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Overview of Indonesian Oil Palm Smallholder Farmers

November
2015

A Typology of Organizational Models, Needs, and Investment Opportunities

Published by:
Daemeter Consulting

With funding support from:
The Climate and Land Use Alliance (CLUA)

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Citation:
Daemeter Consulting (2015): Indonesian Oil Palm Smallholder Farmers: A Typology of Organizational Models, Needs, and Investment Opportunities. Daemeter Consulting, Bogor, Indonesia

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First published in Jakarta, November 2015

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This Working Paper provides an overview of smallholder oil palm farmers in Indonesia, describing (i) their contribution to production, (ii) provinces where they're most abundant, (iii) a proposed typology of smallholder organizational models, and (iv) an overview of smallholder needs, including access to investment or operating capital for replanting and to improve yields. The impact of smallholders on the environment is also described, followed by presentation of options to mitigate risk that investment oriented smallholder support programs will stimulate farm expansion into forested areas. The Working Paper is a background document for an ongoing research project in partnership with CLUA and others to identify challenges and opportunities for mobilizing investment to improve livelihoods and sustainability of smallholder oil palm farmers.

Synopsis

Indonesian smallholder oil palm farmers own and/or manage **at least 3.1 million ha of oil palm**, accounting for more than **40% of the total oil palm area** and generating an **estimated 35% of total crude palm oil** production nation wide. Smallholder farmers are present in all of Indonesia's palm oil growing provinces, with significant[1] areas of smallholder-managed farms in at least 18 provinces.

Based on planted area and number of households involved, the **10 highest priority provinces** for considering improvements to policies and programs related to smallholder farmers are: Aceh, Bengkulu, Jambi, Riau, West Sumatra, South Sumatra, North Sumatra, West Kalimantan, East Kalimantan and Central Kalimantan. These provinces all have **large smallholder managed oil palm area** (more than 150,000 ha each) and **significant numbers of smallholder farmer households** (more than 20,000 households each).

There are five main transactional models[2] for smallholder farmers:
1. **Small-scale independent farmers** linked to supply chain via local agents;
2. **Larger-scale independent farmers** linked to supply chain via local traders or mills;
3. **Farmer groups or farmer-managed cooperatives** that trade directly with mills;
4. **Smallholder farmer managed plots** linked with company plasma schemes; and
5. **Company-managed, smallholder-owned plantations** (leased community-lands).

The different models are present to varying degrees in different geographies and have varied benefits (e.g. productivity and farmer profitability) and risks (e.g. access to reliable markets and quality inputs such as seedlings or fertilizer).

Smallholder farmer needs vary tremendously with local conditions, but in general most farmers experience five main challenges to some degree, including: **organizational, productivity, financial, legal and sustainability challenges.** Some of these challenges are lessened by intrinsic features of the different transaction models (e.g., models 3, 4 and 5 have greater ability to access finance) and so pose fewer problems for some farmers, whereas legality of land title and security of tenure remain a challenge for all models (see Section 3 and Table 4 for more details).

While farmers in some organizational models may be better placed to manage challenges, all models would benefit from more systematic support for smallholder farmers to:
- Reduce transaction costs;
- Increase productivity and livelihood benefits;
- Formalize land tenure;
- Improve access to formal, long-term and affordable credit; and
- Ensure sustainable practices.

Overcoming challenges noted above could deliver marked improvements to farmer livelihoods. Yet, this does not necessarily translate to more sustainable outcomes, since improving farmer productivity improving farmer productivity does not necessarily mean farmers will reduce their impacts on the environment; it could instead encourage farm expansion into forested areas. Smallholder farmer interventions must therefore be carefully designed, and must be coupled with effective landscape planning to avoid undesired outcomes. Three potential options for this are discussed.

[1] Defined as >10,000 ha of planted oil palm
[2] Sometimes also referred to as smallholder organizational models or smallholder business models

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1 Overview of Indonesian oil palm smallholder farmers

Smallholder farmers are important actors in Indonesia's oil palm sector – managing up to an estimated 42% of the total oil palm area in 2013. It is therefore critical that they form part of the ongoing transition to a more sustainable palm oil value chain. Table 1 and Figure 1 depict their contribution to the sector as a percentage of oil palm planted area, and the associated crude palm oil (CPO) and palm kernels generated from smallholder farms. On average, each farming household manages about 2 ha of land, compared with private companies that manage about 4,000 ha. Additionally, in comparison to private companies and state-owned enterprises, smallholder farmers have lower productivity per hectare, as highlighted by their relatively low contribution to CPO and palm kernel production shown in Figure 1.

Based on planted area and number of households involved, the 10 highest priority provinces for considering improvements to policies and programs related to smallholder farmers are: Aceh, Bengkulu, Jambi, Riau, West Sumatra, South Sumatra, North Sumatra, West Kalimantan, East Kalimantan and Central Kalimantan (Table 2, Figure 2). These provinces all have smallholder farmer managed oil palm area more than 150,000 ha each and significant numbers of smallholder farmer households (more than 20,000 households each).

Table 1. Indonesia oil palm overview (2013)

Private Companies	State-Owned Enterprises	Smallholder Farmers
Planted area		
5,366,854 ha	803,817 ha	4,415,796 ha
		3,133,711 ha
CPO production		
15,012,254 tonnes	2,378,214 tonnes	9,504,982 tonnes
Palm kternel production		
3,170,671 tonnes	522,516 tonnes	1,886,280 tonnes
Number of actors		
1,442 companies	15 PTPN	1,458,319 households

Source: BPS 2013 Statistics (annual and agricultural census)

Figure 1. Indonesia oil palm overview (2013)

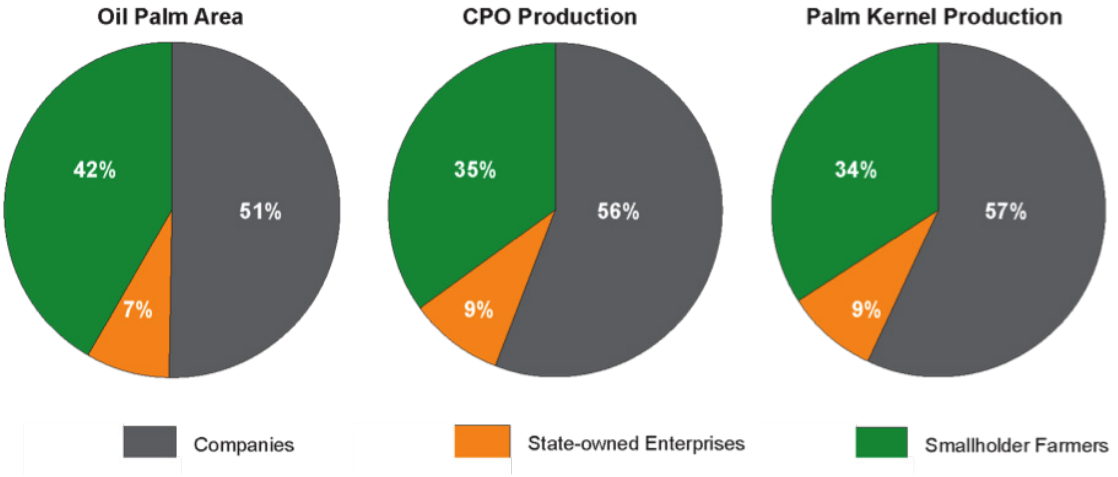


Table 2. Overview - Indonesian oil palm smallholder farmers by province

Province	Total Oil Palm Area (ha)[3]	Smallholder Farmer Area (ha)[4]*	SHF as % Total**	Smallholder Farmer Area (ha)[5]	Smallholder Farmer Households[5]***	Mean ha/ household
Aceh	393,792	**201,489**	**51%**	130,646	**87,590**	1.5
Bangka Belitung	192,777	60,567	31%	63,161	**28,557**	2.2
Banten	20,977	7,629	36%	3,801	4,814	0.8
Bengkulu	309,119	**210,589**	**68%**	157,409	**84,944**	1.9
Central Kalimantan	1,168,451	**181,136**	16%	115,184	**41,380**	2.8
Central Sulawesi	144,956	62,377	43%	22,136	10,218	2.2
East Kalimantan	829,451	**239,056**	29%	107,256	**38,271**	2.8
Jambi	721,403	**445,650**	**62%**	332,492	**125,695**	2.6
Lampung	170,876	93,699	**55%**	94,690	**74,094**	1.3
Maluku	16,124	-	0%	185	254	0.7
North Kalimantan	Not estimated	Not estimated	Not estimated	23,419	6,550	3.6
North Sumatra	1,276,314	**430,600**	34%	526,510	**332,868**	1.6
Papua	52,390	14,244	27%	2,894	1,040	2.8
Riau	2,226,570	**1,362,769**	**61%**	878,696	**308,089**	2.9
Riau Islands	19,277	1,265	7%	727	345	2.1
South Kalimantan	530,609	90,344	17%	35,398	16,372	2.2
South Sulawesi	32,906	23,413	**71%**	28,777	16,068	1.8
South Sumatra	941,063	**401,795**	43%	195,937	**76,774**	2.6
Southeast Sulawesi	62,264	5,538	9%	5,074	2,788	1.8
West Kalimantan	955,184	**332,983**	35%	193,730	**69,513**	2.8
West Papua	40,002	10,915	27%	5,953	2,159	2.8
West Sulawesi	96,599	48,574	**50%**	59,258	**26,906**	2.2
West Sumatra	373,693	**190,985**	**51%**	147,231	**98,100**	1.5

[3] Including private companies, state owned and smallholders
[4] Source: BPS Annual 2013 Statistics
[5] Source: BPS 2013 Agricultural Census

Figure 2. Distribution of smallholder farmers across palm oil producing provinces in Indonesia

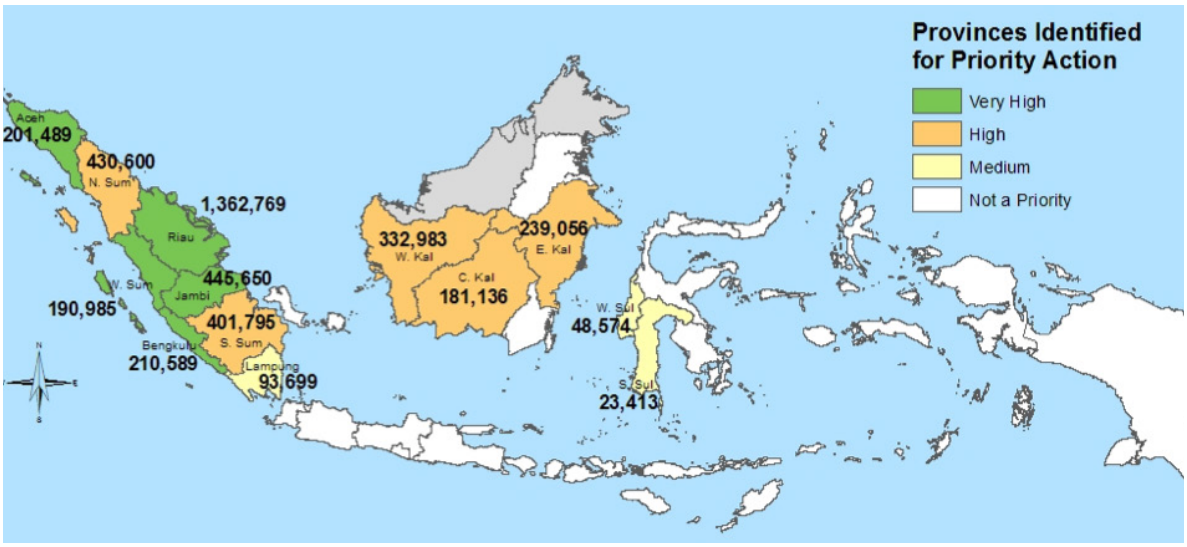


Table 3. Overview - land use by province

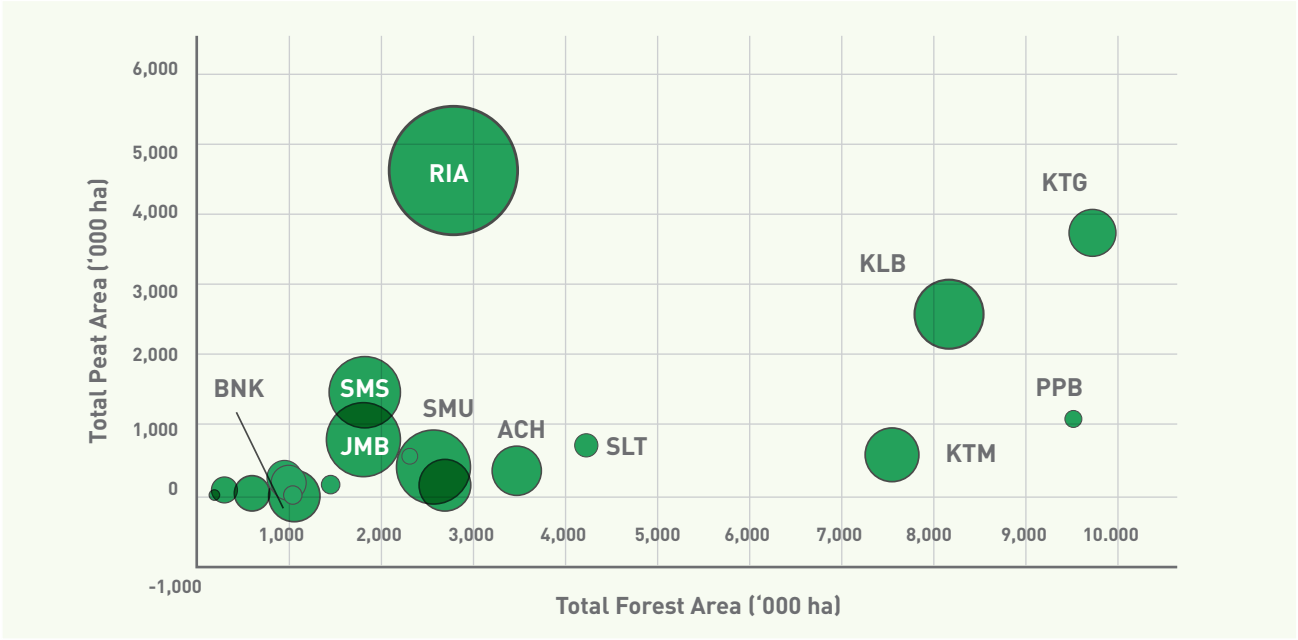
Province	Total Area ('000 ha)	Total Forested Area ('000 ha)[5]*	Forest as % Total**	Total Peat Area ('000 ha)[6]*	Peat as % Total*
Aceh	5,890	3,490	**59%**	337	6%
Bangka Belitung	1,480	340	23%	81	6%
Banten	966	219	23%	0	0%
Bengkulu	2,130	1,080	**51%**	20	1%
Central Kalimantan	17,020	**9,720**	**57%**	**3,733**	**22%**
Central Sulawesi	6,680	4,240	**64%**	729	11%
East Kalimantan	13,980	**7,570**	**54%**	606	4%
Jambi	5,270	1,810	34%	802	**15%**
Lampung	2,020	620	31%	24	1%
Maluku	4,691	3,450	74%	0	0%
North Kalimantan	8,210	**6,780**	**87%**	369	5%
North Sumatra	6,700	2,590	39%	385	6%
Papua	35,860	**25,500**	**71%**	**7,758**	**22%**
Riau	9,070	2,790	31%	**4,659**	**51%**
Riau Islands	700	360	**51%**	0	0%
South Kalimantan	2,950	970	33%	264	9%
South Sulawesi	3,370	1,460	43%	135	4%
South Sumatra	8,270	1,840	22%	**1,472**	**18%**
Southeast Sulawesi	3,680	2,310	**63%**	559	**15%**
West Kalimantan	16,330	**8,170**	**50%**	**2,594**	**16%**
West Papua	10,990	**9,540**	**87%**	**1,093**	10%
West Sulawesi	1,770	1,040	**59%**	101	6%
West Sumatra	4,510	2,720	**60%**	169	4%

Shaded green boxes highlight high priority provinces from ecosystem protection perspective (orange – second tier priority)
** Bold grey boxes highlights provinces with > 5 million ha remaining forest or > 1 million ha peatlands*
*** Highlights provinces where > 50% of total province is forested or > 15% is peatland*

[5] Produced by Daemeter, derived from modification of tree cover data provided in Hansen et al (2012)
[6] Produced by Daemeter, derived from combination of maps published by Wetlands International and RePPProT.

From a sustainable land use perspective, the highest priority provinces are West, Central and East Kalimantan, Riau, Papua and West Papua (Figure 3 Table 3). The three Kalimantan provinces and Riau are also high priority smallholder farmer provinces. With the exception of North Sumatra, other priority smallholder farmer provinces are all second tier priorities from an environmental perspective. North Sumatra has lower prospects to achieve direct environmental gains, but it merits consideration for smallholder interventions given it has the largest number of farming households and third largest smallholder farmer area of all provinces.

Figure 3. Ecosystem protection potential vs smallholder farmer presence



Bubble size proportional to number of smallholders (for reference, Riau = 1.36 million ha). Papua omitted to simplify scaling due to its 25.5 million ha of forest. Province coding: RIA = Riau, KTG = Central Kalimantan, PPB = West Papua, KTM = East Kalimantan, KLB = West Kalimantan, SLT = Central Sulawesi, ACH = Aceh, SMU = North Sumatera, SMB = West Sumatera, JMB = Jambi, SMS = South Sumatera, BNK = Bengkulu.

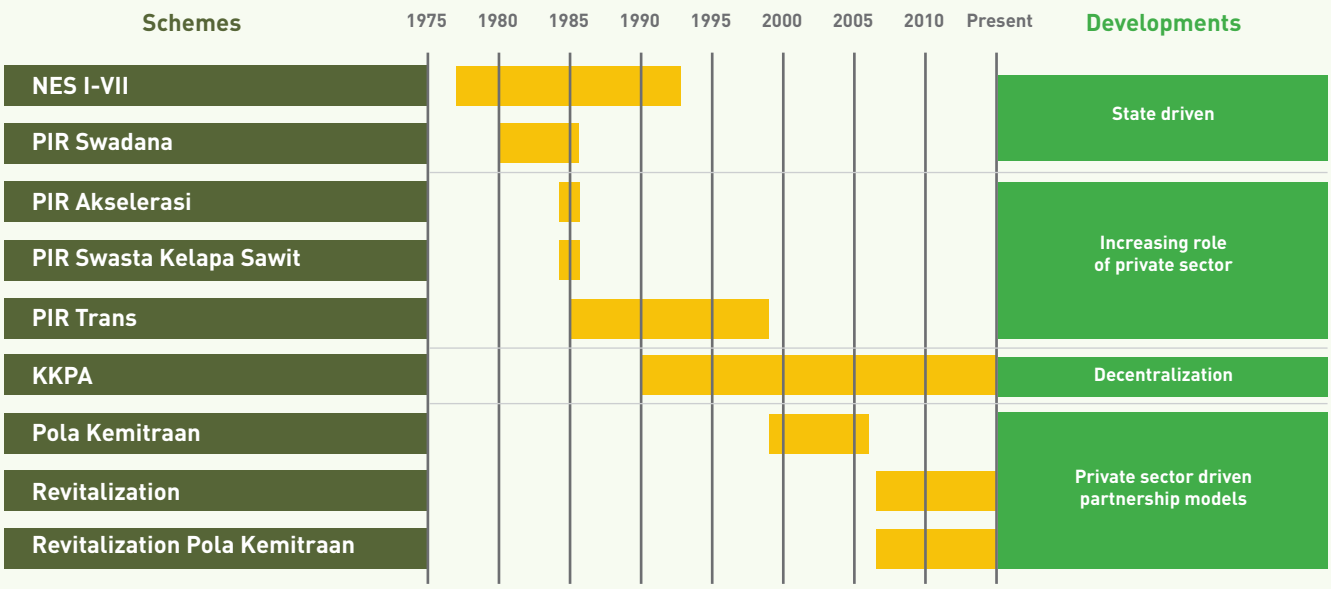
2 Main smallholder farmer typologies

2.1 Historical development

There are three main historical pathways by which smallholder farmers began participating in the oil palm sector (see Figure 4 for summary of programs):

- Participant in a government scheme;
- Approached to form a company-community partnership, wherein a company negotiated a deal with the community to secure land use rights for establishing a plantation in the area, alongside smallholder plots; and
- Farmer independently invested in and established an oil palm plot.

Figure 4. Overview of government schemes to promote smallholder development



Smallholders schemes

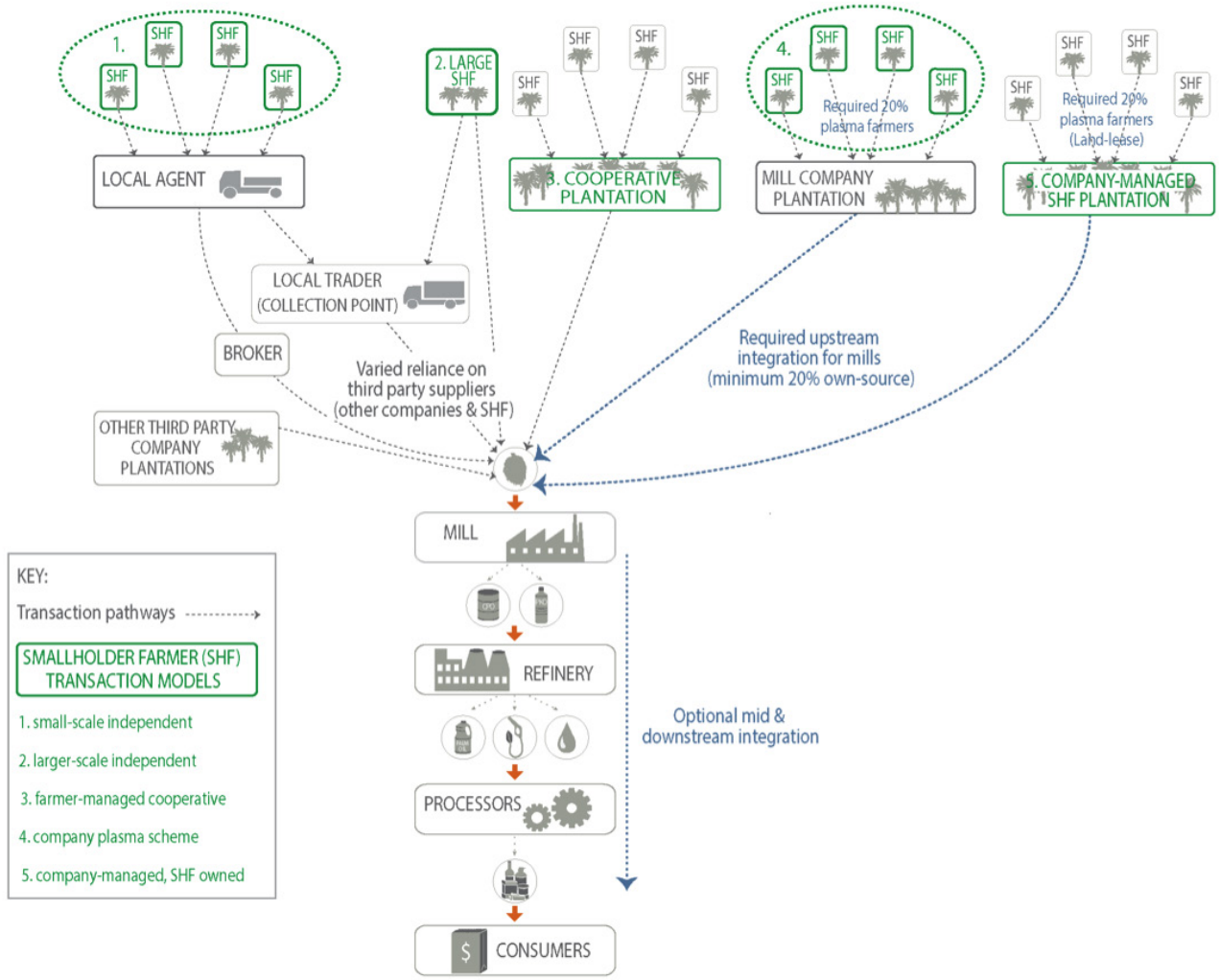
The first state led scheme in Indonesia was introduced in the late-1970s. Over time the governmental role in these schemes declined and private partners (plantation companies/mills) were encouraged to become more involved. The KKPA program in the 1990s introduced a new decentralized governance system, in which farmer organizations became engaged in the coordination of smallholders plantations. In 1999, the Pola Kemitraan scheme (Partnership Mechanism) was enacted, introducing new partnership models, including shareholder models, that reduced the active management role of farmers in a reduced autonomy of smallholders regarding plantation management. The most recent models have a private sector focus and include replanting efforts.

Source: IFC, Diagnostic Study on Indonesian Oil Palm Smallholders (2013)

2.2 Current transaction pathways and organizational models

The different pathways of historical development have also resulted in five main transactional models of smallholder farming (Figure 5). These five models, and the key features distinguishing them, are briefly described here, and summarized in Table 4.

Figure 5. Smallholder farmer transaction pathways



Source: Climate Policy Initiative (2015)

- **MODEL 1. Small-scale independent farmers linked to supply chain via local agents**. Under this model farmers typically manage 2-5 ha parcels of land. They are not locked in to formal company partnerships and are technically free agents to sell their FFB to whomever they choose. However, in reality, they commonly sell their FFB to one agent in order to ensure security of buyer, which is critical given the need to sell FFB within 24-48 hours of harvest before significant yield loss, and to receive a viable return on investment. This means they are integrated into the value chain via their **local agent partner.** Local agents may then play the market to obtain higher prices, subject to logistics. If there is more than one mill or local trader in the area (a 'collection point'), they will sell to the highest bidder. However, in some regions, there is only one logistically feasible sales point, owing to transport costs and time pressure to sell before yield loss. Contrary to theories that these middle players take significant profits, initial field surveys suggest that agents receive very modest profit margins per kilogram of FFB compared to farmers, and that they also take on the majority of the risk as they pay cash at farm gate and therefore may not be able to pass on subsequent charges/penalties to farmers.

This appears to result in some agents cheating the system (e.g. by 'under-weighing' farmers FFB) in an effort to recoup losses. While the transaction pathways for agents appear to be fairly consistent, initial field interviews suggest large variations in transaction fees, both in terms of fees agents pass to farmers and fees imposed on agents by the next point of sale. Local agents are often also farmers and prominent figures in the local social and political hierarchy, which appears to be a key motivation for performing this integrating function.

  - Similarly, **local traders** or collection points are points of aggregation for mills that collect FFB from multiple agents or larger scale farmers. They appear to provide a mechanism to reduce mill transactions, and in some instances to provide the necessary paperwork to enable mills to receive the FFB from established companies that meet local licensing requirements. Like local agents, they earn relatively modest profit margins per kilogram of FFB. However, their margins appear more stable than for local agents, as they are better able to pass on costs at this aggregation point prior to bulk mill delivery.
  - Where local agents sell directly to a mill, they do so via a '**broker**'. This broker earns a fixed percentage fee for connecting agents to mills (normally ~2%). They provide an important cash flow, as they pay agents daily while mills typically only pay them on a weekly basis. However, they appear to carry relatively little risk, only performing this function and reimbursing agents after they have delivered to the mill.

- **MODEL 2. Larger-scale independent farmers linked to supply chain via local traders or mills.** These farmers tend to be local middle-class actors managing plantations greater than 10 ha and often up to hundreds of hectares. They may also perform functions as local agents or local traders. They are relatively self reliant, and produce sufficient FFB per harvest to fill a small delivery truck and sell directly to a local trader (collection point) or mill. They will often employ other farmers to help manage their small plantations. This group of farmers are an increasing focus of attention due to indications they are a growing driver of deforestation and use of fire to prepare land.

- **MODEL 3. Farmer groups or farmer-managed cooperatives that trade directly with mills.** Under this model, a group of farmers pools together to trade with mid-stream mills. There are a variety of variations under this model. ***'Koperasi'*** or farmer groups may still manage a series of individual plots and work cooperatively only to trade or meet certification requirements. They will generally be free to trade with whomever; however, owing to logistics they will commonly only trade with 1-2 mills within the vicinity of their plantations. The *Koperasi* may or may not also perform some shared services, like providing access to fertilizer or finance, and distributing profits to farmers after FFB has been sold to the mill. Alternatively, some farmer groups are set up as **cooperatives** that may involve additional communal benefits for members. These are also commonly managed as one contiguous plot of land (sometimes an area made available to the community following the closure of a forest concession). Benefits of well-organized cooperatives include building a replanting fund through member contributions and reserve funds to guarantee minimum revenues to farmers in years of low yield or volatile prices.[7]

- **MODEL 4. Smallholder farmer managed plots linked with company plasma schemes.** Under this model, a company forms an arrangement with several individual farmers, generally located in close proximity to the company's plantation. The company typically holds the farmer land title in return for initial investment loans to development oil palm plots. The company typically also provides fertilizer, training, extension support and other services, with a formal off-take agreement obliging farmers to sell their FFB to the company. Once plasma farmers fully repay their credit obligations to the company, they can opt to become fully independent (Model 1) or retain close business relationships with the sponsoring mill.

[7] For example, see 'Opportunities for increasing productivity and profitability of oil palm smallholder farmers in Central Kalimantan', PILAR (2015), available at: http://climatepolicyinitiative.org/publication/oil-palm-smallholder-farmers-study/

- **MODEL 5. Company-managed, smallholder-owned plantations (leased community-lands)**. This final model is similar to Model 4, but instead of the farmers managing their own plots, the company effectively leases the land from the farmers and manages the plantation on their behalf, treating the landowner as shareholders and providing a dividend for their stake in the plantation. On the one hand, this model benefits from scale and generally higher productivity, but on the other hand, communities give up direct management control of their lands, which can come at a cost. Additionally, while they do 'opt-in' to the partnerships, in some instances the nature of land licensing may leave farmers with limited choice, the only alternative being to 'opt-out' and obtain no benefits. This problem of lacking agency to opt-out is also a feature of other models, particularly Model 4.

While reliable data on the percentage of smallholder farmers linked to different models are lacking, the IFC (2013) estimated roughly 1/3 of farmers in their diagnotic study sample were company supported, compared with 2/3 of farmers that were independent. Collecting detailed field data on the prevalence of different models in different oil palm geographies, as well as variations in transaction costs, productivity and profitability, will be a key focus of future survey work in up tp six provinces.

2.3 Different scales of 'smallholder' farming

As seen from the above descriptions and transaction models, smallholder farmers are not a homogenous group. They range from shareholders, to subsistence farmers, to small enterprises (or large individual landholders). To qualify as a 'smallholder farmer' in Indonesia, farmer plantations must be less than 25 hectares (Ministry of Agriculture Decree No. 98/2013). On average, smallholders manage around 2 hectares per farming household. However, field discussions and recent research suggest there is a rising class of local 'elite' farmers in established oil palm growing regions with sufficient capital to buy larger tracts (or multiple small parcels) of land, and appear to be avoiding licensing rules by registering plantation areas under multiple names to fall below the 25-hectare limit. Such farmers are effectively an emerging 'landlord' class and commonly have other sources of revenue, also frequently holding positions of power in regional social and political systems. This emerging elite class of farmers is present to some degree in all oil palm geographies, and are anticipated to play a significant role in future oil palm expansion, especially onto marginal lands or those not officially zoned for agriculture. The precise extent of elite landholdings versus smaller farmers is currently unclear and requires further investigation. It will be an important consideration in the design of systematic interventions to support smallholder farmer transition to more sustainable practices, as it has significant impact on patterns of sectoral expansion, power dynamics, land use change and the ability of such programs to support poverty alleviation.

2.4 Independence vs. company affiliation of smallholder farmers

As highlighted in section 2.2, there is a spectrum in the level of independence of oil palm smallholder farmers in Indonesia. While some farmers technically have a choice of where to sell their FFB and freedom to manage their own plots independently, in reality, all farmers are strongly affiliated with a limited number of company mills (generally 1-2 companies). This is owing to a combination of logistics and the need to sell FFB within a short time horizon post-harvest. As such, the focus on supporting 'independent' smallholder farmers in preference to the other models of company-supported or affiliated farmers could be misleading. Strengthening supply chain integration will generally help all farmers to better manage production, investment and market risks. See section 3.2 for further discussion.

Table 4. Summary of smallholder farmer transaction models, attributes and challenges.

Organisation	Productivity	Replanting	Financial Access	Legality	Sustainability
Transaction MODEL 1: Small-scale independent					
~2 ha on average. Sell FFB to an agent (normally only deal with one agent through an informal arrangement to ensure they have secure buyer).	Large variations in productivity observed in previous field studies. On average lowest productivity of all models.	Unlikely to have secure finance (formal or informal) at scale or with repayment grace period needed to support replanting.	Likely to have informal access only to finance via loans from agent (or potentially local credit union).	Less likely to hold formal clear land title.	No formal sustainability requirements, ineligible for RSPO (until organized in groups) and ISPO is voluntary.
Transaction MODEL 2: Larger-scale independent					
10s - 100s ha (can produce ~5000 kg/harvest, fill small delivery truck). Deliver FFB directly to mill or trader collection point and likely to be affiliated with one company/collector to ensure off-take security, although commonly no formal off-take agreement.	Limited field studies conducted on larger smallholders, so productivity range unknown.	Will be dependent on size of farmer assets, but more likely to have larger capital base and hence have ability to finance replanting. May still have challenges accessing formal sources of credit with appropriate loan terms.	Higher access to capital & informal loans from mills/collectors and local investors or smaller local banks. Unlikely to have sufficient collateral for large bank loans.	Generally have greater security of tenure, but large variation in whether they hold formal clear land title.	No formal sustainability requirements, ineligible for RSPO (as require farmer group) and ISPO voluntary. Increasingly cited as emerging driver of deforestation in established oil palm growing regions.
Transaction MODEL 3: Farmer groups or farmer managed cooperatives					
'Koperasi' is a group of farmers that may work collectively to trade or certify plantations (varied scale, commonly with ~300-500+ farmers), but otherwise operate independently. Whereas 'Cooperative' will have other associated benefits and pool farmer plots to manage as one contiguous plantation area (generally >1000 ha). Likely to have an affiliation and off-take arrangement (formal or informal) with one company.	Limited case studies indicated both farmer groups (Koperasi) and cooperatives tend to have higher productivity.	Cooperatives may have set-aside mechanisms to fund replanting, whereas Koperasi unlikely to have set-asides. Some cooperatives opt to rely on credit facilitated by companies to finance replanting.	Can potentially seek formal loan from bank will pooled group collateral, or informal loan from company with whom they trade. Some have internal credit facilities managed by cooperative.	More likely to hold formal clear land title, however many instances where title is insufficient or disputed.	Eligible for RSPO certification, as meet farmer group requirement ISPO remains voluntary, but imposes more requirements on farmer groups than independent farmers.

Organisation	Productivity	Replanting	Financial Access	Legality	Sustainability
Transaction MODEL 4: Smallholder farmer managed plasma					
Varied scales, with individual farmers managing 2-10+ ha plots. Multiple farmers will be affiliated with particular company, but individual farmers manage their plots independently. Generally have a formal off-take agreement with inti company.	Limited case studies indicate higher productivity than small-scale independent, but lower productivity than all other farmer group or company-managed models.	Likely to require replanting support and financing from inti company.	Access to informal loan finance from inti company.	More likely to hold formal clear land title, however many instances where title is insufficient or disputed.	May have sustainability requirements imposed by inti company, but many plots established independently pre-partnership. Eligible for RSPO if cooperate as a group; ISPO is voluntary but companies encouraged to support plasma certification.
Transaction MODEL 5: Company-managed SHF plantations					
Generally larger scale (1,000+ ha). Operate like a company plantation, but pay smallholder farmers benefits like 'shareholders'.	Limited field data, but presumed to have higher productivity typical of company productivity range.	Likely to manage cash flow to enable investment in replanting.	Company can access to loans from formal banking sector.	More likely to hold formal land title, however many instances where title is insufficient or disputed.	Unclear how ISPO requirements apply to company-managed smallholder plantations. RSPO requirements hold.

3 Overview of smallholder farmer needs

Some of the challenges faced by smallholder farmers pose **significant direct economic costs**, while others create disadvantages that will require **structural or institutional adjustments** to overcome. The main smallholder challenges, observed to one degree or another in all oil palm producing regions, are described below.

3.1 Land productivity challenges

Two key challenges linked to productivity pose direct economic costs. The first relates to improving productivity per hectare to provide more efficient land-use and greater livelihood benefits to farmers, and the second relates to replanting aging plantations to ensure that existing agricultural lands remain productive and farmers maintain livelihoods.

In relation to the first dimension, the relatively low productivity of smallholder farmers in Indonesia is well documented and shown in Figure 1. While productivity can vary significantly among locations and transactional models[8], the 2013 IFC smallholder farmer diagnostic study highlights the following average yield gaps:

- Independent smallholder farmers perform 40% below good agricultural scenarios for smallholder farmers and 116% below company plantation scenarios.
- Company-supported smallholder farmers are on average 6% below good agricultural scenarios for smallholder farmers, and 46% below company plantation scenarios.

Foregone smallholder revenue linked to productivity is estimated between USD 0.8 – 2.5 billion annually[9]. Initial field surveys suggest average profit margins for farmers are between 30-50% of total revenue, so this equates to a significant loss in farmer profit, with substantial impact on livelihoods. From a poverty alleviation perspective, there is a clear argument for supporting farmers to improve productivity.[10]

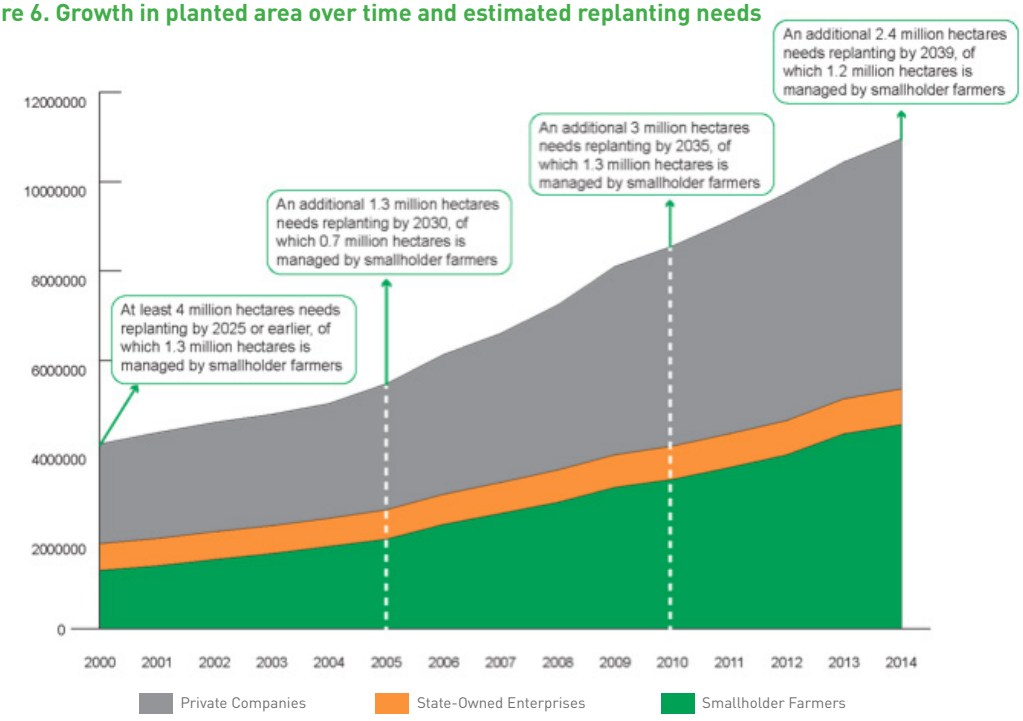
Replanting is a further dimension of the productivity challenge. All existing smallholder farmer oil palm plantations will require replanting by 2040 or earlier, or risk becoming unproductive unless converted to other uses. The total cost of replanting existing plantations is estimated between USD 18 – 23 billion.[11] Nearly 30% of the smallholder farmer area will require replanting before 2025, with an estimated cost of USD 5 – 6.5 billion (see Figure 4).

[8] For example, PILAR (2015) provides a case study of productivity of different smallholder farmer models in Central Kalimantan, within farmer productivity ranging from below 12 tonnes FFB/year/ha up to nearly 20 tonnes FFB/year/ha.
[9] Assuming FFB prices of ~IDR 1,000/kg, and range depending on whether BPS annual or BPS census land area figures are used. This compares actual FFB production in 2013 to potential production if smallholder farmers yielded 18 tonnes/ha on average.
[10] Environmental sustainability considerations relating to improved farmer productivity are discussed in section 4.
[11] Assumes replanting cost of IDR 40-50 million over 4-year plantation establishment phase, as estimated by SPKS.

Failure to replant these areas or convert them to other uses could increase pressure to deforest new areas in frontier regions, such as Kalimantan. Yet, the cost of replanting is prohibitive for many smallholder farmers, which can result in:

- Further reduced productivity if farmers continue to harvest declining plantations.
- Abandonment of the land and shifting to establish new plantations in other available (often forested) areas which are cheaper to clear.
- Use of fire to clear the old plantation.
- Replanting with cheap, low quality seedlings leading to ongoing productivity challenges.

Figure 6. Growth in planted area over time and estimated replanting needs



3.2 Structural challenges

Section 2 outlines the spectrum of transactional models for smallholder farmers in Indonesia. Different models often co-exist within the same district, and sometimes even down to the village level.[12] These models come with different associated organisational features, including scale, ability to access high quality fertilizer and seedling inputs, transaction costs and benefit sharing arrangements. These present different and well-documented logistics and infrastructure challenges, and combined, such organisational features can translate to different levels of productivity and profitability for farmers. Such differences in turn can lead to confusion among communities, with village neighbors deriving vastly different net incomes from the different transactional models.[13]

One example of logistics/infrastructure challenge that varies across models relates to the mode and frequency of FFB collection, and the associated infrastructure network. Small-scale independent farmers are wholly

[12] McCarthy, Gillespie and Zen (2011), McCarthy and Gillespie (2008)
[13] Gillespie (2011)

reliant on an agent to collect their FFB, while larger-scale independent farmers control delivery of their own FFB to their next point of sale. Given the large price impacts associated with yield loss, this fact has significant implications for farmers. Further, independent farming models are often located in regions with lower grade infrastructure, whereas other models tend to be coupled with higher investment in infrastructure, either by the cooperative itself (Model 3) or by companies (Models 4 and 5).

3.3 Legal challenges

Sustainability and net incomes of smallholder oil palm farming is also affected by problems tied to legality in Indonesia. The first relates to farm establishment phase, in particular whether deforestation occurred, and whether it was legal. A recent study by Forest Trends suggests that 80% of commercial agriculture plantations in Indonesia were deforested illegally.[14] The extent of illegal clearing by smallholders is not known, but a global study shows that between 2000-2010, 73% of tropical and sub-tropical deforestation was caused by agriculture, with 40% coming from commercial agriculture and the remainder from smallholder farming.[15] This would suggest that at least a part of deforestation in Indonesia is linked to smallholders, and that a portion of that is illegal. Several recent studies in Indonesia further suggest smallholder farms are emerging drivers of illegal forest conversion, often using fire, especially large-scale independent growers (Model 2).[16] The extent and geographic distribution of smallholder driven deforestation, and possible approaches to controlling this, are a top priority for further study.

A second important dimension of legality relates to the illegal use of fire as a tool to clear or manage plantation lands. Research shows that severe fires and the resulting haze only became a problem in Indonesia since the 1960s, when intensive agriculture was scaled up across Indonesia.[17] It appears that smallholder farmers are a significant contributor to emissions and smoke from fire, with recent analysis showing that 59% of emissions in Sumatra and 73% of emissions in Kalimantan occur outside company concession areas.[18]

A third challenge tied to legality is that few smallholder farmers have formal land ownership or use rights over their plantation area. While there is no reliable data on the area of smallholder land without freehold land title (*Sertifikat Hak Milik* (SHM)) issued by the National Land Agency (BPN), initial field discussions suggest it is a very large percentage of the total area. Instead of such title, many smallholder farmers hold a *Surat Keterangan Tanah* (SKT), which is a letter of ownership issued by the village head. SKT, however, often conflict, creating overlapping land claims and is not accepted as formal land title for all purposes. The absence of clear land title creates a number of challenges for farmers, especially on their ability to use land as collateral to access finance. Further, it can prevent formation of formal partnerships with companies, who might be unable to lease community land. And finally, it may further encourage under-investment in productivity or sustainability, given the risks around expropriation.

The small-scale independent farming model (Model 1) is least likely to have clear land tenure. One benefit of partnership is that many companies assist smallholder farmers to clarify land title as part of the arrangement. Yet, there are still many instances where smallholder farmers partnering with companies are reliant only on the weaker SKT land title, which may not prevail over other land titles or land use rights if legality is later challenged. APKASINDO estimates that 90% of smallholdings are without formal legal title, and that the lengthy process of engagement with bureaucracy and high costs involved (approximately IDR 4 million per 2-hectare plot) makes the process too daunting for most farmers to complete. If only 50% of the smallholder land area requires formal clarification of land title, this would suggest up to USD 260 – 370 million are required to formalize smallholder land title.

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[14] Illegality can include: use of fire to clear; improper license; clearance without timber permit; clearance on deep peat; clearance without plantation permit; clearance in river area; clearance outside concession boundaries (including in protected areas). Forest Trends (2014)
[15] Hosonuma et al. (2012)
[16] A new trend in palm oil production in the context of changing global demands: a portrayal of oil palm development in Riau Province, Sumatra, Indonesia; Palming off a National Park: Tracking Illegal Oil Palm Fruit in Riau, Sumatra.
[17] Field, R. D., van der Werf, G. R., and Shen, S. S. P. (2009), Human amplication of drought-induced biomass burning in Indonesia since 1960, Nature Geoscience 2:185-188
[18] Including oil palm, timber, logging and mixed company concessions. We note that reliable information on these trends are few, and the impact of SHF on forest varies widely across geographies.

3.4 Financial challenges

The price of FFB is one of the most important determinants of oil palm smallholder incomes. The regulated price is market-linked to recent average prices of CPO on global markets and set by provincial governments based on an official formula. The price is revised at least once per month, and often set on a weekly basis. However, this government set price is pre-transaction costs, and for farmers that do not sell directly to mills (e.g. small-scale independent farmers), they typically receive a price that is ~40% lower than the mandated FFB price, depending on steps in the value chain between farm and the mill. Even farmer models that enable selling directly to a mill will incur yield loss, sortation, unloading and other transaction fees at the mill gate, as well as the additional burden of transport costs.

Although FFB prices are usually posted on regional government websites and reported over the radio, websites are not always well maintained and many farmers don't have knowledge of the set price. This generally makes them price takers in a weak position to negotiate, particularly given the need to sell FFB before it deteriorates. Further, with significant recent fluctuations in CPO price, the FFB price has become volatile, yet farmer input prices are relatively fixed. As a result, farmer operating profits and household cash flow are significantly impacted by productivity of their own farms and the price volatility of FFB. Initial field interviews suggest that when FFB prices are strong, all models generate profits above or similar to regional minimum wages, yet when prices are weak income can dip below half the minimum wage.

There is significant variation among households in the importance of oil palm as a source of income. For families that rely predominantly on oil palm, fluctuations in price and productivity can have a major impact on livelihoods. Further study on household-level economics of oil palm is needed, and will be included in future field studies. While highly productive smallholder oil palm farming has the potential to alleviate poverty, limited field data suggests that low performing smallholder plantations with low market prices are likely to be operating at a net loss over the life of the plantation. Farmer perceptions of the overall profitability are impacted by higher cash flows in peak harvest years, without formal consideration of lifecycle economics.

As noted above, the legality of farmer land title has a significant impact on smallholder ability to use land as collateral to access credit from banks. As a consequence, farmers are commonly only able to access informal credit from their direct buyer (agent or trader) within the value chain. Further, where smaller actors such as local agents, brokers or local traders provide credit, it is normally provided with high interest terms and short tenor. These loans commonly also tie farmers to a particular buyer, even where they may technically be entitled to sell to different actors. Farmers are only able to utilise this credit as a short-term source of operating capital and subsidising household cash flow between harvests. Yet, it is not affordable or feasible to use such credit to finance longer-term, more sizeable investments such as replanting. Companies may be able to provide longer term loans to farmers, a frequent practice under past partnership arrangements, but again these loans terms often involve relatively high interest rates given the risk of farmer default borne by the company.

4 Transitioning smallholder farmers to sustainable practices

Section 3 highlights the significant potential to improve farmer profitability and livelihoods by addressing productivity, structural, legal and financial challenges. It also highlights that smallholder farmers are increasingly linked to impacts on the environment, and in some geographies can be a major contributor to deforestation. From a sustainability viewpoint, two considerations must therefore be balanced:

- Firstly, low productivity is a contributing factor to expansion of smallholder oil palm, with farmers growing larger areas of under-productive oil palm rather than intensifying production to meet livelihood and other needs.
- Secondly, improving productivity and profitability does not necessarily lead to more sustainable outcomes, as it could encourage smallholder farmers to further expand their holdings in an effort to improve their economic status.

Consequently, smallholder farmer interventions need to be carefully designed, and must be coupled with effective landscape planning and forest and/or peatland management to avoid undesired outcomes.

One approach is to support recent public and private sector efforts to integrate smallholder farmers into existing sustainability standards, such as RSPO and ISPO. This approach merits consideration, but plot-by-plot certification is proving to be a costly and time-consuming exercise, with numerous challenges to certifying farmers at scale. Further, experience to date shows that without company support, smallholder farmers are much less likely to be integrated into these schemes, raising questions about how to reach independent farmers in regions where they predominate.

A second approach is to incorporate conservation provisions into the terms and conditions of investment loans or credit extension to farmers. While this approach might hold promise, there are legitimate questions about feasibility of monitoring off-farm activities of individual farmers, attributing blame, and executing penalty provisions in Indonesia's rural environments. Further, given most smallholder farmers do not have access to formal sources of credit, this approach requires significant systemic changes to how credit is extended to farmers to become viable. Given the monitoring challenges, alternative approaches would seem to hold greater promise.

A third alternative is to promote jurisdictional or landscape based approaches to reach larger numbers of farmers at scale and (presumably) lower cost. These could also hold more promise for addressing deforestation risks compared with certification or contract-based approaches. A general framework for this approach is being developed by donor and private sector actors, and will be piloted in years ahead. At the smallholder farmer level, the main mechanism or entry point for engaging them as partners in a jurisdictional effort is the formal process of village planning. Firstly, this enables landscape level development and spatial planning at the village scale to ensure that land is allocated efficiently, sustainably and in line with local aspirations. Secondly, it provides a basis for clarifying land tenure at scale for households in the village (taking into account adjacent village boundaries), in partnership with government. Thirdly, it provides an entry point to work with smallholder farmers within the village on the suite of interrelated challenges described in Section 3. Overall, such a jurisdictional approach could provide a broader array of development benefits, reaching a wider cross-section of community members than farmer based approaches, and providing a mechanism to engage in forest management and protection activities.

5 Interim conclusions

- There are significant opportunities to improve oil palm smallholder farmer productivity and achieve sustainable development and environmental goals. Many constraints on smallholder farmer productivity and net income could be alleviated by investment finance, but increased deforestation risks linked to yield improvements must be managed to ensure sustainable outcomes.
- A jurisdictional or landscape-wide approach could offer a viable framework for achieving these goals at scale and delivering more efficient land-use at the village level in Indonesia.
- Further detailed data collection is needed to develop a deeper understanding of (i) the baseline conditions and prevalence of different smallholder business models across Indonesia's palm oil producing regions, and (ii) challenges to inform the design of smallholder farmer support programs that avoid preserve outcomes, including elite benefit capture, or increasing expansion into forested areas or high value ecosystems.
- Given smallholder farmers are a heterogeneous group, programs to support farmers to address structural challenges and to become fully integrated into sustainable supply chains cannot follow a one-size-fits-all model. Rather, a toolkit is needed to help farmers self-select the most appropriate model for their local context that will deliver the greatest livelihood and sustainable development benefits. All models have scope to be optimized and may be suitable under different conditions. It is however likely that in the process of strengthening transactional and organisational models, farmers will generally become more closely affiliated with a company or agricultural service provider partner that can help facilitate improved supply chain integration and access to high quality inputs, good agricultural practice training, financial resources, and other logistics and infrastructure requirements.

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