

Significant economic value is derived from oil palm in Central Kalimantan at all phases of production. In 2013, the value-added upstream was approximately USD 1 billion, with USD 0.95-1.25 billion added midstream, and a further USD 30-31 million added downstream (see Figure 1). Notwithstanding, governments, business and smallholder farmers can derive even greater economic value.

There is potential to increase land productivity upstream, particularly for smallholder farmers, including by applying *good agricultural practices* (GAP) and technology. Average yields of oil palm plantations in Central Kalimantan were around 13% lower than Indonesia-wide yield averages and 23% lower than those in Malaysia. While this is in part driven by differences in the age of plantations, there remains significant potential to improve average yields, particularly for smallholder farmers. In addition to opportunities to increase palm oil production through productivity gains, there is also potential to expand upstream production into environmentally suitable degraded land.

There are also opportunities to better utilize existing capacity of mid and downstream processing and manufacturing facilities. Further, strengthening organization and the integration of actors within and between phases of production can increase value throughout the value chain.

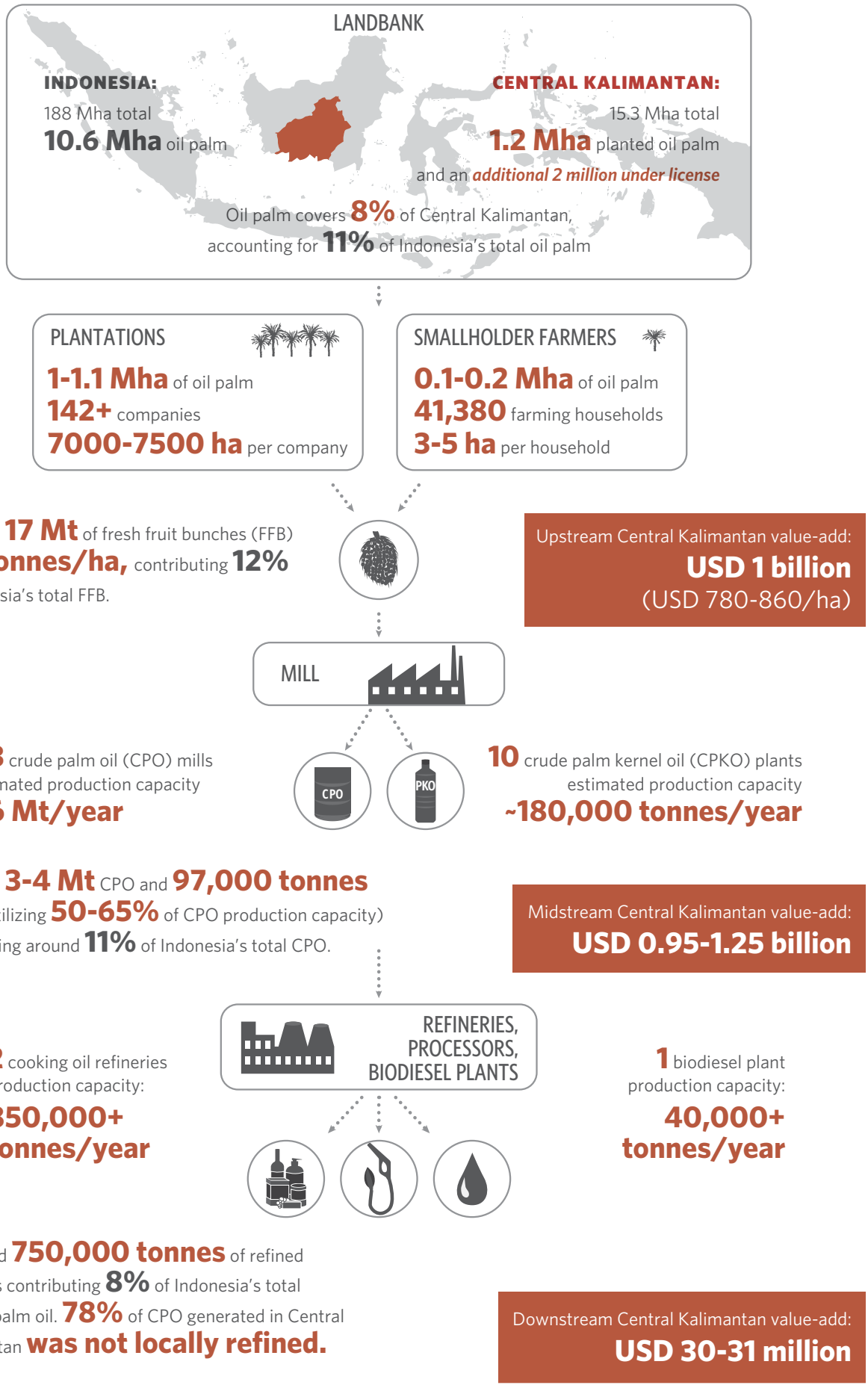
Midstream mill capacity was under utilized in 2013, with mills generating just 50-65% of potential crude palm oil (CPO) compared to total installed capacity. This is in part driven by a lack of sufficient supply of fresh fruit bunches (FFB) from upstream plantations. Increasing upstream FFB yields to the same level as the Malaysian average would increase the supply of FFB for processing and could reduce the CPO production gap by around 40%. To achieve 100% of current mill capacity, however, a further 300,000 hectares of highly productive plantations will be needed. Given that Central Kalimantan has an estimated additional two million hectares of land designated for oil palm plantations, this under-supply issue may be addressed in the near term. However, in addition to supply challenges, infrastructure, energy access and supply chain integration may pose further barriers for some mills and requires further analysis. Addressing this production gap should be a priority ahead of further midstream capacity development.

Downstream, only 22% of Central Kalimantan's CPO was refined locally in 2013. This represents a significant reduction in the value-add retained by Central Kalimantan from this key economic sector and presents a potential opportunity for the region. However, further analysis is needed in relation to the costs, barriers and opportunities for such downstream development, as refineries require suitable infrastructure and energy access, among other factors, to become viable investment propositions.

Supporting business to realize productivity, profitability and sustainability gains

Transitioning to more efficient land use and deriving higher productivity, profitability, and sustainability in the Central Kalimantan value chain will impact the different business models in different ways. This is because their risk and investment profiles are substantially different, and as such they will face different costs, challenges, and opportunities in transitioning to more sustainable practices. This means that understanding which business models and actors are willing and able to take on which risks, and at what cost, will be critical to developing appropriate policy and finance instruments to drive the transformation toward a sustainable oil palm sector (Frisari et.al. 2013).

Figure 1. Central Kalimantan Oil Palm Value Chain (2013)



Source: author analysis of various sources listed in methodology section

Oil palm business models are the production and manufacturing systems applied by business actors and smallholder farmers to produce FFB and convert them to CPO and crude palm kernel oil (CPKO), as well as other derivative industrial and consumer products. The models range from being as simple as 'trees to fresh fruit' to those incorporating more complex integrated elements that carry from plantations right through to downstream manufacturing, including shipping, logistics, distribution, and financing strategies. Business models also range in size, with smallholder farmers managing between 1-25 hectares of plantation, or 1000+ hectares in the case of farmer cooperatives or groups, and companies managing from 25 - 300,000+ hectares. For the more integrated business models, there is wide variation in the level of reliance on third party suppliers at each phase of production. For smallholder farmers, there are varying levels of independence or company partnerships. Variations can also be found in different regions of Indonesia as a result of both the prevailing local conditions and other business considerations.

Within this context, business models operating at a single point in the oil palm value chain, such as smallholder farmers and smaller scale upstream actors, have the greatest challenge in managing broader financial risks, owing to their more limited collateral and lower ability to use tools to transfer and manage currency and investment risks compared with more integrated business models. Off-take risks are also greatest for single point, upstream operators who need to sell their FFB within short time horizons to minimize yield loss.

Market access risks are highest downstream where consumer product brands directly face restrictions, such as European Union sustainable oil palm standards. Conversely, the ability to mitigate market access risks by effectively managing negative social and environmental risks and impacts is largely contained upstream. Therefore, a more integrated approach to managing risks and associated costs is necessary.

Recommendations and Next Steps

We propose that a landscape management approach offers government, business, and community partners the best opportunity to derive greater value added from the oil palm value chain and collectively achieve productivity, profitability, and sustainability gains. New business tools and targeted enabling policies will be needed to support the complex array of actors operating within the sector to transition to highly productive, sustainable practices at scales that deliver meaningful economic, social, and environmental benefits.

As a consequence of the wide variety of business models, there are large variations in productivity, profitability, and risk exposure for different actors within the sector.

To take forward the findings of this working paper, we will support an ongoing multi-stakeholder dialogue and further analysis to improve understanding of Central Kalimantan's oil palm value chain and develop implementation-ready options for capitalizing on these above opportunities.

As a next step, we propose a more detailed case study of the value chain within selected districts in Central Kalimantan working alongside government, business and community partners. This could also inform the development of a more comprehensive and comparable database to support ongoing design and implementation of evidence-based policies and business tools to promote increased value-added and sustainability throughout the oil palm sector in Central Kalimantan.

We also suggest that translating Central Kalimantan's oil palm planted area target into a production-based target could encourage higher productivity and more efficient use of existing lands, including through the adoption of good agricultural practices and good manufacturing practices as a first priority over expansionary measures.

Contents

1. Introduction

Central Kalimantan's economy is particularly dominated by the agricultural sector, which contributes 28% of its regional gross domestic product[1] from upstream[2] operations alone. Within the agricultural sector, oil palm accounts for the largest percentage of investment. While oil palm is a critically important economic sector, analysis shows that it has also been a major driver of deforestation.[3] Finding ways to derive greater economic value from the oil palm sector, while also supporting increased protection of valuable ecosystems and delivering local benefits, is a high priority.

Since 2011, the Central Kalimantan and Indonesian Governments have introduced several important policies that collectively aim to stimulate continued growth in the oil palm sector, while also promoting sustainable development and meeting environmental commitments. Nationally, key policies and regulations include:

- Oil palm sector production target of 40 million tonnes crude palm oil (CPO) annually by 2020
- Palm Oil Fund (Presidential Regulation 61/2015), established to stimulate investment and innovation in the sector, including by delivering support to smallholder farmers
- Biofuel Mandate (Ministry of Energy and Mineral Resources Regulation 12/2015) that requires a significant portion of liquid fuels[4] used in Indonesia to be derived from biofuels by 2025
- Renewable energy target of at least 23% by 2025 (Government Regulation 17/2014)
- Indonesia Sustainable Palm Oil (ISPO) system (Ministry of Agriculture Regulation 19/2011) that aims to support Indonesia's broader commitment to reduce greenhouse gas emissions by 29% by 2030

At the regional level, Central Kalimantan has introduced corresponding policies, including:

- A sectoral target of 3.5 million hectares of planted oil palm by 2020 (Central Kalimantan Plantation Agency, 2011[5])
- Sustainable Management of Plantation Businesses (Provincial Regulation 5/2011) framework that outlines requirements for issuing sustainable licenses, recognizing among other things the need for protection of high conservation value areas and investment in smallholder farmers.

In addition, a growing number of companies have made pledges aligned with the goals of these mandatory requirements, notably, the Indonesia Palm Oil Pledge (IPOP)[6], and many companies participate in additional voluntary international standards such as the Roundtable on Sustainable Palm Oil (RSPO) and International Sustainability & Carbon Certification (ISCC).

There are significant opportunities to deliver agricultural growth and improved ecosystem protection outcomes across Central Kalimantan's landscape. Approximately 7.5 million hectares of forests, which account for roughly 10% of Indonesia's forested area, are located in Central Kalimantan, along with large tracts of degraded lands[7] (see Figure 2). Efficient allocation and management of these land resources, including within the oil palm value chain, can deliver productivity, profitability, and sustainability gains at scale, without further depletion of high value natural resources.

1 As defined by Indonesian BPS, based on data from BPS Central Kalimantan 2013.

2 For the purposes of this working paper, the upstream value chain includes operations to produce and trade fresh fruit bunches. Midstream includes the milling processes to produce crude palm oil and crude palm kernel oil, as well as associated trading, transportation and logistics. Downstream includes the production of refined products and their processing into consumer and industrial goods, including cooking oil and oleo-chemicals, as well as the associated distribution systems.

3 A recent study by Forest Trends indicates that an estimated 6 million hectares of natural forest was deforested in Indonesia between 2000-2012, and that at least 80% of the deforestation was illegal. Growth in oil palm plantations is considered to be among the major drivers of this conversion (legal & illegal), with at least 17% of the deforestation in this period falling within licensed oil palm concession areas (including 11% oil palm only concessions and 6.3% multi-use forestry & oil palm concessions) (Lawson 2014).

4 30% biodiesel, 20% bioethanol and 20% olein

5 As referred to in Table 1.1 "Reducing Agricultural Expansion into Forests in Central Kalimantan – Indonesia: Analysis of Implementation and Financing Gaps", Center for Climate Risk & Opportunity Management, Bogor Agricultural University (IPB). 2012.

6 Current signatories include: Wilmar; Golden Agri Resources; Cargill; Asian Agri and Musim Mas. More information is available at: http://www.palmoilpledge.id/.

7 Note not all degraded lands are suitable for agricultural production, as some contain peat soils or deliver other valuable ecosystem services. WRI estimates that there are 5.3 million hectares of environmentally suitable, degraded lands within the forest estate that could potentially be developed for oil palm if re-zoned (Gingold et al. 2012)

1.1 About this study

Through the Central Kalimantan Production – Protection Initiative, *Palangka Raya Institute for Land-use and Agricultural Research* (PILAR) and CPI are partnering with government and businesses in Central Kalimantan to develop a plan and model for sustainable oil palm production that can help to increase agricultural productivity throughout the oil palm value chain, while simultaneously pursuing better protection for natural resources and livelihood benefits for local communities. Under this initiative, CPI is supporting PILAR to conduct research and analysis on production and protection issues for a multi-stakeholder working group that was established by the Governor to help deliver the Government of Central Kalimantan's vision to optimize land use and build a sustainable palm oil sector. Initial research is identifying the most relevant sectors, actors, and opportunities that could become agents of change.

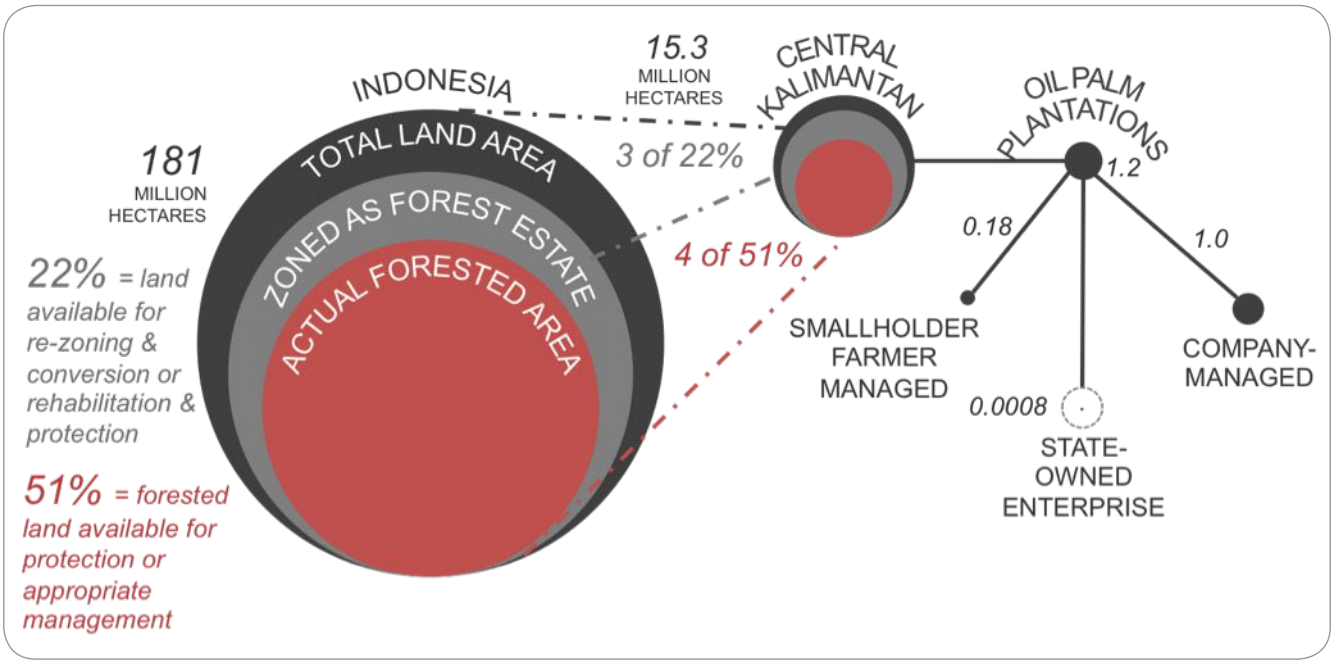
This working paper is part of a series of analyses undertaken within this initiative, together with implementing partners such as GreenWorks Asia. Analysis falls across four work streams, with this paper forming part of work stream two:

1. Land-use allocation and management
2. Business investment
3. Fiscal frameworks and mechanisms
4. Social benefits and livelihoods

This working paper aims to identify how, business investment could be optimized through a landscape management strategy, to help drive a more efficient, highly productive and environmentally sustainable oil palm sector, aligned with government policies and commitments outlined above.

Section 2 outlines how the analysis was conducted. **Section 3** provides an overview of the oil palm value chain and identifies potential opportunities for optimization and further analysis. **Section 4** outlines the spectrum of business models involved in Central Kalimantan's oil palm value chain. **Section 5** highlights investment risks that require effective management, through well-targeted policy enabling environments or business tools, to support businesses to transition to a sustainable oil palm sector. **Section 6** provides a proposed framework for piloting and scaling up this transition to sustainable practices through a landscape management approach in Central Kalimantan.

Figure 2. Land use allocation and oil palm management in Central Kalimantan



Source: PILAR 2015; Directorate General Planning, Indonesian Ministry of Forestry; Indonesian Bureau of Statistics, 2013 Oil Palm Statistics

2. Methodology

The aim of this study is to provide an initial overview of how the oil palm value chain currently operates in Central Kalimantan. This includes building an understanding of the actors involved and estimates of the value added derived at each phase of production, from up to downstream. This understanding can be incrementally improved as more detailed and reliable data becomes available over time.

The analysis presented in this paper builds on previous analysis undertaken by PILAR, supported by CPI, related to opportunities for increasing productivity and profitability of oil palm smallholder farmers in Central Kalimantan. In addition to data collected by PILAR as part of that study, this working paper involved further analysis and integration of data from a range of public and private sources, including:

- Statistics Indonesia and Central Kalimantan (BPS and BPS Provinisi Kalimantan Tengah)
- Central Kalimantan Plantation Agency (Dinas Perkebunan)
- Global Forest Watch
- Roundtable on Sustainable Palm Oil (RSPO)
- Bogor Agricultural University (IPB)
- Indonesian Palm Oil Association (GAPKI)
- LMC International.

Additionally, this working paper was informed by a literature review and a series of informal interviews and dialogues carried out with business and government actors, as well as sector experts, in 2014 and 2015 by Climate Policy Initiative, PILAR, and GreenWorks Asia. Interviews and dialogues were carried out on an anonymous basis, and hence insights are not attributed in the paper. Interviews and dialogues focused on understanding the current operations and business investment models within the oil palm value chain in Central Kalimantan and Indonesia more broadly.

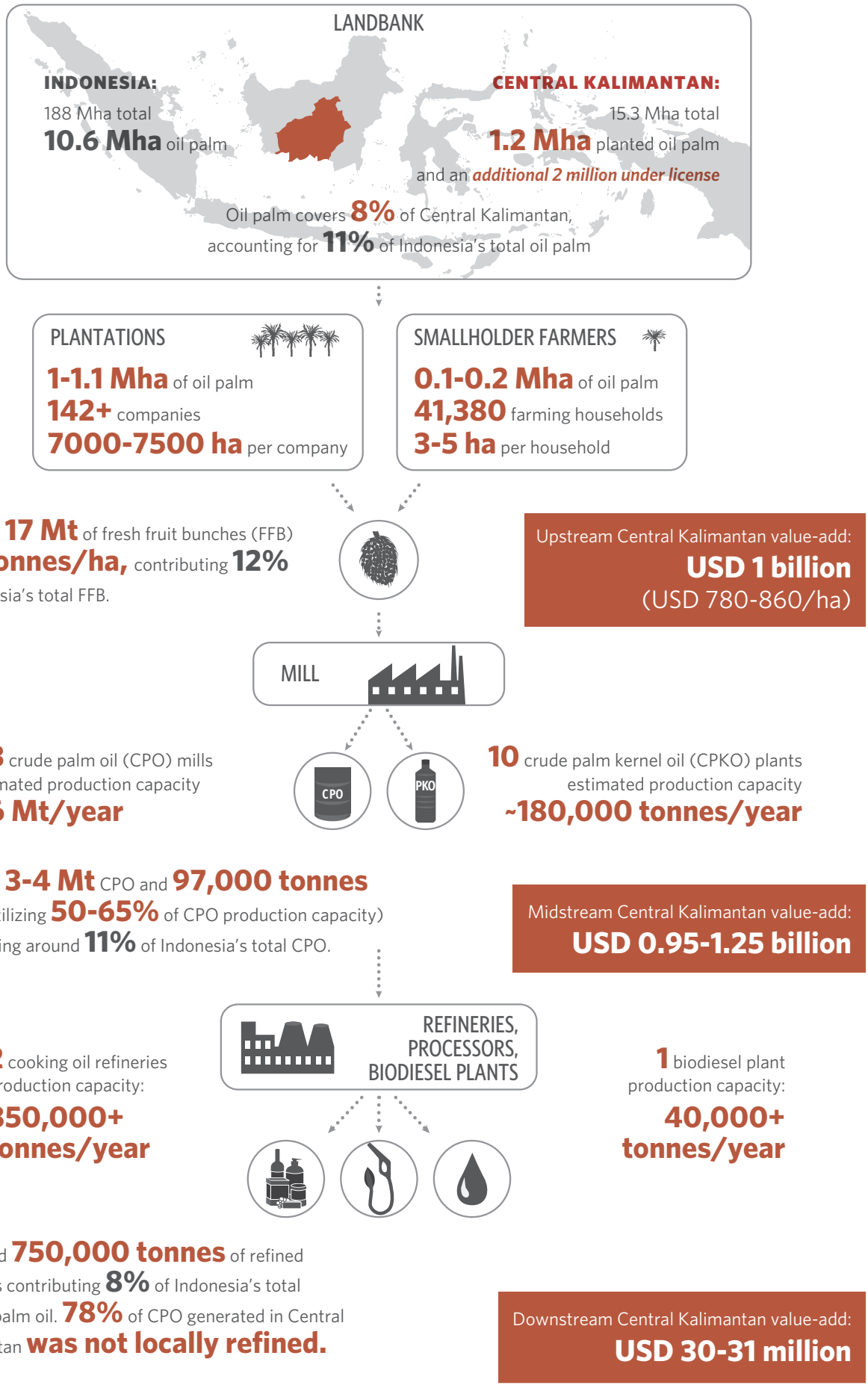
2.1 Data limitations

Data sources collected to inform the analysis in this paper were often conflicting or had significant variation in estimated capacity or volumes produced, and their associated values. Where possible, we have represented the full range of variation in estimates. In addition to variations, data was highly dispersed, with no single source providing a comprehensive picture of all aspects of the oil palm value chain.

Although macro level value chain data was available, detailed, comparable and disaggregated productivity, profitability, and sustainability data for the full range of different business models could not be obtained in the current phase of analysis. Going forward, this information will be important to inform the design of effective and efficient policy interventions and business tools to support productivity, profitability, and sustainability gains with appropriate benefit sharing between government, business, and communities.

To address current data limitations, we propose a follow-up phase involving a more detailed case study of the value chain within selected districts in Central Kalimantan working with government, business and community partners. This could also inform the development of a more comprehensive and comparable database to support ongoing design and implementation of evidence-based policies and business tools to promote increased value-added and sustainability throughout the oil palm sector in Central Kalimantan.

Figure 3. Central Kalimantan Oil Palm Value Chain (2013)



Source: author analysis of various sources listed in methodology section

3. Central Kalimantan's Oil Palm Value Chain

Central Kalimantan can achieve greater economic value and net positive environmental benefits by facilitating companies' and smallholder farmers to transition to business models that support a highly productive, sustainable oil palm sector, including by optimizing existing capacity at all phases of production, and by strengthening the organization and integration of actors throughout the oil palm value chain.

Our analysis shows that significant economic value is derived at all phases of production. In 2013, approximately USD 1 billion of value was added upstream, with a further USD 0.95-1.25 billion added midstream, and USD 30-31 million added downstream. Figure 3 (facing page) presents an overview of Central Kalimantan's oil palm value chain in 2013. Even so, government, business, and smallholder farmers can derive greater economic value at all phases of production by:

- Increasing land productivity upstream, particularly for smallholder farmers, including by applying good agricultural practices and technology;
- Better utilizing existing capacity, such as mid and downstream processing and manufacturing facilities; and
- Strengthening organization and integration of actors within and between phases of production throughout the value chain.

This section describes the Central Kalimantan value chain in more detail, and addresses key opportunities for optimization in each phase of production.

3.1.1 UPSTREAM OVERVIEW & OPPORTUNITIES TO OPTIMIZE NATURAL RESOURCE MANAGEMENT AND PRODUCTIVITY

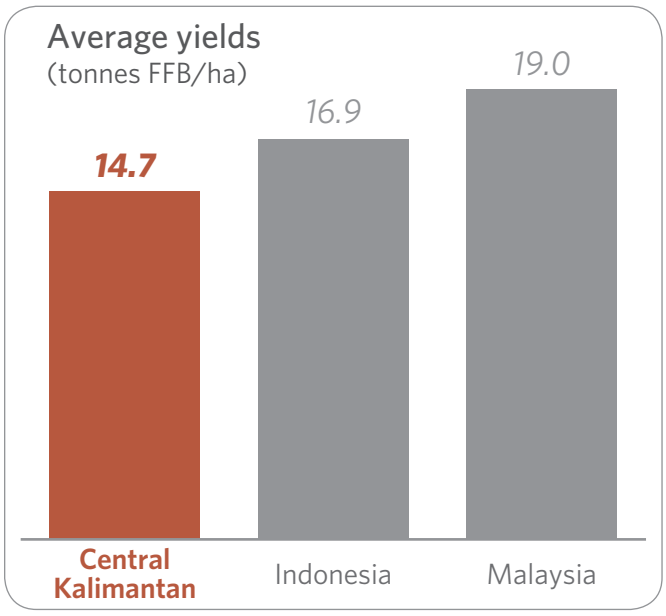
In 2013, approximately 8% of the Central Kalimantan province was planted oil palm, which accounted for around 11% of Indonesia's total oil palm. However, we estimate *an additional 14% of the province is licensed for oil palm expansion, of which around 4% is currently forested and a further 3% contains peat soils* (PILAR, Daemeter & CPI analysis, pending publication). Expanding production into the forested and peat soil areas may produce some economic benefits, but carries high environmental risks, as it will result in significant greenhouse gas emissions and potential loss of high value ecosystems.

Of the planted oil palm, an estimated 41,380 smallholder farming households manage approximately 15% of the oil palm area, with 142+ companies managing the remaining 85% of the area. Different companies and smallholder farmers operate at vastly different scales and employ a wide variety of business investment models, which will be further discussed in section 4.

In the upstream sector, estimated average annual productivity per hectare was 14.7 tonnes of fresh fruit bunches (FFB) in 2013. As shown in Figure 4, this is lower than the Indonesia-wide and Malaysian averages for the same period.

This suggests there are significant opportunities to improve upstream productivity and sustainability of oil palm plantations on two fronts – firstly, by increasing yields through *good agricultural practices*, and secondly,

Figure 4. Upstream Productivity (2013)



Source: BPS 2013 & Malaysian Palm Oil Board

by ensuring expansion of the planted area occurs in environmentally suitable lands.

In relation to increasing yields, the differences between Central Kalimantan, Indonesian-wide and Malaysian productivity in 2013 can be explained to a degree by differences in the age-class profile of plantations, given that, on average, plantations in Central Kalimantan are younger and hence still reaching their peak in production levels. However, there remains significant potential to improve average yields in Central Kalimantan, particularly for smallholder farmers. This was highlighted in a recent PILAR study about smallholders, which found that actual yields compared to potential yields varied significantly within the study sample (see Figure 5). These variations are partly driven by differences in agricultural management practices, and partly driven by more systematic logistical and organizational challenges. It is likely that similar variations in productivity would be observed between small-medium enterprises and larger integrated companies, but as yet there is not sufficient data to verify the scale and prevalence of these company productivity discrepancies.

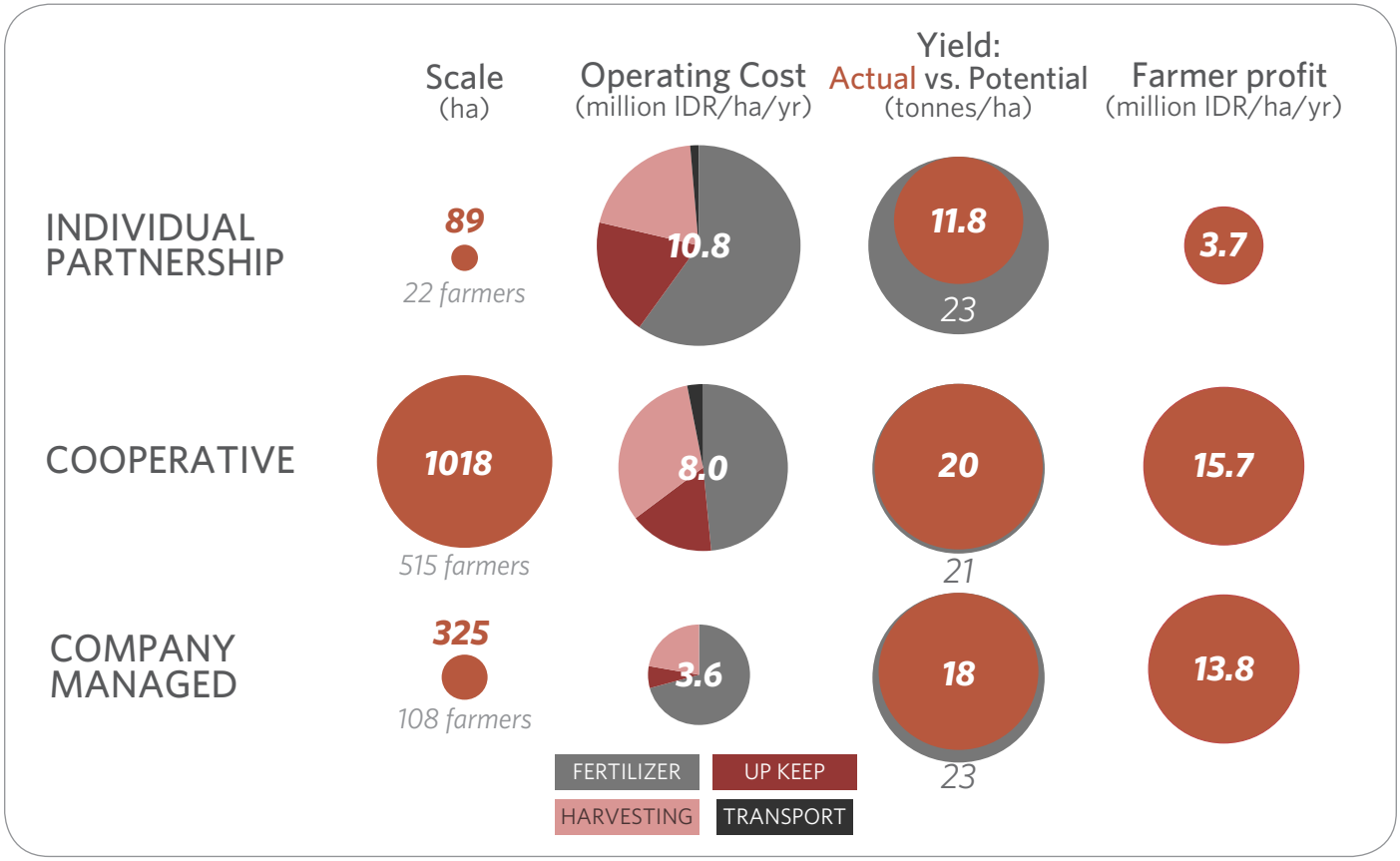
Beyond the identified need to help smallholder farmers improve productivity, translating Central Kalimantan's oil palm planted area target into a production-based target could also help to encourage higher productivity and more efficient use of existing lands as a first priority over expansion.

In addition to opportunities to increase palm oil production through productivity gains, there is **also potential to sustainably expand upstream production onto areas that are suitable for production**. These opportunities are examined in detail in a related PILAR analysis under the land-use allocation and management work stream as part of a province-wide assessment of high conservation value (HCV) areas.

3.1.2 MIDSTREAM OVERVIEW & OPPORTUNITIES

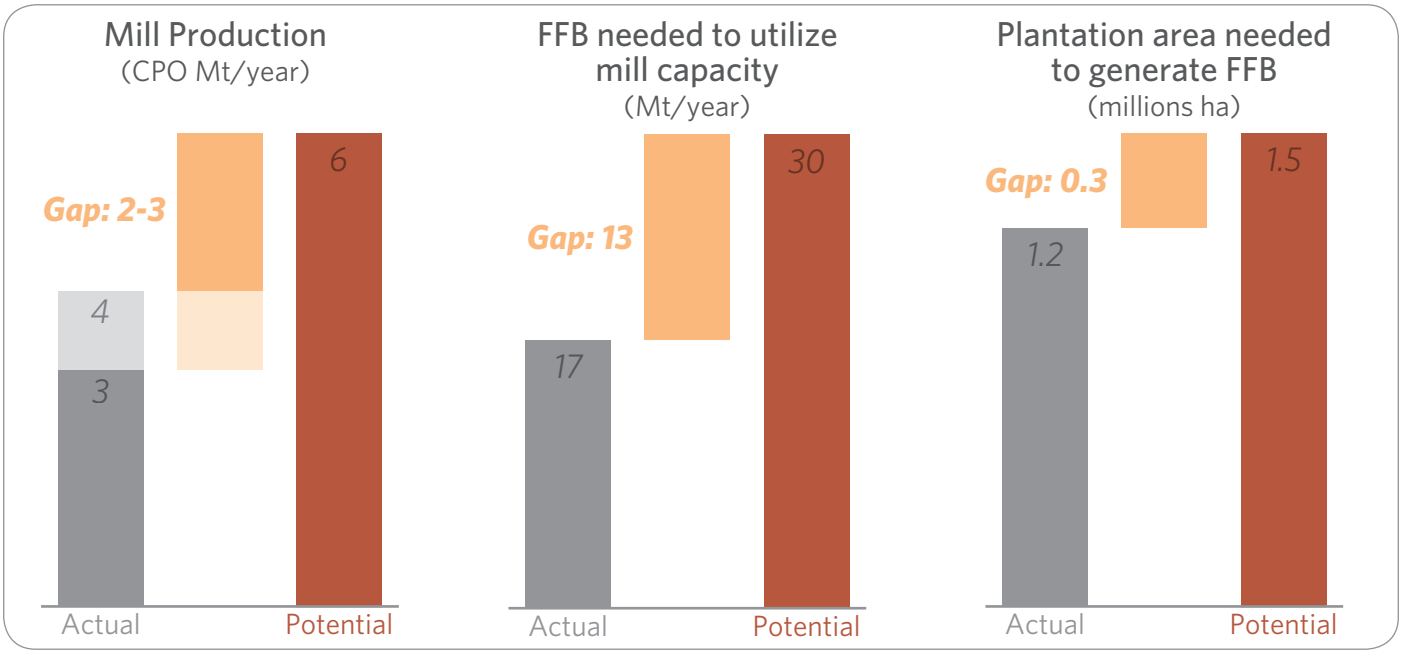
Central Kalimantan is the third largest crude palm oil (CPO) producing region in Indonesia, after Riau and North Sumatra. It had significant installed midstream processing capacity in 2013, including 83 CPO mills and 10 crude palm kernel oil plants (Dinas Perkebunan 2013). This mill infrastructure is heavily concentrated in Seruyan, Kotawaringan Timur and Kotawaringan Barat, three districts which are also close to large ports

Figure 5. Central Kalimantan Case Study: smallholder farmer productivity & profitability



Source: PILAR & CPI 2015

Figure 6. Midstream Production Gaps (2013)



Source: author analysis

and, combined, contain more than 75% of the oil palm planted area in the province.

In midstream processing operations, there are further opportunities to derive greater value by better utilizing existing mill capacity. On average, mills only operated at 50-65% of their installed capacity[8] in 2013. As shown in Figure 6, there was a production gap of between 2-3 million tonnes of CPO compared with installed mill processing capacity. This midstream-processing gap is in part owing to a lack of sufficient supply of fresh fruit bunches (FFB) to fully utilize mill capacity, with the gap of actual compared to necessary supply estimated at 13 million tonnes FFB in 2013.

As highlighted above in the upstream section, improving yields can help to reduce this production gap. We estimate that increasing planted oil palm yields to the levels equal to the Malaysian national average of 19 tonnes FFB/ha would reduce the production gap by about 40%. However, for all installed mills to reach 100% capacity, an additional 300,000 hectares of highly productive, sustainable oil palm plantations would still be needed to generate sufficient FFB supply.

Given that Central Kalimantan has an estimated additional two million hectares of land slated for oil palm plantations, this under-supply of FFB is likely to be addressed in the near term. However, in addition to supply challenges, interviews suggest that infrastructure, energy access and supply chain integration may pose further challenges for some mills. Integration into the supply chain also poses a problem for smaller scale actors who commonly do not have off-take contracts for the sale of their FFB, but must sell their FFB promptly post-harvest within the 24 to 48 hour time period before FFB quality significantly deteriorates.

There is also considerable scope to strengthen sustainability of midstream operations, which may in turn have a correlation to productivity. In 2013, companies were not required to complete certification under the Indonesian Sustainable Palm Oil (ISPO) system. However, of the 83 mills, 17 were RSPO certified (RSPO & Global Forest Watch). While only accounting for around 20% of the installed mill capacity, these mills produced roughly one third of the province's CPO in 2013. This suggests that certified mills were not only observing more sustainable practices, but they also were less impacted by broader supply and infrastructure challenges.

More detailed analysis is needed to better understand how many mills operated under capacity in 2013, where they are located, the degree to which they suffered from infrastructure or energy challenges, and how they are supplied with FFB (e.g. % from own-source plantations, vs. third party companies and smallholder farmers). This analysis would help to inform development of well-targeted policy and investment tools to support

8 Based on analysis of Dinas Perkebunan estimates on mill production capacity, compared with various estimates of the actual volume of CPO produced in 2013.

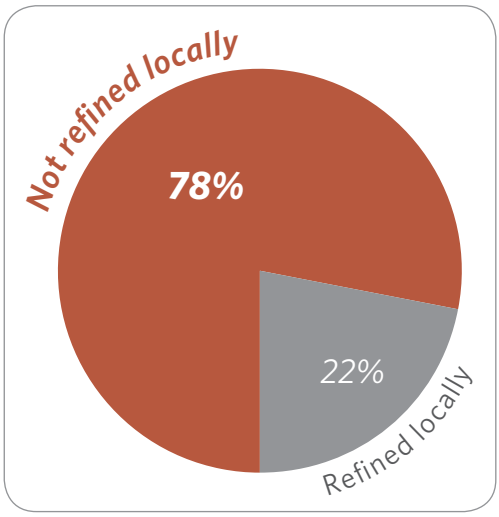
improved value-added in the midstream.

3.1.3 DOWNSTREAM OPPORTUNITIES

Downstream, Central Kalimantan has comparatively limited processing capacity, which represents a significant reduction in value-added retained by Central Kalimantan from this key economic sector. With only two refineries and one biodiesel plant in 2013, Central Kalimantan's processing capacity is considerably lower than the downstream processing capacity found in Sumatra. In part, this may be driven by the fact that unlike FFB, processing of CPO and palm kernels does not face the same time-bound pressures to prevent loss of FFB quality. As such, it is more readily shipped and processed elsewhere. However, as a consequence, only 22% of Central Kalimantan's CPO was locally refined in 2013 (see Figure 7), resulting in an outflow of the potential value add.

This lack of downstream capacity presents a potential opportunity for the region to derive more value-added by promoting the development of refining facilities within the province. Further analysis is needed in relation the costs, barriers and opportunities for such downstream development, as refineries require suitable infrastructure and energy access, among other factors, to become viable investment propositions.

Figure 7. Downstream Production (2013)



Source: author analysis

4. Business Investment Models

Central Kalimantan hosts a wide spectrum of oil palm business models, including for companies' and smallholder farmers, and as a result, there are large variations in productivity, profitability, and risk exposure for different actors within the sector.

In order to understand how to capitalize on the opportunities to derive more value added from oil palm in Central Kalimantan, as outlined in section 3, it is important to understand the various actors involved in the value chain and how different policies or business tools would impact their operations and business decisions.

This section provides an overview of the most prevalent business models utilized by palm oil companies operating in Central Kalimantan, and Indonesia more broadly. We define business investment models as the production and manufacturing systems applied by business actors and smallholder farmers to produce fresh fruit bunches (FFB) and convert them to crude palm oil (CPO) and crude palm kernel oil (CPKO), as well as other derivative industrial and consumer products.

The models in Central Kalimantan range from as simple as 'trees to fresh fruit', to more complex integrated models that include plantations right through to downstream processing plants, including shipping, logistics, distribution, and financing strategies. They also range in size, with smallholder farmers managing between 1-25 hectares of plantation, or 1000+ hectares in the case of farmer cooperatives or groups, and companies managing from 25 - 300,000+ hectares. For the more integrated business models, there is wide variation in the level of reliance on third party suppliers at each phase of production, while for smallholder farmers, there are also varying levels of independence vs. partnerships with companies and other third parties.

Figure 8 provides an overview of the main transaction pathways within the oil palm value chain. More specific business models are then detailed in the remainder of this section, where we divide models into two main, overarching categories: smallholder models, and company models.

4.1 Smallholder farmer models

A recent PILAR study, explored the main business models employed by smallholder farmers in Central Kalimantan, and examined the opportunities to increase productivity and profitability of these (see Figure 8). They main models are:

Partnership models:

- Farmer-managed cooperatives
- Individual partnership scheme (company plasma model)
- Company-managed, smallholder farmer owned, plasma plantations

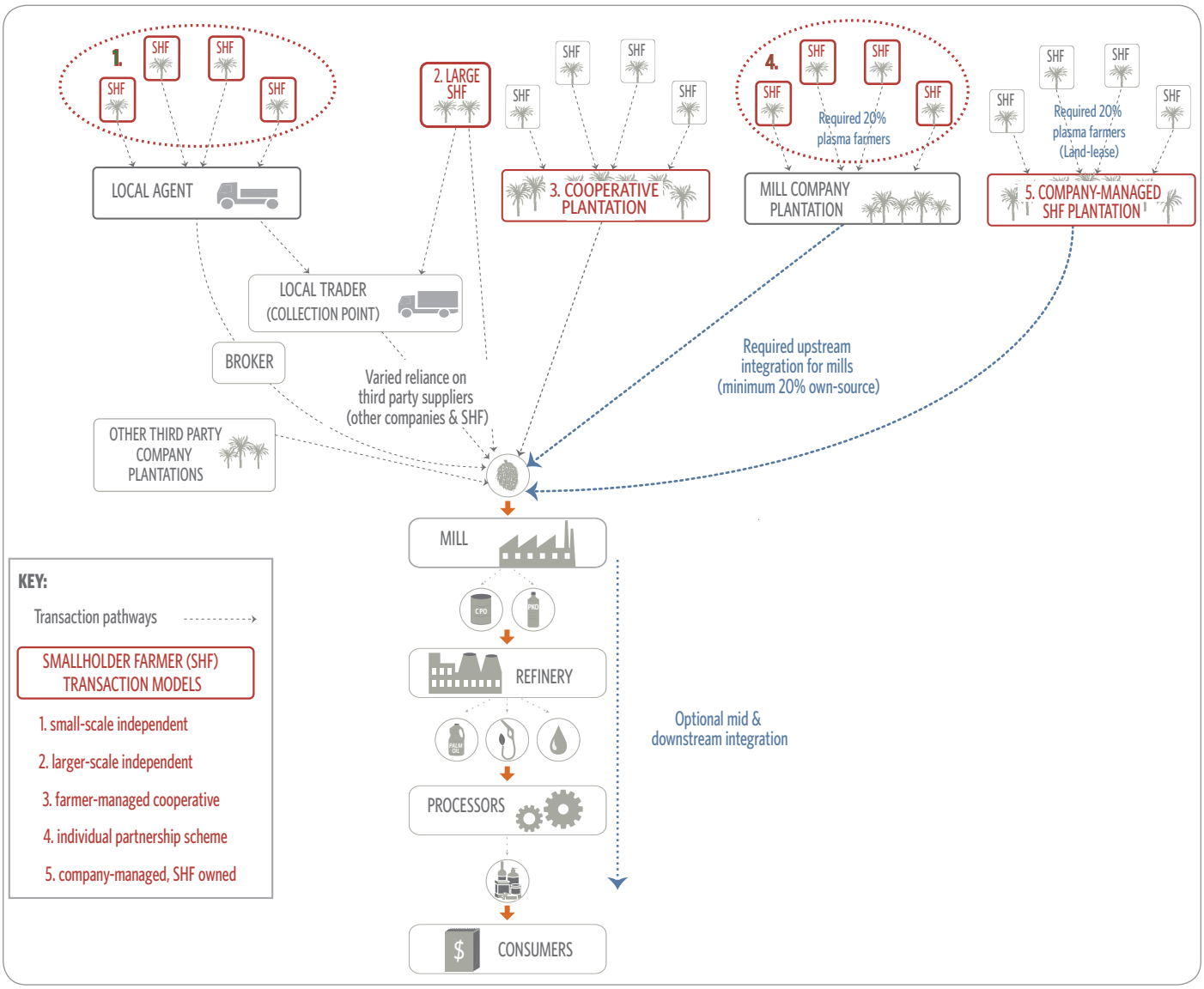
Independent models:

- Small-scale independent farmers (generally ~2-5 hectare plantations)
- Larger scale independent farmers (generally ~10+ hectare plantations)

Overall, the PILAR study findings provide a strong case for supporting larger scale, more integrated smallholder farmer plantation management. Both the cooperative and company-managed plasma models contribute to better performance in terms of yields and profitability per hectare. Both models allow for better planning and more efficient management, while also mutualizing risks among a larger pool of members.

In follow up to this study, PILAR is undertaking a series of case study analyses to better understand the features of a successful cooperative, and to develop a toolkit to support smallholder farmers and companies to select and implement the most suitable model of organization and value chain integration.

Figure 8. Oil Palm Value Chain Transaction Pathways



4.2 Company models

4.2.1 MODEL A: INDEPENDENT PLANTATIONS

Model A is the simplest company investment model and involves small to medium scale plantation management, without valued added investment in mid to downstream processing.

Actors investing in this model are highly reliant on business relationships with midstream mills to ensure purchase of their fresh fruit bunches (FFB), which should ideally be processed within 24-48 hours after harvesting.

Company plantations falling in this category commonly range from 25 - 100 hectares.[9] Historically, some larger plantations in the low 1000s of hectares were managed under this business model. However, under Ministry of Agriculture Regulation No. 98/2013, plantations larger than 1000 hectares are now required to have integrated plantation to mill operations.

Consequently, most companies utilizing the independent plantation business model are relatively small, and hence, generally, are not publicly listed companies. As such, relatively little information is publicly available on the operations of independent plantations, including their levels of productivity and profitability.

9 Plantations under 25 hectares are classified as smallholder plantations in Indonesia.

4.2.2 MODEL B: INDEPENDENT MILLS

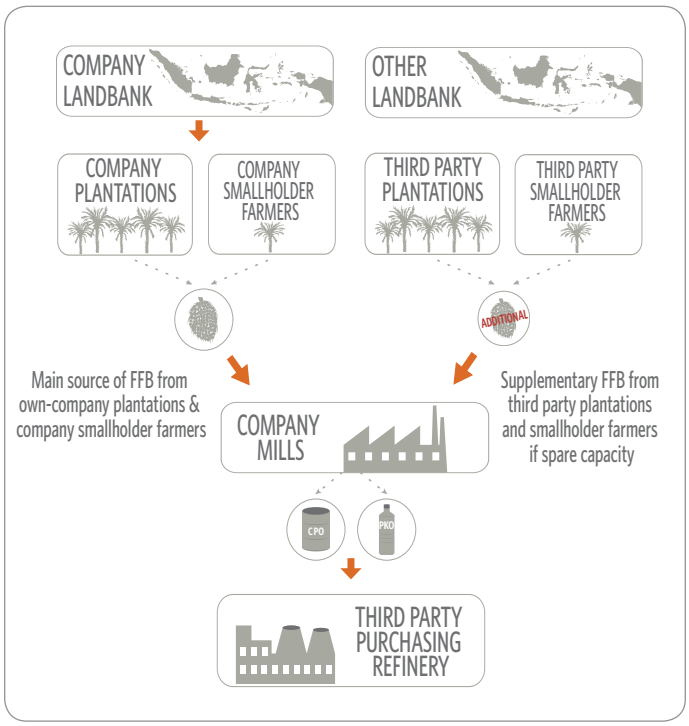
Like in Model A, Model B involves investment at a single point in the value chain.

The Ministry of Agriculture Regulation 98/2013 requires mills to source at least 20% FFB from their own linked plantations. There are, however, some exceptions where land availability is limited, or where there are numerous pre-existing independent mills. So, despite this regulation, independent mills are still common in many parts of Indonesia, and are managed by investors who do not have a linked upstream plantation investment. As such, they are reliant on third parties to provide FFB for processing.

Independent mills often have relatively small processing capacities, below the standard 30-45 tonnes FFB per hour[10].

As with Model A, mills are often smaller actors and not publicly listed, and as a consequence information about the productivity and profitability of this model is relatively limited. It is likely that independent mills face particularly high challenges in terms of operating at full capacity, given their heavy reliance on third parties. As such, working with actors who fit within this model would be important to realize the midstream opportunities to improve productivity outlined in section 3.

4.2.3 MODEL C: INTEGRATED UP TO MID STREAM, WITH LOW THIRD PARTY RELIANCE



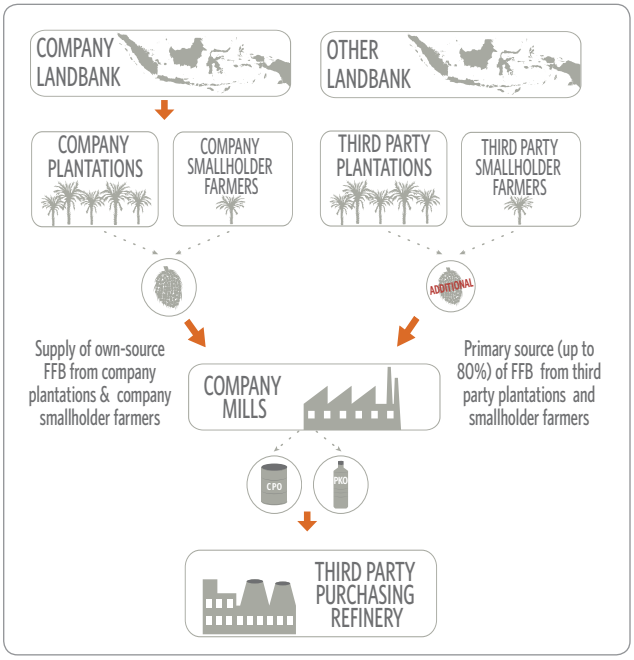
The majority of small-medium enterprises engaged in the palm oil industry in Indonesia invest in Model C. However, some larger scale investors also follow this model. It is often referred to as the 'grower model', as the primary focus of business operations is on the upstream or plantation side.

Under this business model, companies own mills with sufficient capacity to process the FFB generated by their own land bank and any associated company smallholder farmers. Consequently, they are fairly independent operators, although they will at times receive supplementary supply of FFB from third party plantations or smallholder farmers in the event they have spare milling capacity. They are reliant on third party downstream refineries and processors to off-take their CPO and CPKO.

Companies following this model hold varied sizes of land bank, commonly ranging from 1,000 to 30,000 hectares. Additionally, some larger operators with land banks over 400,000 hectares follow this model. Company managed plantations are commonly more productive than smallholder farmer or smaller-scale operations, owing to scale and improved access to higher quality inputs such as seedlings and fertilizer, and use of *good agricultural and management practices*. There is limited information relating to their productivity or capacity utilization midstream.

10 Under Ministry of Agriculture Regulation 98/2013, mills must have a minimum of 5 tonnes FFB per hour capacity.

4.2.4 MODEL D: INTEGRATED UP TO MID STREAM, WITH MEDIUM TO HIGH THIRD PARTY RELIANCE

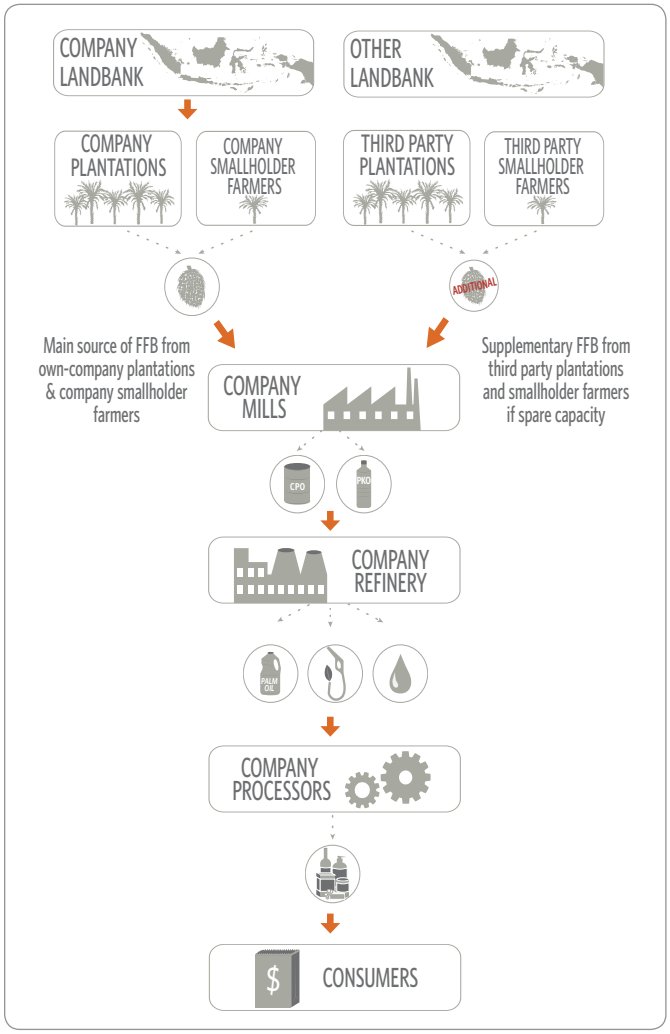


Model D is similar to Model C, involving integration of plantation and mill operations. However, the main difference is that companies investing in this model invest in significantly greater midstream processing capacity compared to the size of their existing land bank. This investment is frequently intended to accommodate future growth in their plantation base.

As such, mid stream processing is a larger focus of this model's operations and there is a medium to high reliance on third party providers of FFB, at least in the short to medium term, impacting both the risk and investment profile of this models.

Companies following this model often have a land bank of 80,000 to 300,000+ hectares. As with model C, this business model tends to have higher upstream productivity, but there is limited information relating to variations in midstream capacity utilization.

4.2.5 MODEL E: FULLY INTEGRATED, WITH LOW THIRD PARTY RELIANCE



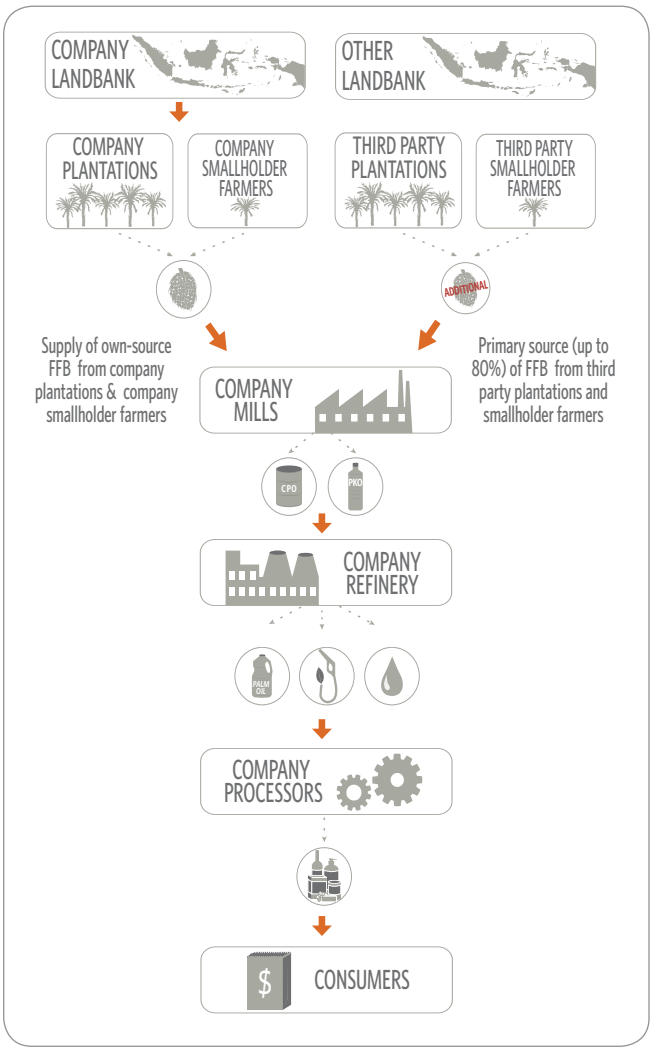
Larger-scale, multi-national company groups often follow Model E. This model involves integration of companies from upstream plantations, to mid-stream mills and downstream refining. Under this model, companies generally also produce branded consumer or industrial products ready for supermarkets or industrial users.

Like Model C, company groups following Model E have relatively balanced capacity throughout their supply chain, and as such have limited reliance on third party actors. Trading operations executing both physical and financial trades are also integrated into their systems. Research and development facilities may also be part of these larger agro industrial company business models.

These companies usually have plantation land banks of 100,000+ hectares, and high 'value-add' is captured through this model, as it involves the full value chain. As with models C and D, this business model tends to have higher upstream productivity, but there is limited

information relating to productivity and utilization of capacity in the mid and downstream.

4.2.6 MODEL F: FULLY INTEGRATED, WITH MEDIUM TO HIGH THIRD PARTY RELIANCE



As with Model E, Model F is usually followed by larger-scale, multi-national company groups. Again, these companies are fully integrated from upstream plantations, to mid-stream mills and downstream refining, and they produce branded consumer or industrial products ready for consumers or industrial users. These companies usually have plantation land banks of 100,000+ hectares, with multiple large sites spread across Indonesia.

However, like Model D, these companies have greater mid and/or downstream capacity relative to the size of their upstream plantations. As such, they have medium to high reliance on third party providers of FFB and CPO / CPKO (sometimes as high as 80%). Again, high 'value-added' is captured through this model, but with a different risk and investment profile to Model E. And similar to model E, this business model tends to have higher upstream productivity, but there is limited information relating to productivity and utilization of capacity in the mid and downstream.

4.2.7 MODEL G: DOWNSTREAM PRODUCERS

Larger-scale, multi-national company groups may also follow Model G. Their primary focus is on the production of consumer or industrial products, of which palm oil and its derivatives are an input only. As such, they generally only become involved on the downstream side of operations, at the refinery or processer stage, and hence have a high reliance on third parties to provide CPO and CPKO to support their operations.

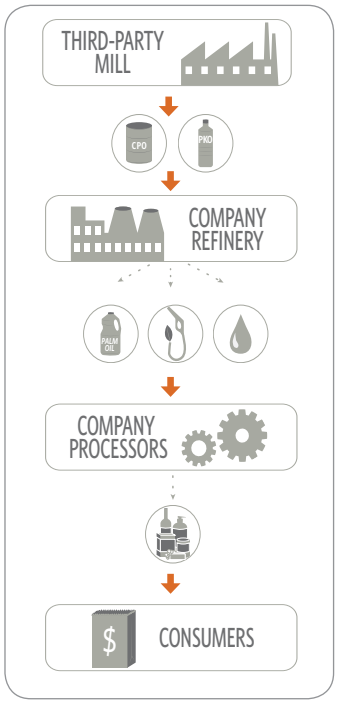


Table 1: Summary of Oil Palm Company Business Models

MODEL	SCALE	PHASES OF PRODUCTION	RELIANCE ON THIRD PARTIES
A	Commonly 25-100 Ha	Upstream only	High reliance to off-take FFB
B	Ranging from 5 - 30 tonnes FFB/ Hr	Midstream only	High reliance for supply of FFB and off-take of CPO
C	Commonly 1,000 – 30,000 Ha*	Up and midstream	Low reliance upstream, reliant for off-take of CPO
D	Commonly 80,000 – 300,000 Ha	Up and midstream	Medium-high reliance upstream, reliant for off-take of CPO
E	100,000+ Ha	Fully integrated – up, mid and downstream	Low reliance
F	100,000+ Ha	Fully integrated – up, mid and downstream	Medium-high reliance upstream
G	1+ refineries	Downstream only	High reliance for supply of CPO / CPKO

*Note there are some examples of larger scale companies with 400,000+ hectares also following this model

5. Transitioning to a sustainable palm oil sector

Transitioning to more efficient land use and deriving higher productivity, profitability, and sustainability in Central Kalimantan value chain will impact the different actors outlined in Section 4 in different ways. This is because their risk and investment profiles are substantially different, and as such they will face different costs and challenges in transitioning to more sustainable practices.

Overall, there is a case to be made for a transition to more integrated business models, which are better able to manage and distribute risk, coupled with targeted support for smallholder farmers and smaller, less integrated businesses to improve productivity and sustainability.

Policy enabling environments are also highly important to support business to deliver on both agricultural production and ecosystem protection goals, either by optimizing investment within their existing business models or transitioning to new more optimal business models.

In the previous sections of this working paper we identified initial opportunities to derive more value added from oil palm in Central Kalimantan and provided an overview of the wide-range of different business investment models utilized by actors engaged in the sector.

This section of the paper examines what this implies in terms of promoting the transition to a more sustainable, highly productive oil palm sector, by examining risks and costs associated with sustainability compliance.

5.1 Investment Risk Framework

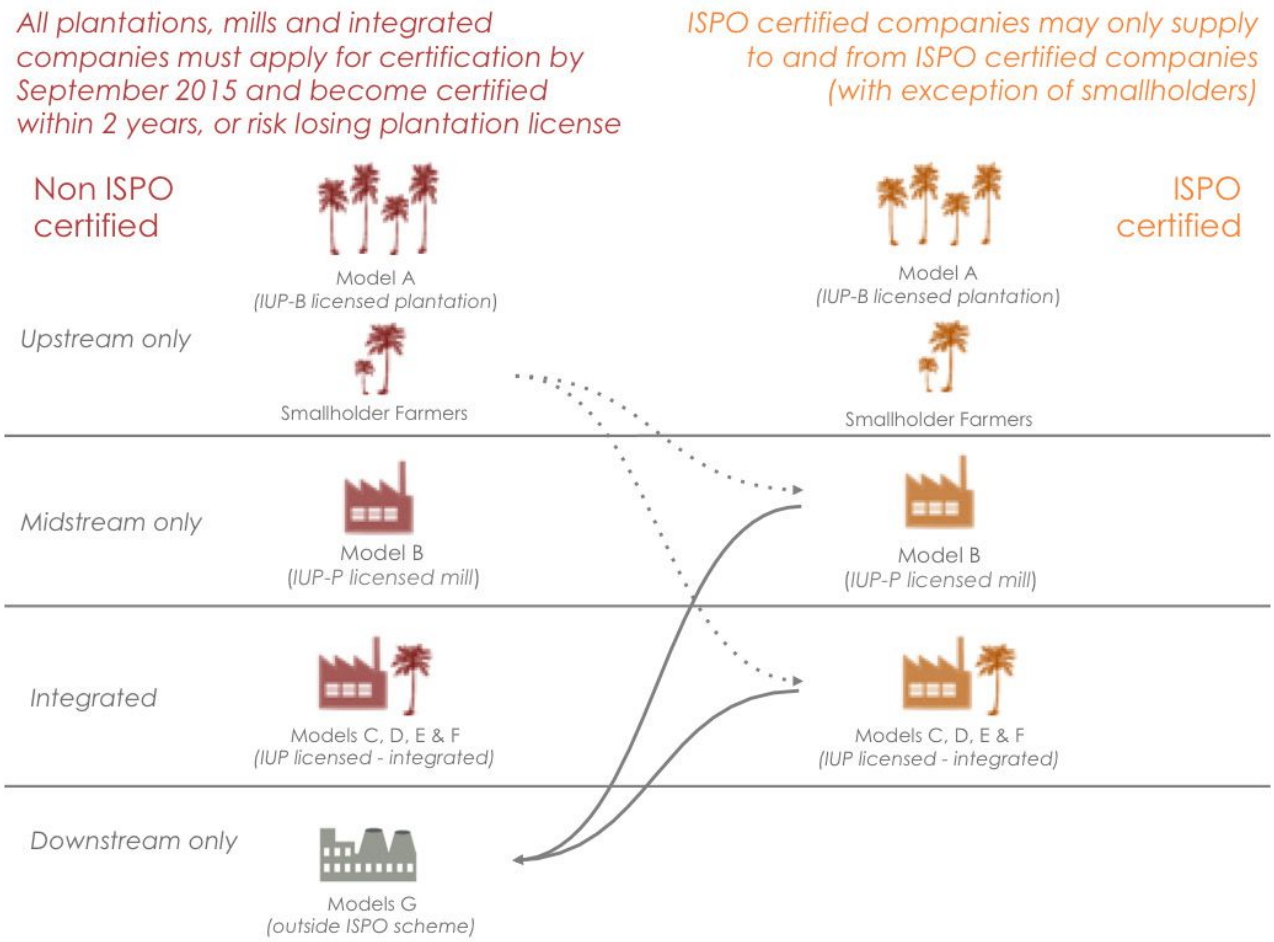
Managing risk plays a key role in relation to the transition towards a sustainable oil palm value chain actor, as various investment risks can act both as an inhibitor and motivation for changing business practices. On the one hand, shifting practices can incur unknown or new risks that businesses, particularly small-medium scale, are not willing to face or unsure how to manage. On the other hand, reputational, environmental, and social risks are acting a key driver for changing practices, particularly for larger business actors who sell to international markets.

As shown in Box 1, it is now mandatory for many businesses to start to take steps to address negative impact risks under the Indonesian Sustainable Oil Palm (ISPO) system. Taking advantage of the value-added opportunities identified in Section 3 while also adhering to sustainability requirements will carry upfront capital-intensive expenses, often with longer pay back periods than simply following a business as usual approach.

Understanding what business models and actors are willing and able to take on which risks, and at what cost, will hence be critical to developing appropriate policy and finance instruments to drive the transformation toward a sustainable and productive oil palm sector (Frisari et.al. 2013). Table 1 provides an overview of the main risk categories that apply to all investments in the oil palm value chain at each phase of production.

We will now look at some of the key risks in turn and a preliminary assessment of how they may relate to the different business models and phases of the value chain. This initial summary is observational in nature, and based on limited interviews and dialogues. Further analysis, in partnership with business, is required to test these hypotheses and inform the development of innovative business tools and policy frameworks that could help to comprehensively manage the full package of investment risks and promote the transition to more sustainable, yet still profitable, practices.

Box 1: Implications of the Indonesia Sustainable Palm Oil (ISPO) system for different business models



In recent years, there has been a growing focus within the Indonesian and Central Kalimantan Government's, as well as among business investors and civil society on how to best transform the palm oil sector from being a driver of deforestation, to one that is highly productive and sustainable. The introduction of the Indonesian Sustainable Palm Oil (ISPO) system in 2011 was an important step toward achieving this goal, although it is still in the early stages of implementation and their remains opportunities to strengthen this framework.

We will now briefly look at how this system applies to the business models set out in Section 4 of this report.

Smallholder farmers are not currently required to become ISPO certified, but may do so voluntarily. If they choose to become certified, smallholder farmers that are part of company partnerships or cooperatives have slightly more requirements to fulfill than independent smallholder farmers.

Models A to F are all required to become ISPO certified or they risk losing their plantation and operating licenses. The process of certification requires them to prove legality of operations (location permit, valid land concession, plantation business permit, company deeds etc.). It also requires the protection of primary forests and peat land, establishment of a sustainable business development plan and environmental management system (including greenhouse emissions reporting). Further, it mandates responsible employment standards and includes limited social responsibility and community economic empowerment requirements.

Notably, Model G, which enters the value chain at the refinery stage, is not required to become ISPO-certified. Although their Indonesian suppliers should all be covered by the ISPO system, this means there is no onus on refiners to ensure compliance.

5.1.1 FINANCIAL RISK

Financial risk includes inability to access investment capital at affordable terms and currency exposure.

Companies operating at single points up or midstream in the value chain have the highest investment risk, owing to their relatively limited collateral and smaller scale of operations. This applies to smallholder farmers as well as company models A and B. The more integrated the business model, the higher the ability to raise finance at affordable rates due to the ability to use cross collateral.

Within the oil palm value chain, currency risk is highest at the transition between up to midstream, where transactions shift from Indonesian Rupiah (IDR) to USD. This again means that actors operating at a single up or midstream point are most exposed to these currency fluctuations, with more limited tools available to manage the risk. Integrated business models are still exposed to various financial risks, but they are better able to manage them either within their own operations or by transferring the risk to other parties, albeit at a cost (for example through currency swaps, interest rate swaps, and derivatives).

This overall ability to manage financial risk is key in considering different actors' abilities to invest in more sustainable practices. Actors that already face high financial risks under a business as usual scenario are less likely to be able to invest in the transition. Given sustainability goals are linked to delivering net environmental and social impacts, failure to support the full spectrum of business actors to transition to more sustainable practices risks undermining progress toward sustainability overall.

5.1.2 PRODUCTION RISK

Production risks include operational risks that may impact production and climate risks, such as natural disasters.

While all actors have relatively even exposure to climate risk, larger scale operators will generally be able to invest in technology and management systems to better mitigate these risks. Smaller scale operators at single phases of production, on the other hand, are unlikely to be able to invest in such measures. This imbalance is a cyclical issue, and part of the reason for lower productivity of smaller-scale actors outlined in Section 3. As such, helping smallholder farmers and small-medium operators invest in improved practices, or shifting towards larger scale, more integrated models of production will help them to address productivity challenges. Increasing productivity and profitability will better equip actors to be able to invest in tackling additional negative impact risks and transition toward sustainable practices.

5.1.3 MARKET RISK

Market risk includes inability to access high quality and timely production inputs, such as seedlings and fertilizer upstream, FFB midstream, or CPO and CPKO downstream. It also includes off-take risks, where producers are not able to trade their goods with suitable buyers, price volatility risks and market access risks where traders are not able to sell into certain markets due to lack of compliance with market standards or requirements.

As with financial risks, companies operating at single points in the value chain have high supply and off-take risks. On the supply side, this also includes larger scale actors following Model G, where they only engage in the oil palm value chain at the downstream phase. Off-take risk is particularly high for companies only operating upstream, given FFB needs to be processed 24-48 hours after harvesting. This has a high impact for smallholder farmers and independent plantations. Similarly, actors that are integrated, but have a higher reliance on third parties at various points in the value chain, also face increased supply risk.

Market-access risk is particularly high for actors with downstream operations; given this is the point at which most international market requirements, such as requirements to meet sustainability standards are imposed. Where these downstream actors have higher reliance on third parties, this risk is particularly acute if they cannot attract sufficient supply from up and midstream suppliers to meet such standards.

This means that, in general, market risks are best managed by integrated actors with relatively consistent capacity at all phases of production.

5.1.4 NEGATIVE IMPACTS RISK

Negative impact risks are the focus of calls for sustainable agricultural supply chains and include risks that production of palm oil may have negative legal and social impacts on communities, or result in loss of environmental quality.

While these risks are present to some degree at all phases of production, the impacts associated with these risks are highest upstream. However, some

Table 2. Risk Overview – Oil Palm Value Chain

RISK TYPE		FEATURES	IMPACT
FINANCIAL	INVESTMENT	Shortage of required capital, unable to access capital at affordable terms	Abandonment of projects by potential investors
	CURRENCY	Unbalanced currency exposure between cost & revenues	Uncertain financial performance, lower profit margins or liquidity issues
PRODUCTION	OPERATIONS	Output impacted by management practices, technology, access to labor etc.	Lower yields, sub-optimal productivity
	CLIMATE	Output impacted by weather patterns / natural disaster etc.	Lower yields, sub-optimal productivity
MARKET	SUPPLY	Inability to source production inputs at various points in value chain (e.g. fertilizer & high quality seedlings upstream, FFB midstream, or CPO/CPKO downstream etc.)	Sub-optimal productivity, reduced output
	OFF-TAKE	Lack of demand, not able to find a suitable buyer	Lower / unstable revenues
	PRICE VOLATILITY	Uncertainty of realized output price due to fluctuating market prices	Lower / unstable revenues
	MARKET-ACCESS	Inability to sell into specific markets (e.g. EU) due to non-compliance with market requirements	Restricted market access
NEGATIVE IMPACT	LEGAL & SOCIAL	Disputed land ownership / land-use rights, other company-community conflict	Halting of operations, unable to access loan finance due to lack of collateral
	ENVIRONMENTAL	Environmental damage (e.g. water or air pollution), high emissions	Loss of environmental quality, failure to meet emissions reduction targets, increased production (climate) risk

of the associated costs are not applied until market access requirements discussed above come into play for downstream actors. As such, there is a discrepancy between which actors are best placed to address these risks and how the risk impacts and costs are distributed.

Integrated companies are again better placed to manage these risks, particularly those with low third-party reliance such as Models C and E. These models have the benefit of being readily able to trace their supply and to put in place mitigation measures both up and downstream to manage negative impacts and any associated market access implications.

However, given a large portion of the upstream sector is managed by smallholder farmers and small to medium plantation operators that have limited access to finance, these actors will require additional support to fully manage these risks and meet requirements under ISPO and other related standards and policies.

Legal risks are particularly challenging for many smallholder farmer plantations, given they often do not hold clear land title, combined with the prevalence of overlapping land claims and their limited ability to demonstrate plantations are located on culturally and environmentally suitable lands. Notably, ISPO is currently only voluntary for smallholder farmers, but given they manage more than 15% of Central Kalimantan's upstream plantations, and nationally around one third of Indonesia's plantations, supporting them to manage these risks effectively is critical to achieving a highly productive, sustainable oil palm value chain.

6. The way forward?

Given the heterogeneity of actors and diversity of investment risks throughout the oil palm value chain, coupled with the significant opportunities to derive greater value-added, we propose a landscape management approach as the best way forward to achieving improved agricultural production across multiple actors and better ecosystem protection.

Given the diverse interests and actors who participate in the oil palm supply chain, it is clear that no single actor can deliver a 'sustainable oil palm sector' on their own. As opposed to each plantation and business being required to manage and deliver *agricultural production* and *ecosystem protection on a plantation by plantation basis, a* landscape management approachinvolves a **partnership between government, business, and community** actors who's combined capabilities, interests and actions can deliver sustainable oil palm across an entire landscape and supply area.

6.1 Piloting a landscape management approach

Through an ongoing partnership between PILAR and CPI, we support the Central Kalimantan Government, together with 2-3 selected district governments, business and community partners, to test this approach across district-wide landscapes under the planned ***Production-Protection Approach to Landscape Management (PALM) Program (2016 – 2020).***

The strategic delivery framework for the PALM Program is set out at Figure 9. An important component of this approach is developing evidence-based, enabling policies that provide the right fiscal settings and business tools to support business actors, including smallholder farmers, to effectively manage risks discussed in Section 5 and investment in sustainable practices.

The PALM Program strategic framework will be implemented through a dynamic and iterative approach, with ongoing analysis informing evidence-based design and testing of actions through on-ground pilots with government, business, and community. This involves active learning and periodic evaluations to assess whether policies, tools, and actions are improving productivity and sustainably expanding production within the oil palm value chain in order to support the end goal of sustainable, socially inclusive regional development. The PALM Program components and strategic framework are discussed in more detail in a related discussion paper, Central Kalimantan Production-Protection Approach to Landscape Management (PALM): Strategic Framework (2016 – 2020).

7. Conclusion

This working paper provides a first, comprehensive overview of Central Kalimantan's oil palm value chain and the key actors within it. It provides some initial insights into the opportunities for optimization of the value chain in order to achieve productivity, profitability, and sustainability gains.

7.1 Key Findings

We find that substantial value was derived from the Central Kalimantan oil value chain in 2013, more than USD 2 billion in total. However, there are opportunities throughout the value chain for deriving greater value to support sustainable, socially inclusive development in the region. These include:

- Increasing land productivity upstream, particularly for smallholder farmers, including by applying good agricultural practices and technology;
- Better utilizing existing capacity, such as mid and downstream processing and manufacturing facilities; and
- Strengthening organization and integration of actors within and between phases of production throughout the value chain.

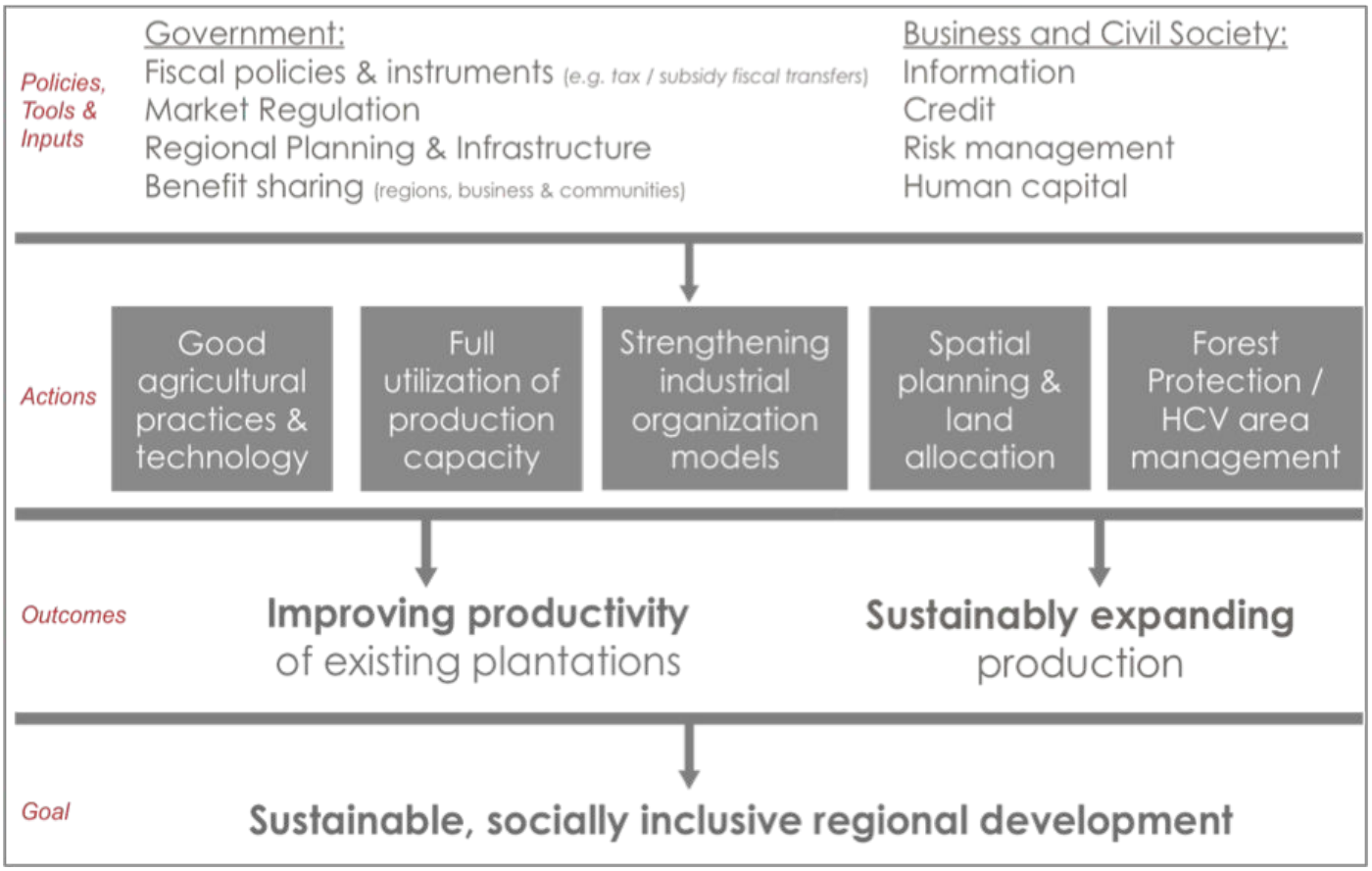
Given the wide variety of business actors involved throughout the value chain, business tools and enabling policies will be needed to support actors to effectively manage risks and transition to highly productive, sustainable practices.

We therefore propose a landscape management approach, supported by the PALM Program, as a way forward to design and test actions in selected pilot districts with government, business and community partners.

7.2 Further Analysis

The PALM Program will support ongoing analysis, building on this working paper within PILAR's four work streams. We propose the following areas of analyses and case studies as next priorities for informing the detailed design of business tools, approaches and policy reforms:

Figure 9: PALM Program Strategic Framework



- Case studies on the features of successful smallholder farmer cooperatives to inform development of a toolkit to support smallholder farmers and companies to select and implement the most suitable model of organization and value chain integration.
- District-level value chain analysis to better understand:
  - » Variations in upstream productivity between different business models;
  - » How many mills operate under capacity, where they are located, the degree to which they suffer from infrastructure or energy challenges, and how this varies relative to different business models;
  - » The costs, barriers and opportunities for such downstream development, as refineries require suitable infrastructure and energy access, among other factors, to become viable investment propositions;
  - » The prevalence and impact of investment risks on different business models.

7.3 Recommendations

There is potential to improve data quality and availability relating to the oil palm value chain. Development of a more comprehensive, disaggregated and comparable database relating to licensing, production and sustainability, among other things, would be valuable to support ongoing design and implementation of evidence-based policies and business tools to promote increased value-added and sustainability throughout the oil palm sector in Central Kalimantan.

We also suggest that translating Central Kalimantan's oil palm planted area target into a production-based target could also help to encourage higher productivity and more efficient use of existing lands as a first priority over expansion.

7.4 Next steps

In follow up to this working paper, we will support an ongoing multi-stakeholder dialogue and further analysis to improve understanding of Central Kalimantan's oil palm value chain and develop implementation-ready options for capitalizing on these above opportunities.

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