

Case Study: Rubber in Indonesia





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Grow Asia

Grow Asia is a multi-stakeholder partnership platform that brings together farmers, governments, companies, NGOs and other stakeholders in Southeast Asia to develop inclusive and sustainable value chains. At Grow Asia's core are three goals: to increase productivity, profitability, and environmental sustainability of smallholder agriculture across the region by helping farmers and the organizations that work with them access knowledge, technology, finance, and markets.

Grow Asia is comprised of the regional Grow Asia Secretariat in Singapore; six Country Partnerships, each supported by an in-country Secretariat; and their Working Groups, which focus on specific issues or crop-based value chains.

PISAgro

The Partnership for Indonesia's Sustainable Agriculture (PISAgro) is Grow Asia's Indonesia Country Partnership (CP), and aims to improve the yields, incomes and environmental sustainability of 2 million smallholder farmers by 2023. PISAgro facilitates collaboration among government, international and local companies, NGOs, farmer organizations and other stakeholders in developing inclusive and sustainable value chains. Its 13 Working Groups (WGs) co-design and co-implement these value chain projects, bringing together stakeholders from different disciplines to leverage their expertise.

Purpose of the Case Study

One promising way to reduce deforestation, improve food security, and end poverty is to improve productivity on small family-run farms. A range of actors – donors, NGOs, traders and consumer good companies – have delivered projects to lift smallholder farm yields. Achieving change is difficult, and what works, and what doesn't, is the subject of significant debate.

While Grow Asia encourages discussions on approaches that work well in the field, much of our work, including this study, focuses on a few key questions: how can actors from different sectors work together on the smallholder productivity challenge? How can businesses work with other market actors to achieve more than they can working alone? And crucially, what factors limit high-potential interventions from lifting smallholder livelihoods at scale?

A range of different models have been trialed in the Grow Asia network to make value chains more inclusive and profitable for farmers and off-takers alike. This case study looks at the attempt of Kirana Megatara – the largest producer of crumb rubber in Indonesia – in increasing the sustainability of rubber value chains. While the case study showcases certain good practices, it explores in particular the factors that hinder achieving positive impact at scale. This case study delivers important lessons about the centrality of commercial incentives, the alignment of stakeholders' definitions of success and understanding the value-adding functions in existing markets.

Executive Summary

This case study focuses on value chains in South Sumatra and Bangka Belitung – the primary sourcing areas of the rubber processor, *Kirana Megatara* (Kirana), and the pilot locations for its sustainability partnership initiatives. Kirana initiated its sustainability concept in 2011 and partnered with *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) and the Netherlands Development Organization (SNV). The premise of both partnerships was the same: to replace existing intermediaries with collective selling through cooperatives, farmer groups and farmer champions that train farmers on better management practices.

It is important to see this project in the context of persistently low prices for rubber crops. The study found that while the adoption of better practices raised productivity and quality, this did not always translate into higher incomes for smallholders. However, farmer champions did benefit from the payment of volume-based commissions, albeit only slightly.

While we were unable to find evidence to validate the success of Kirana's project, many important learnings did emerge from this process. Firstly, we were able to determine that insufficient commercial incentives are the main reason for failure, compounded by a lack of understanding of intermediaries' value-added functions and their importance to the supply chain. Secondly, important market players like local suppliers were not systematically engaged by the sustainability program. Lastly, the limited capacity of Kirana's sustainability division and lack of alignment between headquarters (HQ) and field operations also contributed to the ineffectiveness of the initiative.

On a positive note, the study found that some farmers have improved performance and incomes under the *Unit Pengolahan dan Pemasaran Bokar* (UPPB) collective rubber processing and marketing unit model. The UPPB model supports farmers in increasing dry rubber content and rewarding them with quality-based price premiums. Whilst this model has not proved to be scalable, it does suggest that there is a viable business case for upgrading smallholder plantations, if a similar bundle of support and price premiums could be provided by processors and their agents.

This study identifies four areas where Kirana and other organizations looking to increase the sustainability of their supply chains could improve their approach:

- 1) Strengthen corporate policy, culture and people by building a common understanding of sustainability as part of the core business and provide support to operationalize sustainability;
- 2) Explore innovations to increase smallholder profitability;
- 3) Implement a more analysis-based change process by partnering with capable existing market actors to ascertain the business case for each market actor involved, and;
- 4) Use pilots to test, measure and refine sustainability models before scaling them up.

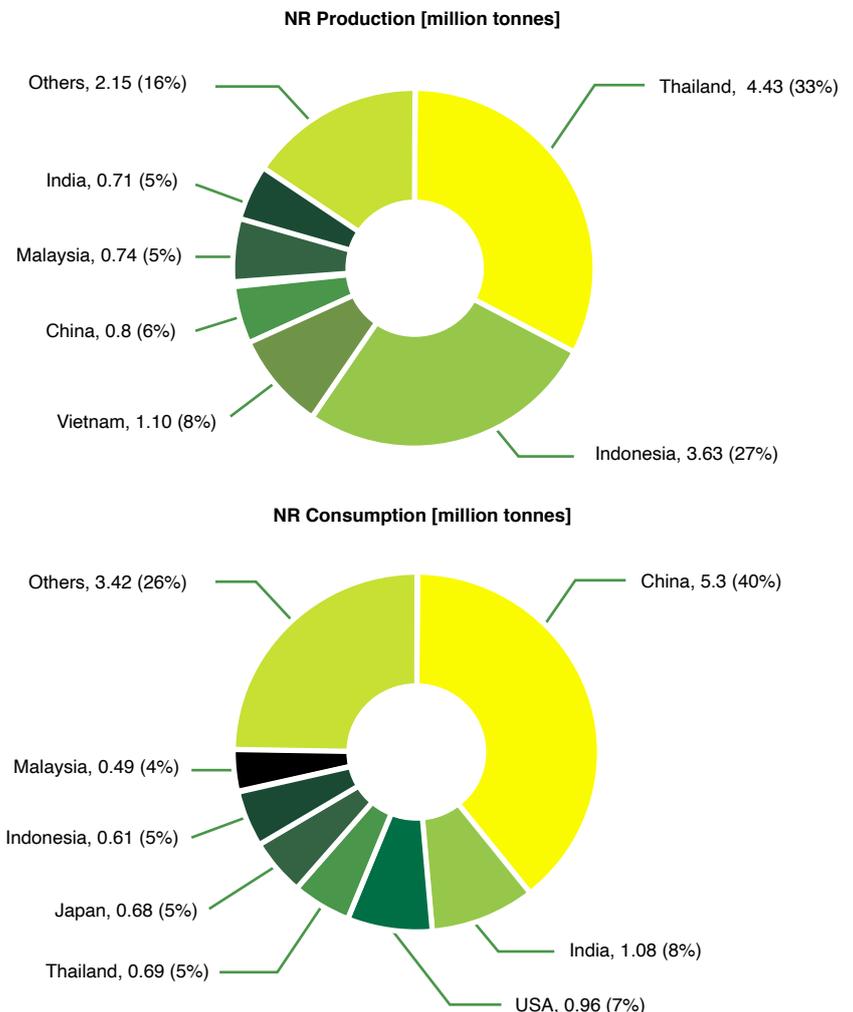
This study also provides recommendations to Grow Asia and our Indonesia Country Partnership, the Partnership for Indonesia's Sustainable Agriculture (PISAgro) – namely to: (1) Further strengthen the provision of high-level strategic and technical advice to members; (2) Validate results reported and synthesize lessons learned; (3) Continue to foster knowledge exchange between sectors and countries; and (4) Support members in developing an evidence-based advocacy agenda for governments and global buyers.



Sector Profile: Supply, Demand, And Price

Indonesia is the second largest natural rubber (NR) producer in the world, contributing 27% to global production. Other key global producers include Thailand and Vietnam (see Figure 1). In 2017, Indonesia's total NR production reached 3.6m tons with a total plantation area of 3.6m ha. Indonesia's average land productivity at 1.0 t/ha is lower than Thailand's and Malaysia's at 1.7 and 1.5 t/ha, respectively¹.

Figure 1: Top global producers and consumers of natural rubber (2017)



Source: IRSG (2019)

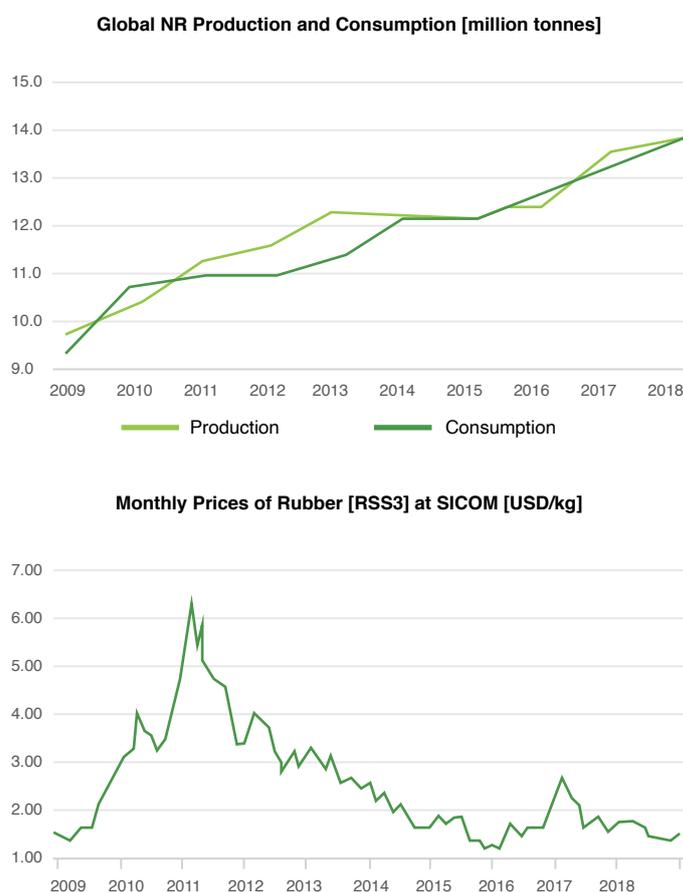
Around 80% of Indonesia's total rubber production goes to the export market, generating a revenue of USD 5.1 billion in 2017 – the second largest agriculture commodity export by value after palm oil. Key export destinations for Indonesia's NR are USA, Japan and China, which is by far the world's largest NR consumer (see Figure 1).

Global NR production and consumption has recorded a slow but steady growth in the last ten years, growing above 4.0% per annum. However, in 2014-2018, the average annual production and consumption growth rate has weakened to 3.4% and 3.2%, respectively. No significant supply gap in NR has been identified.

Persistently low price is plaguing the industry, limiting growth opportunities. For the last five years, global prices have remained in the lower range of USD1.5-2.0/kg after hitting a peak in 2011 at USD6.3/kg (see Figure 2). Weakening demand, especially for automotive tyres, and large stocks of raw material by the main consuming countries³ are cited as the key factors for price pressure.

Indonesian rubber companies are struggling under price stagnation. Many regional-level factories have ceased operation and while large-scale ones are still able to withstand the price pressure, they require an immediate solution. The current price level is not commercially feasible and has led to farmers abandoning their rubber plantations.

Figure 2: Production, consumption and price of natural rubber (2009-2018)²



Source: IRSG (2019); IndexMundi (2019)

1. Nugraha, et al (2018).

2. Global NR prices are based on 100% dry rubber content (DRC).

3. Kynetix (2017).

Indonesia’s rubber plantation areas can be grouped into three types of ownership: Approximately 85% are owned by smallholder farmers, 9% by private companies and 6% by state-owned companies (see Table 1). Over 2.25 million farmers and 255,000 farm workers are involved in the rubber sector. The islands of Sumatra and Kalimantan are the primary production areas, accounting for 96% of Indonesia’s total production and plantation areas. The top five producing provinces are shown in Figure 3.

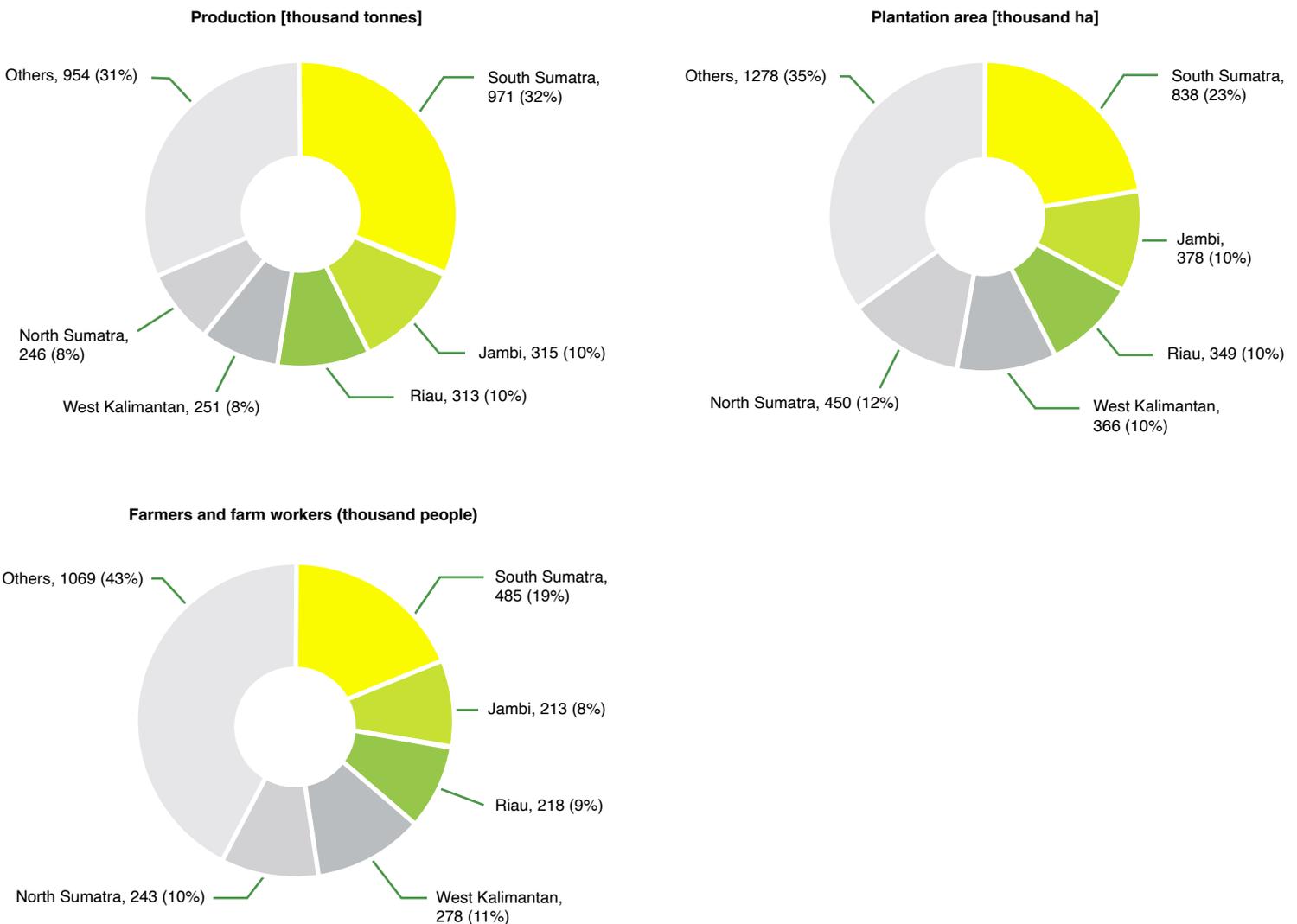
This case study focuses on value chains based on smallholder rubber producers in South Sumatra and Bangka Belitung – primary sourcing areas of Kirana Megatara and its pilot locations for sustainability partnership models.

Table 1: Indonesia’s rubber plantations by ownership type (2017)

	Smallholders	Private Companies	State-owned Companies
Plantation Area (million ha)	3.10	0.32	0.23
Production (million tonne)	3.05	0.38	0.25
Land Productivity (tonne/ha)	0.98	1.19	1.09
Percentage of immature/mature/damaged plantation areas	13% / 85% / 2%	20% / 76% / 4%	24% / 70% / 6%

Source: Ministry of Agriculture (2018)

Figure 3: Rubber production, plantation area, farmers and farm workers by province (2017)



Source: Ministry of Agriculture (2018)



The Intervention Model

The introduction of a ‘sustainability concept’ into Kirana’s operations management was initiated in 2011 by the founder. The concept was incorporated into the supply chain, where the majority of raw material suppliers are smallholder farmers who directly sell to the company. This was considered a prerequisite for improving smallholder farmers’ wellbeing. This vision was reinforced by the establishment of a sustainability division in 2017 when Kirana joined the Global Platform for Sustainable Natural Rubber (GPSNR), which promotes socioeconomic and environmental performance of NR value chains, including traceability.

Partnership Development

To explore a sustainable supply chain model, Kirana partnered with GIZ (2016-2017) and SNV (2017-present). GIZ – *Deutsche Gesellschaft für Internationale Zusammenarbeit*, a German development agency – engaged Kirana as its private sector partner under a project called Sustainable Regional Economic Growth and Investment Programme (SREGIP) located in West Kalimantan province. The project reported having trained 5,000 rubber and pepper farmers and facilitated the establishment of farmer groups and cooperatives for collective selling. SNV – a Dutch international development organization – initiated a partnership with Kirana in 2017 through its *Kelola Sendang Project*, which is located in South Sumatra and Jambi and aims to benefit 4,000 rubber farmers.

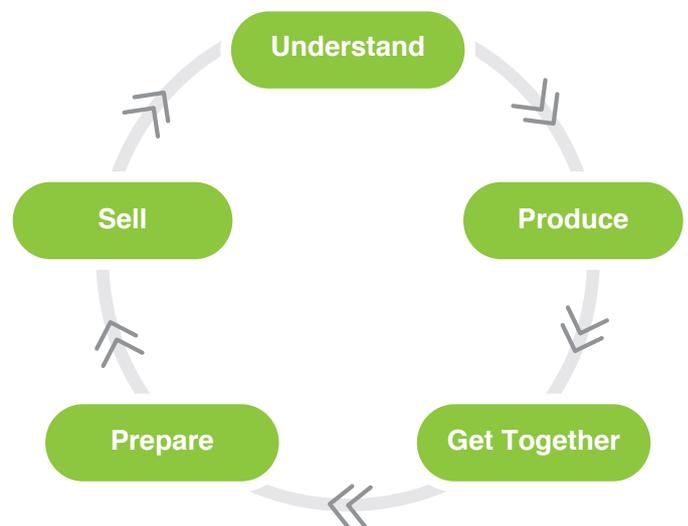
These partnerships were developed independently from PISAgro’s Rubber Working Group. PISAgro’s role is to act as a platform for exchanging knowledge and experience with the other members of the Rubber Working Group and PISAgro’s broader member-base.

Intervention Model

The intervention model of both partnerships share a similar idea: To replace existing intermediaries with collective selling. The underlying hypothesis is that the lengthy transaction chain between rubber farmers and processing factories is inefficient and lacks price transparency, leading to reduced margins and farm-gate prices. The aim of collective selling arrangements are to bypass these intermediaries (i.e. small and large suppliers) and establish direct access to the factories, so that farmers can attain higher prices, and earn more income.

GIZ’s intervention model focused on establishing cooperatives and farmer groups for collective selling (see Figure 4). GIZ provided training on seedlings and nursery development⁴, good agricultural practices in rubber cultivation⁵, and technical support for the cooperatives. Kirana’s role is to act as the buyer.

Figure 4: Five steps in developing a model for collective selling



1. **Understand** the benefits of collective selling
2. **Produce** better quality rubber by applying GAP
3. **Get together** and establish a collective institution like cooperatives
4. **Prepare** cooperatives to perform aggregation, transportation and distribution of sales revenue
5. **Sell** directly to processing factories to get higher prices

4. GIZ (2016a).

5. GIZ (2016b).



Market Map

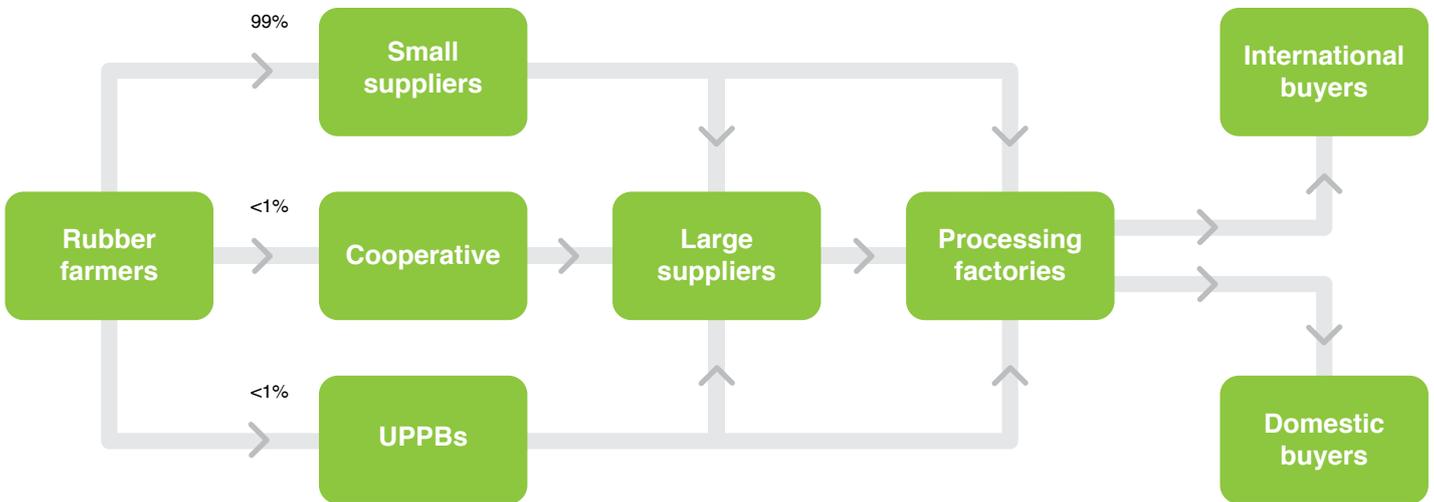
The characteristics of rubber value chains across Indonesia’s provinces are similar. They are summarized in Figure 6 and the areas salient to our analysis are elaborated on in the following sections.

Figure 6: Rubber market map

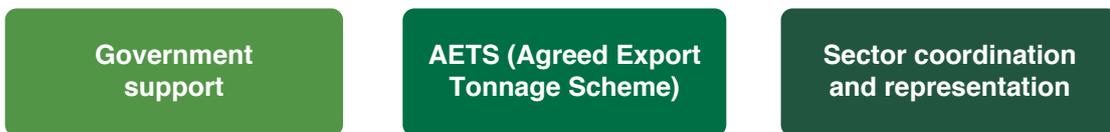
Supporting functions



Core value chain



Rules and regulations



Core Value Chain

Rubber Farmers

Small-scale rubber producers share similar characteristics. They mostly cultivate rubber as a monoculture crop with an average plantation area of 1 ha, tree density of 600 trees/ha, and tree age of 10-20 years. Farmers sell their produce to three types of buyers: local 'suppliers', UPPBs (*Unit Pengolahan dan Pemasaran Bokar* – collective rubber processing and marketing units) and cooperatives. 'Supplier' is the common industry term for traders who sell rubber to processing factories and purchase rubber from smaller traders or farmers. Selling to local small suppliers is the predominant market channel, as few farmers are organized in farmer groups, cooperatives or UPPBs. Most smallholder plantations are in dispersed and remote locations, typically a 1-2 hours motorbike ride from a main road and 2-3 hours from the nearest processing factory. Farmers who live in remote areas prefer to sell, mostly once per week, to small suppliers who come and collect their produce.

Most rubber farmers follow an input-low yield model. Their average productivity is around 120-160 kg/month of field rubber. Low productivity is caused by poor quality seedlings and coagulant and no use of fertilizer and latex stimulant. A comparison of best practices is presented in Figure 7 under the following section, "Analysis of Constraints and Opportunities".

- **Seedlings:** Most farmers grow their own seedlings from retained seed, resulting in low quality rubber trees. Those who are members of government-supported farmer groups have access to certified rubber clones with superior traits of high yield, early maturation, high adaptability, and climate and disease resilience.
- **Fertilizer:** Most farmers do not use fertilizer at all. Members of farmer groups can access government-subsidized fertilizers, whereas others must purchase commercial fertilizer.
- **Coagulant:** Around 80-90% of rubber farmers use either alum or sulphate, leading to low dry rubber content (DRC) of 15-35% and thus low price. Farmers selling to UPPBs use formic acid, the recommended coagulating agent, as per UPPB's requirement, to reach a DRC of 45-50%.

Low prices in recent years have discouraged farmers from properly managing their rubber plantations.

Five to ten years ago⁷ farm-gate price levels stabilized at USD1.20-1.30/kg (IDR12,000-13,000/kg) and peaked at USD2.00-2.40/kg (IDR20,000-24,000/kg). Rubber farmers now⁸ receive USD0.32-0.45/kg (IDR4,500-5,600/kg, 15-35% DRC) from small suppliers, a price that is too low to sustain farmers' livelihoods. One farmer interviewed stated that *"Back then one kilogram of rubber could buy several kilograms of rice; but now, not even one kilogram"*⁹.

While farmers with larger plantation areas continue rubber production, smallholders are abandoning or selling their plantations and switching to other income-generating activities or replacing rubber with palm oil, cassava or pepper. Those that continue with rubber production stop spending money on their plantations and consequently do not apply recommended practices such as applying fertilizer, although they understand it can increase productivity by 100-120kg/ha per month.

UPPBS – Collective Rubber Processing And Marketing Units

UPPBs were initiated to increase farmers' rubber quality and selling price. UPPBs were established by their district's agriculture office following the Ministry of Agriculture's guideline¹⁰ and are usually managed by the leader of a farmer group, supported by a treasurer and a secretary.

- To ensure high DRC, UPPBs require supplying farmers to use formic acid; they conduct compliance screening for every batch of delivery, usually once a week. UPPBs provide technical information to their new members on post-harvest handling practices to improve DRC.
- To attain higher prices, rubber is sold either directly to local rubber factories or – predominantly – through closed auctions where UPPBs inform large suppliers about the quantity of rubber for sale and solicit bids via text messages. Large suppliers with the highest bid prices win the auction and can collect the rubber for delivery to the processing factories. UPPBs then inform all bidders about the winners of the auction and their bid prices to create price transparency and encourage competition.

7. The average exchange rate in 2010-2015 was 10,000 IDR/USD.

8. The average exchange rate in 2019 was 14,000 IDR/USD.

9. For comparison with other livelihood options, see Figure 7.

10. Ministry of Agriculture (2008).

The UPPB model has succeeded in demonstrating higher price for better quality. With a DRC of 45-50%, UPPBs receive a price around USD0.58/kg (IDR8,100/kg) from large suppliers and USD0.59/kg (IDR8,300/kg) from rubber processors. After charging a service fee of USD0.01/kg (IDR100-150/kg) and deducting any additional costs such as transportation and depreciation due to volume shrinkage, UPPBs pass on a price to members of approximately USD0.54-0.57/kg (IDR7,500-8,100/kg), a price level that is 20-80% higher than those offered by local traders (USD0.32-0.45/kg).

Less than half of UPPBs are active. Of the 430 UPPBs established in Indonesia, approximately 270 UPPBs are located in South Sumatra which means fewer than 50% are active. Many cease operations because they are afflicted by internal conflicts between their managers and members, for example due to lack of transparency about costs and prices. Another critical factor is competition from local suppliers, who make inducements or coercions to farmers in order not to lose them to UPPBs (see below). Active UPPBs have approximately 60-80 registered members, but not all these members sell through UPPBs. The weekly sales volume of active UPPBs ranges from 3.5-5.0 tonnes.

Some UPPBs have a supply agreement with Kirana factories, yet the volume is negligible. Until November 2019, only 2 out of 40 UPPBs in the Sekayu sub-district, Musi Banyuasin district, South Sumatra province have a partnership arrangement with the Kirana factory. One UPPB sells directly to the factory because of its proximity to the factory, while the other has a special deal where the factory picks up the rubber from the UPPB and bears all costs.

Cooperatives

There are very few cooperatives in the rubber sector. One example is a KUD (*Koperasi Unit Desa* – village-unit cooperative) in Bangka that was established by the Corporate Social Responsibility (CSR) program of PT Timah Tbk. The cooperative buys rubber from its 21 member farmers and 61 non-member farmers. It sells around three tons per week to a large supplier in the same sub-district, who bears the transportation and shrinkage costs. Its buyer pays approximately USD0.29-0.46/kg (IDR4,000-6,500/kg), depending on the DRC, deducts 10% from the total volume due to impurities, and gives a commission of USD0.04/kg (IDR 500/kg). In effect, the cooperative's value addition is limited to aggregating rubber from farmers, associated with transportation and

shrinkage. It is apparent that location and transportation are a critical consideration. Unlike in South Sumatra, there is no UPPB in Bangka.

Small suppliers

Small suppliers have the strongest tie to rubber farmers. Although they tend to offer much lower prices (USD0.32-0.45/kg), small suppliers pay cash to farmers with some even providing advance payments to secure their loyalty. On average, each small supplier purchases regularly from 15-20 farmers and more intermittently from other farmers. Small suppliers usually operate within one sub-district. Their weekly capacity is around 8-16 tons (1-2 truckloads) in South Sumatra and 1.5-3.0 tons (1-2 pickup loads) in Bangka.

Small suppliers have seen their transaction volumes decline significantly in recent years. Most small suppliers face difficulties in procuring rubber from farmers. Several years ago, small suppliers could supply their buyers daily; now they sell only once or twice a week. Some small suppliers have switched to other businesses, such as trading sand for construction or renting out their vehicles.

Large suppliers

In general, large suppliers have annual contracts with monthly supply obligations. They operate at the province level, with a supply capacity exceeding 1,000 tons per month. Around 5-10 large suppliers cater to one processing factory.

Large suppliers have long-term partnerships with small suppliers and rubber farmers in the same location. They provide advance payments and in-kind loans (e.g. foodstuffs like rice, sugar, salt) to secure the loyalty of farmers.

Processing factories

There is a sizeable number of processing factories in the main rubber-producing provinces. More than ten rubber factories are operating in South Sumatra. In Sekayu sub-district, Musi Banyuasin district, South Sumatra province, there are two large processing factories producing SIR crumb rubber (Standard Indonesian Rubber), namely PT Kirana Musi Persada (monthly capacity 4,000-5,000 tons) and PT Pinago Utama (monthly capacity around 3,000 tons). While the former sources completely from smallholder

farmers, the latter has its own rubber plantations. In Bangka, there are two processing factories, PT Karini Utama (monthly capacity 1,000 tonnes), owned by PT Kirana Megatara, and Tbk and PT Fajar Berseri, owned by local entrepreneurs. In general, processing factories assign supply chain or sourcing managers to manage the relationships with their suppliers.

Some rubber factories are downsizing, reducing working hours, or ceasing their operations completely because of supply shortages. As the minimum processing volume is not reached, factories are not able to cover their operational costs.

Supporting Functions

Seedlings

Seedling nurseries are operated by public agencies, not by the private sector. *Badan Pengawasan dan Sertifikasi Bibit Tanaman Perkebunan* (BPSBT-BUN – Agency for Supervision and Certification of Plantation Seedlings), operating at the province level, manages and sells certified seedlings at USD0.71/seedling (IDR10,000/seedling). Private businesses are not interested in investing in nurseries because, on the supply side, the seedling market is dominated by government subsidies (e.g. replanting programs), while on the demand side, farmers do not yet see the benefits of using high-yielding clones. Only large-scale rubber plantations above 10ha use certified seeds.

Free certified seedlings are also distributed through rubber companies' CSR initiatives. For example, PT Kirana Megatara, Tbk distributed 10,500 seedlings in 2017 and 20,600 seedlings in 2018 to their loyal rubber farmers.

Agriculture inputs

Agriculture inputs are available in the regions. Most input retailers are located at the district level. A few smaller (approx. 3-5) input retailers are located at the sub-district level near to rubber production centers, and provide inputs needed for rubber plantation such as fertilizers, coagulants, latex stimulants, plant protection, manual and mechanized tools. Coagulants are the most demanded input. The demand for commercial fertilizers is weak, as farmers rely on subsidized fertilizers.



Rules and Regulations

Training and extension

Rubber-specific training and extension is not provided by public agencies or private companies. Public extension workers do not have the mandate and capacity to impart technical know-how on rubber production, as they focus primarily on food crops such as rice and maize. Input companies provide basic product information but only to input retailers, not to farmers. Due to stagnant sector growth, there is a lack of agronomists from input companies who might provide technical knowledge at the point of sale, conduct demo plots or organize farmer meetings. As a result, most rubber farmers rely on fellow farmers to obtain information related to good agriculture practices (GAP) and post-harvest practices, or through trial and error on their own farms.

Transportation

Transportation services are a critical part in the supply chain. Rubber is bulky and heavy, making transportation costs high (see Figure 7). Farmers who own motorbikes can transport their produce to buyers. However, most farmers prefer selling to small and large suppliers who provide a collection service. To minimize transportation costs, most suppliers use their own vehicles as opposed to renting or buying logistic services.

Finance

Informal financing predominates in the rubber value chain. There are no formal financial service providers offering loan schemes specifically geared for rubber cultivation or replanting. Some farmers receive pre-financing in cash or in kind from small suppliers for rubber cultivation and household needs, including education or health services. In addition, some small suppliers receive financial support from large suppliers.

Government support

Government support to the rubber sector includes fertilizer subsidies and replanting. Rubber farmers are eligible for subsidized fertilizer provided they are registered in a farmer group and submit their request through local public extension workers. However, as most public extension workers are not active in the rubber sector, most rubber farmers cannot access subsidized fertilizers. BUN 500 (*Program Benih Unggulan – Superior Seedling Program*) is a national government program that seeks to distribute 500m high-yielding, certified seedlings in 2019-2024 to rejuvenate damaged and non-productive smallholder plantations, including rubber.

Sector coordination and representation

Key rubber value chain stakeholders are coordinated under GAPKINDO (*Gabungan Perusahaan Karet Indonesia – Rubber Association of Indonesia*). Established in 1971, GAPKINDO performs a range of functions, including coordination, supporting members to understand and implement environmental regulations, and engaging GoI in dialogue on export policies and regulations. GAPKINDO is Indonesia's official representative in ITRC and other trade negotiations.

AETS

AETS (Agreed Export Tonnage Scheme) attempts to stabilize rubber global prices by controlling export volumes. For example, the sixth AETS agreement in 2019 seeks to reduce NR exports by 240,000 tons within four months. This agreement is issued by the International Tripartite Rubber Council (ITRC), established in 2001 by key global NR exporters in Indonesia, Thailand and Malaysia.

The Government of Indonesia (GoI) sees expanding domestic demand as the primary strategy to solve the low rubber price problem. As the export restriction strategy attempted by ITRC has been deemed ineffective, GoI has shifted towards strengthening domestic consumption by scaling up the use of rubberized asphalt. Despite positive progress in the last few years, including the establishment of a rubberized asphalt factory in South Sumatra, industry players are skeptical about its market potential.



Analysis of Constraints and Opportunities

Low productivity and low quality are confirmed as the primary farm-level problems. These problems are caused by the lack of use of certified seedlings, fertilizers, recommended coagulant, and latex stimulant by rubber farmers.

The underlying cause is low farm-gate prices that discourage farmers from investing in their plantations. Although there is indeed a lack of technical

know-how in cultivation and post-harvest practices among farmers, the assessment concluded that lack of incentives is the dominant reason for their low performance. Low global prices are an external factor driving domestic prices down. To date, market players along the supply chain have yet to identify ways to raise farm-gate prices or reduce costs to preserve the commercial viability of smallholder rubber plantations and prevent smallholders from abandoning their plantations.

A secondary cause is that supporting functions for rubber farmers are weak or non-existent:

Seedling nurseries and input retailers are not promoting their products or increasing the awareness of farmers to the value of using high quality inputs, due to persistently low rubber prices that inhibit their motivation and investment of such services.

Transport to bring rubber to factories is the largest cost component in the supply chain. A transportation model where farmers bring rubber in small quantities to small suppliers is inefficient. Other transportation models where small suppliers collect rubber from farms or decentralized collection centers in the plantations' location are more efficient.

Extension services delivered by both the public and private sector are largely absent or not well coordinated with rubber processors' sourcing strategies and plans. In general, rubber processors and their suppliers have the strongest incentive in the sector, as they need to secure larger supply volumes. It remains to be ascertained whether they are willing to invest in activities that can improve farmer productivity and returns, in order to enhance their access to larger volumes of quality rubber.

Financial service providers are not yet aware of the opportunities to develop and test financial schemes for rubber trading, plantation improvement or replanting, compared to more advanced agriculture supply chains, where financial service providers frequently collaborate with off-takers or traders in value chain financing models. However, given the underlying problem of low prices, it seems unlikely that the sector would be attractive to formal financiers.

On the positive side, UPPB's focus on using formic acid and strict quality control to increase DRC and price premiums has shown promising results. This provides a recipe to raise farmers' interests and convince them to invest in productivity and quality enhancement. However, the group-based model for delivering these services presents challenges, in terms of capacity and incentives for effective governance, management, logistics and large-scale operation. These challenges are consistent with wider national and international experience of service delivery based on group-based models.

The following simplified cost-benefit calculation confirms why farmers reduce working capital and investment in their rubber plantations given the

current circumstances (see Figure 7). Under current cultivation practices (150kg/month of field rubber) and price conditions (IDR5,600/kg), farmers earn an extremely low level of income at USD19/month (IDR272,600/month), or actually lose money if full costs, such as labor, land, equipment and upfront investment in land clearing, seedlings and planting were included. Such a level of income is far below the national poverty line of USD30/person/month (IDR425,250/person/month) and is less attractive than alternative livelihood options such as working as a construction worker (USD32/month or IDR450,000/month)¹¹ or cultivating oil palm (USD70/month or IDR980,000/month)¹². To keep costs to a minimum, farmers only incur expenses for transportation and purchasing coagulant.

Figure 7: Simplified cost-benefit comparison between current and improved practices

Plantation size 1 ha		Current practices (alum/sulphate acid, no inputs, small supplies)	Improved practices (formic acid, with inputs, UPPB model)	
Direct costs	Monthly pro-rata [IDR]	Remarks	Monthly pro-rata [IDR]	Remarks
Coagulant	13,000	Average cost; monthly either alum 2 packs @4,000 or sulphate acid 2 packs @9,000	30,000	Yearly 1 pack formic acid @360,000
Fertilisers (non- subsidized)	-		270,000	Every 4 months urea 2 sacks @250,000, KCl 1 sack @320,000, SP36 1 sack @260,000
Herbicides	-		130,000	Every 3 months herbicide for side buds 1 ltr @180,000 and field grass 3 ltr @70,000
Latex stimulant	-		60,000	Monthly 1 pack @60,000
Transportation from e-plantation	554,400	Monthly 24 motorbike trips, 3 ltr fuel @7,700	554,400	Monthly 24 motorbikes trips, 3 ltr fuel @7,700
Transportation buyer	-	Pickup service costs borne by small suppliers	92,400	Monthly 4 motorbike trips, 3 ltr fuel @7,700
Subtotal	567,400		1,136,800	
Revenues	Monthly pro-rata [IDR]	Remarks	Monthly pro-rata [IDR]	Remarks
Rubber sales	13,000	Average yield 150kg/month of field rubber with 35% DRC: farm-gate price by small suppliers, 5,600/kg	2,430,000	Average yield 300kg/month of field rubber with 45% DRC: farm-gate price by UPPB 8, 100/kg
Profit margin [IDR]:	272,600		1,293,200	
Profit margin [%]:	32%		53%	

Note: For simplification, the calculation focuses on direct, real costs incurred monthly, but does not include upfront investment costs (land clearing, seedlings, planting), costs for tools and equipment and opportunity costs (land and labour).

11. Monthly average: 10 workdays at IDR45,000/day.

12. Furqon, et al (2014).

The cost-benefit comparison shows that there is a viable business case for small-size rubber plantations (1ha) if their practices are upgraded and quality premiums are paid:

- Under improved practices (300kg/month) and higher prices (IDR8,100/kg), farmers earn almost five times more (USD 92/month or IDR1,293,200/month). If farmers were to upgrade their practices and switch to the UPPB 'model', they would earn an additional revenue of USD114 or IDR1,590,000 and incur additional costs of USD41 or IDR569,400, resulting in a net income increase of USD73 or IDR1,020,600. The benefit-cost ratio (BCR) is 2.8, a commercially prospective investment.
- However, if farmers were to upgrade their practices and farm-gate prices remained the same, they would earn an additional revenue of USD60 or IDR840,000 and a BCR of only 1.5. This demonstrates that without improving quality and introducing premium price payments, investing in productivity enhancement does not have a strong business case.

The majority of farmers are unlikely to upgrade practices on their own because they lack the resources, no control over the payment of premiums, and availability of alternative attractive livelihood options. The only feasible way that upgrading is likely to occur is if other actors, particularly processors and their agents, are prepared to support farmers and provide them with more favorable terms. Processors have the strongest motivation because they require reliable supplies of quality rubber, and they have the resources to provide such support.





Results, Evidence and Lessons Learned

Our assessment did not find adequate evidence to validate the success of these interventions, against the background that the partnership models were working in an extremely difficult environment of persistently low prices where market players have weak incentives and are demoralized. Neither monitoring nor assessment was conducted to measure behavior changes, their reasons and results at the farmer, service provider (farmer champions), and sectoral level. Kirana confirmed that the intervention had no impact on their sourcing volume. The only data available pertains to activities – training participation. Unfortunately, the figures reported for this are inconsistent.

The adoption of good practices (BMP/GAP) has raised productivity and quality but did not always translate into higher incomes. Key elements in this productivity program included the use of fertilizer, formic acid as a coagulating agent, and certified seedlings. However, there were reports that despite substantial increase in rubber output, cooperatives in West Kalimantan were unable to sell directly to Kirana's factories and instead were advised to sell through the status quo method of large suppliers. However, the anticipated higher prices for better rubber quality were not always evident. First, large suppliers used manual scale and visual observation to approximate DRC and other price-determining quality criteria and thus it was difficult to objectively measure the quality difference. Second, large suppliers mixed production batches from cooperatives and other sources with varying qualities and sold it to processing factories for one price.

Farmer champions have benefited from the payment of volume-based commissions, albeit insignificantly (see next page). Documentation on the purpose of the farmer champion intervention, its business model and commission schemes and the actual commission payments are available¹³.

Lack of commercial incentives is the main reason for failure. Intervention planning did not include any business calculations to compare the anticipated benefits with the additional costs and efforts for adopting new practices:

- **Farmer champions:** The selection of potential farmer champions did not consider important criteria such as business acumen and management skill, experience in trading and logistics, and access to local farmer networks. Fewer than ten of the 45-60 trained farmer champions have supplied Kirana during May-November 2019. The commissions they received – USD520 (IDR 7.3m) for 100 tons – were not sufficient to justify their additional costs and time needed to identify and engage farmer members, coordinate aggregation among 20-40 farmers and manage administrative issues.

- **Rubber farmers:** Most rubber farmers did not want to switch to direct selling via farmer champions, because they prefer to preserve their long-term relationship with local suppliers, who pay cash on delivery and even offer advance payments.

Another reason for failure is the lack of understanding of intermediaries' value-adding functions and their significance to the supply chain.

As demonstrated above and in other Grow Asia [case studies](#), intermediaries – i.e. small and large suppliers – deliver a range of critical functions for the supply chain: coordination, aggregation, transportation, financing and administering transactions. Without these, the exchange of goods between rubber producers and processors would be severely inhibited. Removing intermediaries means that other market players need to perform these functions to keep the supply chain functioning, however this has proven easier said than done. Collective actions or group-based arrangements have neither the specific competences nor commercial incentives to do it. Wider experiences have confirmed similar findings. For example, Krakovsky (2015) noted that valued middlemen deliver six type of solutions: (1) bridging geographic, temporal and social distance; (2) certifying, through their expertise, the quality of goods and services and bringing trust to the marketplace; (3) enforcing the accountability of buyers and sellers to live up to their commitments; (4) managing risks by pooling goods and services to reduce fluctuations and other forms of uncertainty; (5) reducing information overload by delivering organized and decision-related information to clients; and (6) insulating or shielding buyers and sellers from negative factors, for example acting as a representative in a confrontational situation.

Important market players like local suppliers and UPPBs were not systematically engaged by the sustainability program. Local suppliers with their extensive trader and farmer networks account for more than 90% of the company's total purchase volume and without their involvement, the sustainability program was never likely to reach scale. Similarly, only a few UPPBs have been engaged even though there were clearly successful elements of the UPPB model that might have provided practical lessons to other players in the supply chain. A lesson from Grow Asia's networks as well as wider international experience is that certain types of constraints in a value chain can often only be overcome by coordinated or collective actions of several

market actors, rather than any single actor working in isolation. For instance, large buyers working with farmers' representatives, trading intermediaries, government extension workers or specialized service providers in a more structured manner¹⁴.

Other critical constraints were the limited capacity of Kirana sustainability division and policy misalignment between HQ and field operations. Although the general notion of empowering smallholder farmers is understood, the team lacks the ability to translate the sustainability concept to practical business operations and view smallholder inclusion as a social endeavor that has no bearing on supply chain development. The sourcing development officers at the factory level, who are in charge for supporting farmer champions and providing information on direct supply opportunities, focus exclusively on relationships with local suppliers to ensure sourcing volume – which is their key performance indicator (KPI).

14. See Grow Asia (2019), Nugraha (2019a), Nugraha (2019b), and CSIRO (2019) for examples of collaboration with different types of private sector players, public sector agencies, and research institutions, respectively.

Recommendation for improvements: Recommendations for Kirana

Strengthen corporate policy, culture and people for sustainable business

Build a common understanding of sustainability as good for core business. Sustainability is often perceived as part of CSR – a business’s obligation to ‘do good’ – and is treated separately from core business. Sustainability activities are equated to the charitable activities of an NGO and don’t utilize the core competences and motivations of a company. However, increasingly it is being recognized as not just about what your company can do for sustainability, but also what sustainability can do for your company. How can doing good improve a company’s reputation and positively impact the performance of its supply chains (reduce costs or improve quality, quantity, reliability), open up new market opportunities (traceable products) and consumer

segments, and reduce risks? To create lasting environmental or social impact, sustainability must make sense from a business angle and be viewed as value adding to the core business which will lead to the greater likelihood that the company, its employees and stakeholders remain committed to it. If it remains being seen as a charitable endeavor it will be regarded as a low priority or a temporary fad. In practical terms, this means that long term sustainability is much more likely to be effective when it is embedded into procurement or sales. This is a lesson that has surfaced in nearly every Grow Asia case study to date¹⁵.

15. See Grow Asia (2019)

Figure 8: Integration of CSR and core business

Level 3:
CSR Integrated into growing inclusive and sustainable business



CSR as part of expanding core business and creating positive impacts on suppliers, consumers, and the environment

Level 2:
Partial linkage of CSR to core business



Charity for suppliers or consumers...

... but no sustainable business, social and environmental impacts

Level 1:
Complete separation between CSR and core business



Charity often disconnected from core business

Business as usual



Synergize CSR with supply chain development

strategy. The starting point is for a company to identify a feasible opportunity – the business case – for making its supply chain more inclusive and sustainable. To realize this opportunity, different types of activities will be required: (a) those relating to core business, such as agronomic training, business coaching, provision of tools and equipment to enhance the commercial performance of weaker parts of the supply chain (e.g. smallholder farmers, nurseries, small suppliers); and (b) activities of a non-commercial nature, such as for education, health, small-scale infrastructure, etc. that might encourage these weaker actors to engage with the company or secure their loyalty over time. The CSR activities serve the objective of building a more sustainable, inclusive supply chain.

Provide practical guidance and build capacity to operationalize sustainability in day-to-day business.

Sustainability and inclusion need to be clearly defined for people in all areas of the company, from head office to factory level and from holding companies to subsidiaries and suppliers, i.e. how it is practically different from business-as-usual. A company's sustainability vision needs to be translated into realistic objectives, clear roles and responsibilities, set measurable targets and KPIs

linked to performance bonuses. Operational guidelines and tools (such as the market map, business modelling and business calculation provided by the case study) need to be provided to equip field teams to collect and analyze data, redesign business models, select partners and intermediaries, and measure performance.

Consider engaging specialized service providers with a track record in supply chain development to train and mentor internal teams through a 'learning by doing' approach. Such support should be facilitative in nature, i.e. guiding internal teams through changes in policy, strategy and operation. This might entail analysis of critical constraints and feasible opportunities for change, providing insights into the motivation and behavior of other market actors, introducing practical 'how-to' instruments for diagnostics and measuring performance, or bringing different market actors together to develop collaborative solutions. A consultant's role should be temporary and catalytic; it should not be to take over responsibility for implementation from the internal corporate team. A consultant should strengthen the internal team's understanding, ownership and capacity to operationalize the sustainability agenda.

Explore innovations to increase smallholder profitability

Review potential innovations to increase commercial feasibility of smallholder rubber production.

As shown by the simple cost-benefit calculations, there is a limited scope to increase returns to smallholders purely through productivity enhancement and quality-price improvement. Innovations may include:

- Designing more efficient logistical arrangements e.g. collective transportation, decentralized aggregation points, zoning of production areas.
- Expanding landholding size and introducing mechanization solutions to increase labor efficiency.
- Intercropping or polyculture (agroforestry or agrosilvopastoral system) with higher-value commodities to diversify income streams and reduce rubber price risks.
- Aspects of the 'UPPB model' might also be reviewed with the aim to adapt and replicate the functions.



Implement a more analysis-based, purposeful change process



Be open to engaging any type of willing and capable market players in partnership. Intermediaries are not only farmer champions, but may include existing local suppliers, UPPBs, cooperatives, and others. It is often more feasible to build on existing actors and relationships than creating something new. Field-level functions such as extension and training might benefit from collaboration with public extension officers and agricultural input companies, including their distribution and retail networks. Synergies with government initiatives (e.g. replanting, nursery development, introducing innovations such as new high-yielding, disease-resistant, climate-resilient clones) might also need to be identified and implemented to stimulate the development of supporting services. In other Grow Asia [case studies](#), cooperative local traders, off-takers, or local input suppliers have been successfully integrated into projects, to function as intermediaries and influencers.

Ascertain the feasible business model and business case (costs and benefits) of the sustainability innovation for each market actor involved, which includes the company, large and small suppliers, smallholder farmers and input and service providers. This is a diagnostic phase where internal teams could enlist the support from external consultants. Firstly, map out the flows of money (and margins), goods and services in the business model. Secondly, identify how each key actor will need to change their behavior and practices in order to improve performance and then assess whether such changes make good business sense for them. If innovations do not make sense, then actors will not be motivated to invest in change.

Use pilots to test, measure and refine the model before scaling it up. New business models will need to be tested and refined based on practical experience. This requires investment in monitoring, measurement and learning: You can't manage and improve it if you don't measure it. Establish a simple, logical impact chain

with key indicators to track progress and results, identify flaws early on, and inform management response (e.g. adjusting the basis of premium payments to improve performance). Some indicators (e.g. supply volumes, value, quality, price and number of suppliers) are likely to be already captured in existing business processes; others (e.g. adoption of new practices by farmers or suppliers) will necessitate dedicated monitoring resources and effort. Again, specialized expertise (e.g. agronomy, behavior research, household surveys) can be engaged where necessary.

Capitalize on existing strengths in the supply chain. Where possible, start by working with select, loyal suppliers and their networks, rather than creating new structures detached from existing supply chains. Working with partners who are motivated and capable is likely to be more well-received and an efficient route to achieving scale, by establishing a solid foundation for further expansion – ‘pushing out the frontier’ incrementally. Develop a supplier upgrading plan to add new functions e.g. in extension and training, quality assurance, internal control, and traceability data recording to enter higher-value, more sophisticated markets. Engage suppliers in designing interventions, the business model, activity planning, implementation and results measurement. Create cost-sharing mechanisms and balanced division of responsibilities and tasks to ensure strong ownership. Studies found that leveraging progressive local traders as intermediaries has proven to be a more effective way of operating, while helping overcome trust issues¹⁶.

Effective local delivery: Much of the success of a sustainability initiative hinges on the effectiveness of its implementation and the capability of project management execution at the local level, typically mediated by having local targets, on-going measurement of delivery and a fair degree of autonomy to respond to local requirements and needs. Again, this is something we have seen successful in various other commodities and countries.

16. For examples of the role and significance of local intermediaries, see Nugraha (2019a) on cases from AIP-Rural, RISE (2017a), (2017b) and Grow Asia's case study on coffee in Lampung, Indonesia.

Recommendation for improvements: Recommendations for PISAgro and Grow Asia

Provide technical support to members

Strengthen the provision of high-level strategic and technical advice through consultants. Members like Kirana would benefit greatly from professional strategic and technical support in designing, implementing and measuring sustainability programs, providing quality assurance of implementation and conducting evaluation and learning. Some standardization of monitoring, results measurement and reporting practices would also make it easier for members to compare their respective experiences and learn from one another. The Grow Asia network has on occasion provided consulting support to help Working Groups in design, articulation and facilitation of execution of their field projects.

Validate results and synthesize lessons learned. In addition to helping members establish fit-for-purpose internal results measurement systems, PISAgro and Grow Asia should continue to commission external reviews by third-party organizations, focused on key strategic initiatives or common thematic areas, to generate credible results and build a reputation for integrity. Such reviews

can provide constructive feedback and generate valuable lessons learned – from successes and failures – that are useful for other members and sectors.

Facilitate knowledge exchange between sectors and countries where appropriate. The Rubber Working Group can benefit from the models, experiences, successes and failures from other sectors such as cocoa that face similar global market issues, sector structures and field-level challenges. The cocoa sector has seen companies evolve from simple trading, to sustainable sourcing, to traceable and certified supply chains¹⁷. Experience sharing might also be more relevant. For example, when it comes to market functions like intermediary functions, the understanding of how and why such functions are effectively executed are far more important than the organizational form or institutional arrangements (i.e. form follows function). It explains why replacing existing intermediaries with new buying arrangements that farmers are required to manage themselves are often unsuccessful¹⁸.

Support members in policy dialogue

Offer support to members in developing evidence-based advocacy materials and agenda. Robust analysis, proven business models, credible and evidence-based results, and practical lessons are powerful advocacy tools that can aid PISAgro and Grow Asia in collectively voicing their members' concerns and ideas, convening key stakeholders in the sector, building dialogue and consensus with relevant government agencies or business membership organizations, and brokering beneficial partnerships. In this specific case, PISAgro and Grow Asia can facilitate dialogue with global rubber manufacturers like Bridgestone, Michelin, Pirelli, and Goodyear on strategic issues of price premiums for sustainable sourcing, traceability information, and smallholder inclusion.



17. See Heinz (2019) for Grow Asia's case study on Sustainable Cocoa Production Program (SCPP).
18. See Nugraha (2019a), RISE (2017a), RISE (2017b).

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Appendix

AETS	Agreed Export Tonnage Scheme
BCR	Benefit-Cost Ratio
BMP	Best Management Practices
BPSBT-BUN	Badan Pengawasan dan Sertifikasi Bibit Tanaman Perkebunan <i>Agency for Supervision and Certification of Plantation Seedlings</i>
BUN	Program Benih Unggulan <i>Superior Seedling Programme</i>
CSR	Corporate Social Responsibility
DRC	Dry Rubber Content
GAP	Good Agricultural Practices
GAPKINDO	Gabungan Perusahaan Karet Indonesia <i>Rubber Association of Indonesia</i>
GIZ	Gemeinschaft für Internationale Zusammenarbeit <i>German Corporation for International Cooperation</i>
GoI	Government of Indonesia
GPSNR	Global Platform for Sustainable Natural Rubber
IDR	Indonesian Rupiah
ITRC	International Tripartite Rubber Council
NR	Natural Rubber
PISAgro	The Partnership for Indonesia's Sustainable Agriculture
SIR	Standard Indonesian Rubber
SREGIP	Sustainable Regional Economic Growth and Investment Program
ToT	Training of Trainers
UPPB	Unit Pengolahan dan Pemasaran Bokar <i>Collective Rubber Processing and Marketing Units</i>
USD	US Dollar



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