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Sweetening the Pot

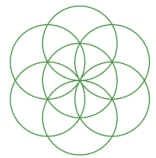
Developing the market for
Palm & Coconut Sugar in
Southeast Asia

June 2017



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Ventures





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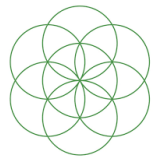
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Data Sources



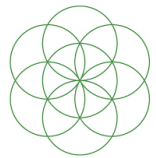
Executive Summary





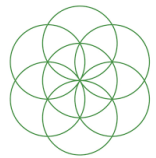
- Coconut and palm sugar are not formally tracked in the national and global trade flow databases, holding back recognition and formalization in domestic markets and international trade channels
- Triggered by reports of a lower Glycemic Index and higher levels of nutrients in Coconut and Palm Sugar in 2008, global demand accelerated and continues to rise. Currently demand is flattening in the US but taking off in Europe, China, Japan, and Middle East
- Demand in the region varies significantly by country. The largest market by far is Indonesia, where coconut sugar has been used in local cuisine for centuries and is now being used for processing sweet soy sauce
- The size and growth of the Indonesian sweet soy sauce market presents an opportunity for scale, but requires higher levels of on-farm productivity to ensure farmers can earn a livable income and avoid poverty traps
- Lack of production and market data combined with widespread misinformation in the market on product characteristics, is leading to inefficiencies in production and marketing





- Production models vary widely and are based on heritage and legacy practices rather than crop research, market-driven technology and innovation
- Consequently, productivity varies widely across value chain and geography, variables include: specific trees, landscape, rainfall, “farmers touch”, tools, cooking methods
- The value chain structure in all three countries – Indonesia, Cambodia, Philippines – is antiquated and inefficient (tenant farmers, collector capture) – holding back investment and value addition
- Adulteration is wide spread and a risk to legitimacy in the global market
- On their own, the coconut and palm trees and their products are not viable sources of income for a household in all locations, but can be a strong source of income in a multi-crop portfolio for the household
- Demand from Indonesia is an opportunity for innovations in productivity and increase prosperity for farmers, but the model being used for replication is antiquated
- Opportunity for research in ag technology and improvements in productivity of the trees, harvesting and cooking process





The coconut / palm sugar sector varies widely across the region

Cambodia

- Only palm sugar
- 14,000 tons produced per year
- Most production for domestic consumption
- Under-developed and limited production and processing capacity
- Harvesting occurs only from December to May

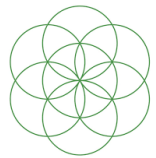
Indonesia

- Mostly coconut sugar, limited palm sugar
- Large, domestic market for sweet soy sauce
- Estimated production ~400,000 MT per year
- Growing exports of powdered sugar
- Concentrated in Java with palm sugar in Sulawesi and Madura

Philippines

- Largest exporter and 2nd largest coconut producer globally (all products)
- Only powder coconut sugar
- Most production for export
- Estimated exports of 400 MT per year
- Concentrated in Mindanao

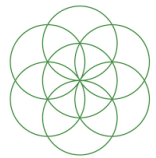




Country	Sugar break ratio	Length of season	Anti fermenting agent	Production methods	trees serviced per day	Production (annual)	# of trees
Indonesia	14% (Arenga) 11-12% (coconut)	all year	limestone and mangosteek bark	no ladders, no bridges, no safety devices	20-30	300,000 MT	250 mln
Philippines	12.5%	all year	none	full-fledged ladders, bridged between all trees	up to 150	20,000	350 mln
Cambodia	10 % - 12%	Dec-May	popel wood	one-pole ladders, trees above 30 m not climbed	20-30	< 20,000 MT	13 mln (c) 3 mln (p)

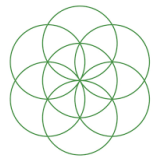
Note: Sugar break ratio is the percentage kg yield of sugar from sap





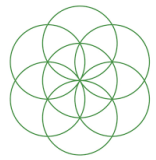
- Massive domestic market (400,000 MT) for block coconut sugar as an input to processed sweet soy sauce in the local market, fueled by traditional distributed household harvesting and production model concentrated in Java
- With 3.5 million hectares of coconut growing area, 5 million households, and 20 million Indonesians are involved in cultivating coconut trees
- 85% of the production comes from 2.5 million households in Java with the rest spread across Sumatra, Sulawesi and Bali/Kalimantan
- Rising demand has led to a 4 fold increase in prices since 2004. Prices are highly volatile -- fluctuating by nearly 40% in any given year
- Growth in production is held back by availability of land for scale farming in Java and know-how in other parts of Indonesia
- Antiquated structure throughout the value chain is holding back the adoption of technology and practices for higher levels of productivity
- Widespread adulteration (mixing with cane sugar) is threatening the legitimacy of coconut sugar in higher value export markets





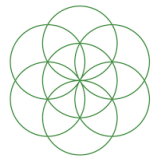
- Philippines is among the largest producers and exporters of coconut products globally, but top agricultural coconut exports have declined in recent years
- Coconut industry based on large scale coconut plantations installed in the middle of the 20th century.
- Coconut sugar is not a traditional product in the Philippines – local cuisine is more savory – production is fairly new as a higher-value extension to copra, is almost entirely for export
- To date, coconut sugar represents a small fraction of Philippines coconut industry (USD \$2 million); however there are plans to grow the industry rapidly in the coming years
- Tree varieties and harvesting techniques hold back productivity; however processing is the most centralized and scaled among the three countries
- Philippines authorities are focused on positioning the industry for higher value granulated coconut sugar in the global market
- Largest production risk is the large stock of aging trees, many of which are senile





- Large, untapped base of both Sugar Palm (3 million trees, 1 million tapped) and Coconut trees (13.4 million trees, none are tapped)
- Lack of coconut sugar production is attributed to the traditional use of coconut for its water and milk
- Majority of palm sugar production still artisanal for local markets and household consumption
- Seeded by social entrepreneurs over the past 15 years, there is an emerging value chain of palm sugar products for export
- No institutional crop research, extension services that is upgrading the production and processing capacity
- Recent arrival of international buyers is quickly soaking up excess production capacity and creating incentives for further organization of farmers and processors





- Limited investment across the region in scientific research on growing, harvesting and cooking process to systematically raise productivity
- Aging base of lower productivity trees requires a systematic effort to replanting higher productivity seedlings in Indonesia and Philippines
- Traditional collector networks are antiquated and holding back investment and adoption of productivity enhancements
- Distributed base of farmers and producers is an opportunity to use technology and new logistical models to restructure the value chain in a more efficient manner
- High interest financing and poor farmer economics resulting in poverty traps – new models for financing and on-farm production (practices, equipment, intercropping) needed



Product Characteristics and Segmentation

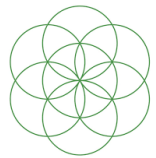


While coconut sugar and palm sugar are nearly perfect substitutes, there are significant differences in their agronomy and productivity

- Palm sugar comes from the *Arenga pinnata* and *Borassus flabellifer* trees, also known as the Sugar Palm or Date Palm tree. This is not to be confused with the *Elaeis* Palm tree that is the principal source of Palm Oil. Unlike *Elaeis*, the Sugar palm is native to Asia
- Coconut sugar is sourced from numerous different varieties of the *Cocos Nucifera* tree collecting the sap from the blossom
- Palm and coconut sugar are nearly perfect substitutes on the market leading numerous manufacturers & retailers in certain markets to merge the two into “Coconut Palm Sugar”
- Despite similar characteristics of the end product sugar, the growing conditions, harvesting cycle/techniques and productivity of the trees vary significantly

- Arenga palm tree grows roots 12 meters deep, while coconut roots are more shallow in the soil. This allows arenga to draw nutrients from deep down and maintain consistent sweetness of sap, irrespective of precipitation levels. Coconut tree sap is diluted when it rains heavily.
- The circumference of some arenga palm trees can grow quite thick, which also increases productivity, while coconut trees are usually quite slender.
- Coconut does best in salinated soil. The Arenga palm does not require salinated soil to thrive.

Characteristic	Arenga/Palm Sugar	Coconut
Height (old tree)	14 – 20 m	15 – 40 m
Initial fruiting at.....	5 years old	7 – 8 years old
Productive period	7 – 8 years	40 – 45 years
Litre of sap per day	20 – 80 litres	5 – 10 litres
Sugar per day (average)	6.7 kg	2.3 kg



Variables of production and quality for Coconut and Palm Sugar

Rainfall	<i>heavy rainfall precipitates new root growth on coconut palm trees and decreases available sap supply. The sap itself is also diluted and has a lower sugar break ratio. Palm tree is not affected by it, as it grows roots about 12 meters deep and gets all its nutrients from down below, irrespective of precipitation levels.</i>
Soil	<i>sandy soils and volcanic soils require different varieties of trees</i>
Age of tree	<i>coconut trees' productivity decreases with age, peak performance is between 10-40 years, and after 50 it decreases significantly</i>
Harvesting know-how	<i>selection of best trees (think trunks, big leaves, selection of right seedlings) and even slicing methodology affect productivity</i>
Processing know-how	<i>most farmers and processors do not cool sugar immediately after boiling. This practice speeds up the condensation process and allows for bigger quantities to be processed faster</i>
Processing facility capacity	<i>size of facility and availability of drying and sieving equipment dictate maximum levels of production</i>
'Farmer's touch'	<i>Farmers and cooks develop techniques for tapping trees and cooking sap that are very hard to identify and replicate</i>



Native to Southeast Asia, the sap of Sugar Palm has been used for centuries as a sweetener and alcoholic beverage.

Sap-based products

- Fresh sap for drinking
- Palm granulated/powdered sugar
- Palm jaggery
- Palm paste sugar
- Palm syrup
- Palm wine
- Palm spirit
- Palm vinegar
- Palm cider



Non sap-based products

- Medicinal uses of the roots and male flowers
- Wood for houses
- Leaves for roofs and walls, braiding baskets
- Fruit eaten green or used to make jelly when ripe



Diversity of possible products from the “tree of life” results in a constant optimization problem for farmers and processors. Technology and market growth are leading to full utilization of the coconut tree’s productive potential in domestic markets and for export

	Edible	Non-edible (Sap)
Nut	<ul style="list-style-type: none"> Young coconut juice Coconut flesh Coconut shavings Coconut milk Fresh fruit Dessicated coconut 	<ul style="list-style-type: none"> Coconut oil Cosmetics products Coconut Shell Charcoal/ Activated Carbon Coir Copra
Sap	<ul style="list-style-type: none"> Coconut sugar Wine Vinegar 	
Tree/Leaves		<ul style="list-style-type: none"> Weaved baskets Plate covers Food wrappers Planks Firewood

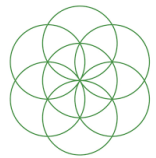


Global Market Landscape



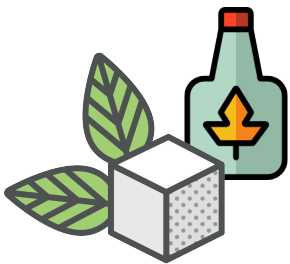
World sugar consumption and production continues to increase, with faster growth in developing countries

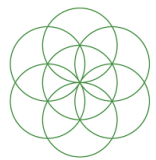
- Over 170 million MT of sugar are produced annually,¹ primarily from sugar cane in tropical climates (75-80%),² followed by sugar beet in industrialized countries
- **Brazil dominates world sugar production**, accounting for approximately one-fifth of production. Other major sugar producers are India, EU, and China.³ These are also the top four sugar consumers globally. Along with the US, they account for 51% of world sugar use.⁴
- Most sugar is consumed in producer countries, but **30% is traded on international markets.**⁵ Global sugar export trade was valued at USD 42.5 billion in 2016.⁶
- Worldwide production is forecasted to **expand at 2.1% annually**, reaching 210 million MT by 2025.⁷ Faster consumption and production growth is expected from developing countries.⁸



Artificial and natural sugar substitutes are a relatively small but growing market, driven by increasing concerns and awareness of the negative health impacts of sugar

- The global market for non-sugar sweeteners was estimated at USD 9.2 billion in 2010¹ and is forecasted to reach over USD 14 billion by 2020²
- High-intensity sweeteners (HIS) are widely used in food and beverages. Initially driven by diet soft drinks, this segment was valued at USD 1.22 billion in 2014 (equivalent to the sweetening power of 16 million MT of sugar).³
- Artificial HIS (acesulfame-K, aspartame, cyclamate, neotame, saccharin, sucralose) dominate the HIS segment (>70%) and are much cheaper than natural options.
- However, natural HIS are expected to register the fastest growth in the HIS segment. The shift towards stevia, licorice root extract, and monk fruit extract is driven by growing health concerns around artificial sweeteners.⁴ Other natural sugar substitutes include agave syrup, corn syrup, palm sugar, honey, maple syrup, etc.



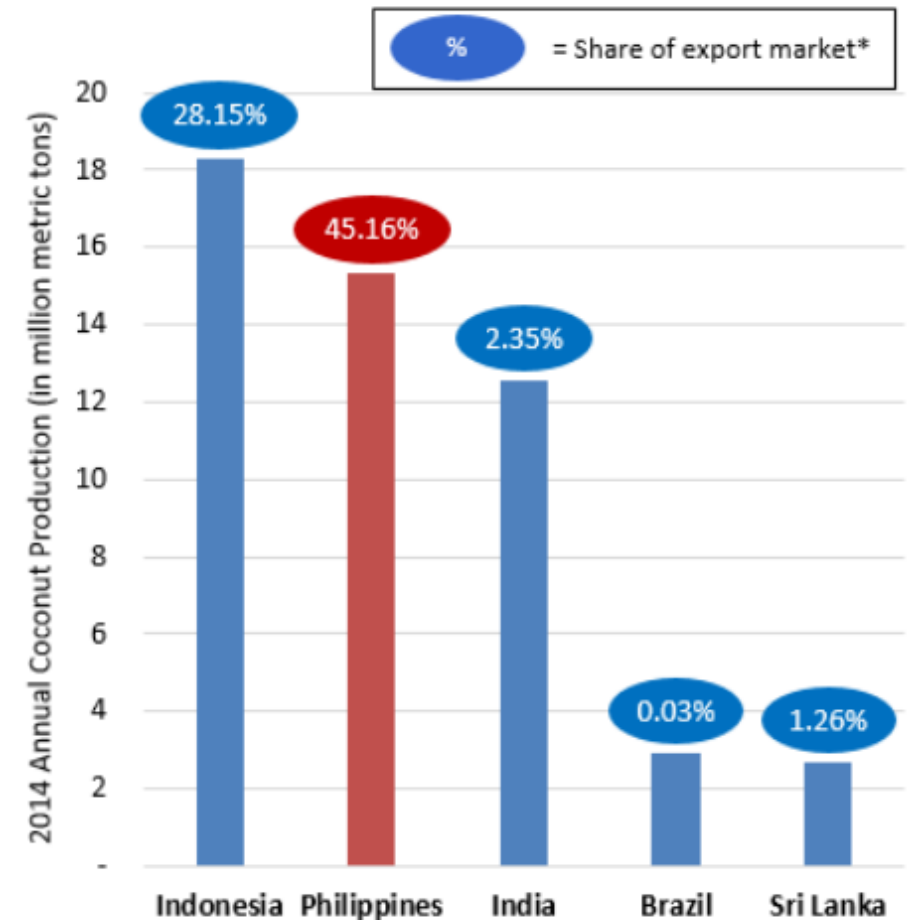


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Global Market Landscape: Overview of Market for Coconut Products

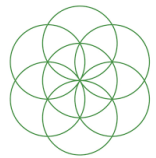
Global demand for coconut products is increasing, with top producers struggling to keep up with demand¹

- Global export market for coconut products is growing at >4% per year, with coconut water growing even faster at ~20% annually²
- Coconut milk and water alone makes up >30% of overall global coconut consumption³
- Indonesia is the largest coconut producer with an annual production of >18 million metric tons
- However, the Philippines (the 2nd largest coconut producer) accounts for the largest share of coconut exports (~45%) and the majority of European and US coconut oil requirement.⁴
- Despite growing global demand, production is stagnating for many of the top producers⁵
- This is putting upward pressure on prices, with the price of copra more than doubling over the past decade (from \$403/MT to \$854 between 2006 & 2015)⁶



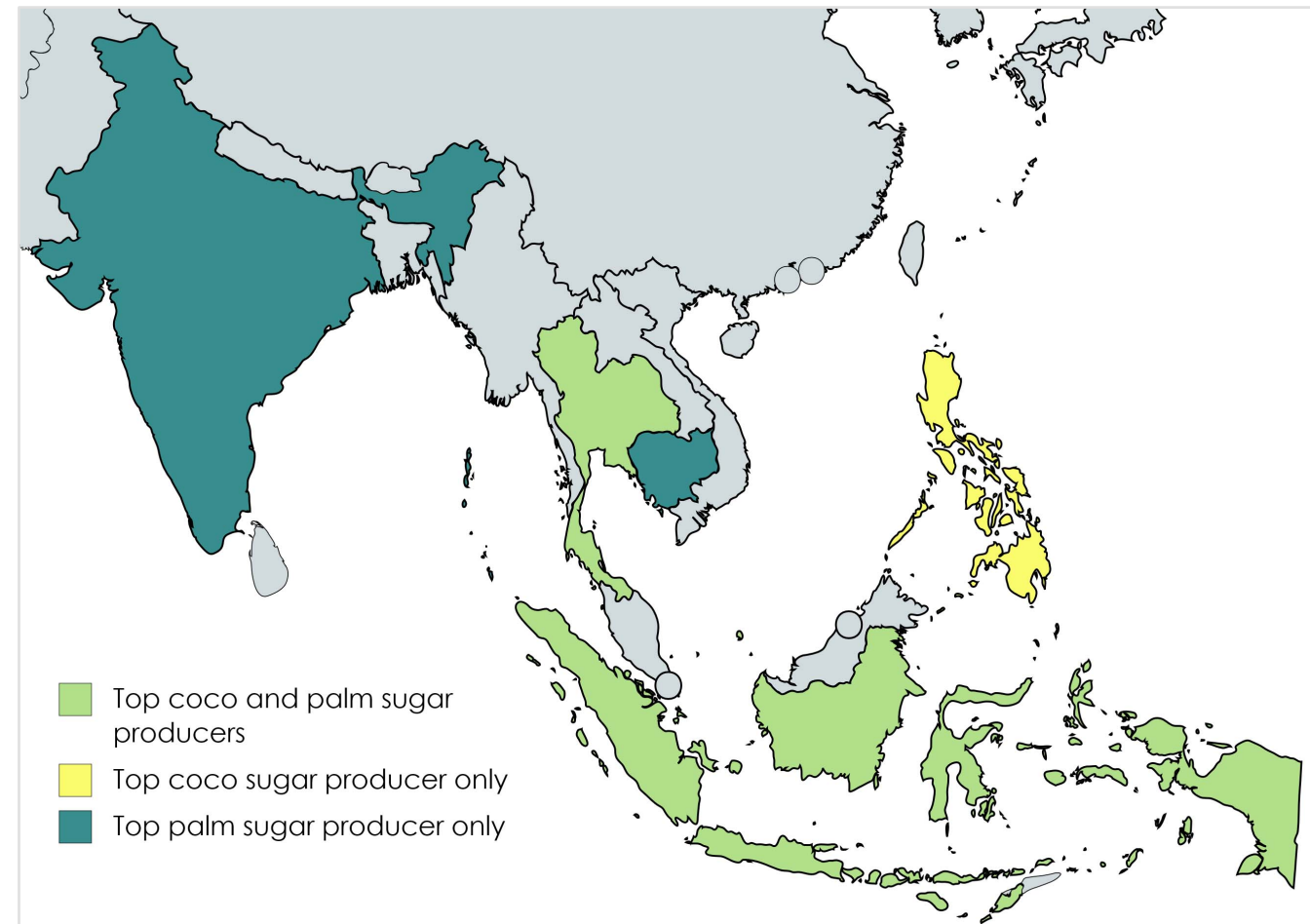
Source: Hope in a Coconut- Coconut Market Analysis





Coco & palm sugar constitutes a small proportion of the market for non-sugar substitutes, with most of the largest producers in South and South East Asia

- Global databases on agricultural production and trade flows do not currently track coco/palm sugar as a separate commodity from other types of sweeteners, making it difficult to get accurate estimates of the market size and trade volumes.¹
- Estimates place coco sugar as a **USD 1.3 billion industry**,² whereas the overall total sugar and sweetener industry ranges between USD 77.5 to 99.1 billion depending on the year and volatility in sugar prices.³
- Indonesia, Thailand, and the Philippines account for 80% of coco sugar production.⁴
- Major palm sugar producers include Indonesia, Ethiopia, India, Cambodia, and Thailand.⁵

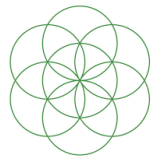




Coco & palm sugar have high demand in many of the domestic markets, as well as growing international demand in more recent years

- Coco & palm sugar are commonly used in a range of traditional foods in producing countries
- The largest international demand for palm sugar is from the US (~500 MT per month). The US market for coco sugar was valued at USD 22 million in 2015. Although this has more than doubled since 2014 and has made it the fastest growing sweetener in the US, stevia, the most prominent natural sweetener in the US, reached nearly USD 430 million the same year.¹
- In Europe, where the estimated market for coco and palm sugar is between 1,500-3000 MT per year, this constitutes at most 0.02% of the total European sugar market. Importers are concentrated in northwestern Europe (UK, Netherlands, and Germany), where there is greater consumer interest in natural products.²
- Other major export destinations include Australia, China, New Zealand, South Korea, Japan, Canada, and South Africa. The Middle East is also an emerging market for coco sugar.³





International trade in coco & palm sugar is being driven by the backlash against sugar, preferences for more natural and healthier products, and increased exposure to and experimentation with alternative ingredients

CONSUMER BACKLASH AGAINST SUGAR¹

- Sugar is overtaking fat and salt as a primary health concern
- Studies link sugar with rising prevalence of obesity, diabetes, heart disease, and tooth decay
- 2015 WHO guideline recommends reducing daily sugar intake to <10% of total energy intake and to <5% for additional health benefits
- Consumers are reducing sugar intake and demanding lower sugar content and sugar alternatives
- Several governments are also experimenting with taxes & legislation to curb sugar intake

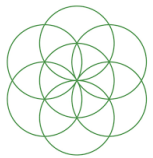
PREFERENCES FOR NATURAL & HEALTHIER PRODUCTS²

- Consumers wary of artificial sweeteners as a result of studies on the negative effects of artificial food products
- Consumers equate 'naturalness' with health and are increasingly demanding fresh, natural, and/or organic products
- Strong overall growth in health food market, with consumers willing to pay premiums
- Coco and palm sugar is being marketed as a healthier alternative (with a lower GI and more nutrients) to conventional sugar

EXPOSURE TO & EXPERIMENTATION WITH ALTERNATIVE INGREDIENTS³

- Cooking shows (including the recent rise of competitive cooking shows) is exposing viewers to new, alternative ingredients and encouraging viewers to be more adventurous in their cooking
- Coco and palm sugar is also gaining a reputation among food communities, with some popular establishments converting 100% to coco palm sugar





Global Market Landscape: Coco-related Health Trend

Coco sugar has also benefited specifically from the explosion of coconut products in the West, riding on the health halo established by coconut water

(1) Launch of coconut water in the US puts coconut "on the map"¹ as a major health product

- Vita Coco launches in 2004 followed by One and Zico
- Coconut water marketed as an all natural sports drink high in electrolytes
- By 2015, the US coconut water market was generating revenues of USD 778 million²

(2) Other coconut products increase in popularity in the US, with the trend starting to spread to Europe

- Consumers associate coconut products with health, vegan, dairy-free, and gluten-free benefits
- Alongside soy and almond milk, coconut milk has taken off as a dairy free alternative in the US
- Coconut oil makes a comeback with the 2015 Dietary Guidelines for Americans increasing allowances of dietary fat and cholesterol³
- Other coconut applications include snacks, baking flour, and beauty products. Coconut-containing product launches is increasing on average by 21% per year in the past five years.⁴
- The coconut trend is starting to emerge in Europe (particularly in the UK, the Netherlands, France and Germany), with coconut water, oil, and milk growing rapidly in recent years.⁵



(3) Coco palm sugar introduced to the US and takes off among health food retailers

- A. 2007 study by the Philippine Coconut Authority finds a low glycemic index of 35 for coco palm sugar
- Based on these health claims, the Philippines breaks into the coco palm sugar market in the US with its first export in March 2007.⁶
- Similar to coco palm sugar, other types of palm sugars are also positioned and marketed as a premium and healthier alternative to conventional sugar.

(4) While growth of coco/palm sugar has plateaued in the US, demand in Europe is quickly picking up

- Expectations are that demand in Europe will soon catch up to the US.



Country Analysis: Indonesia

- National Context
 - History and background
 - Market size and growth
 - Current product portfolio: characteristics, quality
 - Pricing and seasonality
- Productivity & Production Models
- Value Chain Mapping
 - Inputs
 - Harvesting, Processing, Route-to-market
 - Cost economics
- Market Dynamics

History of the industry

Coconut sugar has been produced in Indonesia for centuries. It is primarily produced in Java and only by the ethnic Javanese. It is unlikely to find such coconut sugar outside of Java unless there is a significant Javanese migrant community.

Traditionally sugar has been produced in blocks and then used in a wide variety of local cuisines. Historically, very few producers go as far as making powder (granulated sugar), which requires additional labor and special packaging for transport.

Harvesting and cooking of sugar is a household and community tradition. Climbing and cooking practices have been handed down over generations. Climbers develop relationships with specific trees. Specific trees are only tapped by one climber, unless the climber is physically unable to climb.

Despite the existence of Arenga across Indonesia, especially in Sulawesi, Palm Sugar has not been a traditional product. Instead, the tree sap has been used to make palm wine.

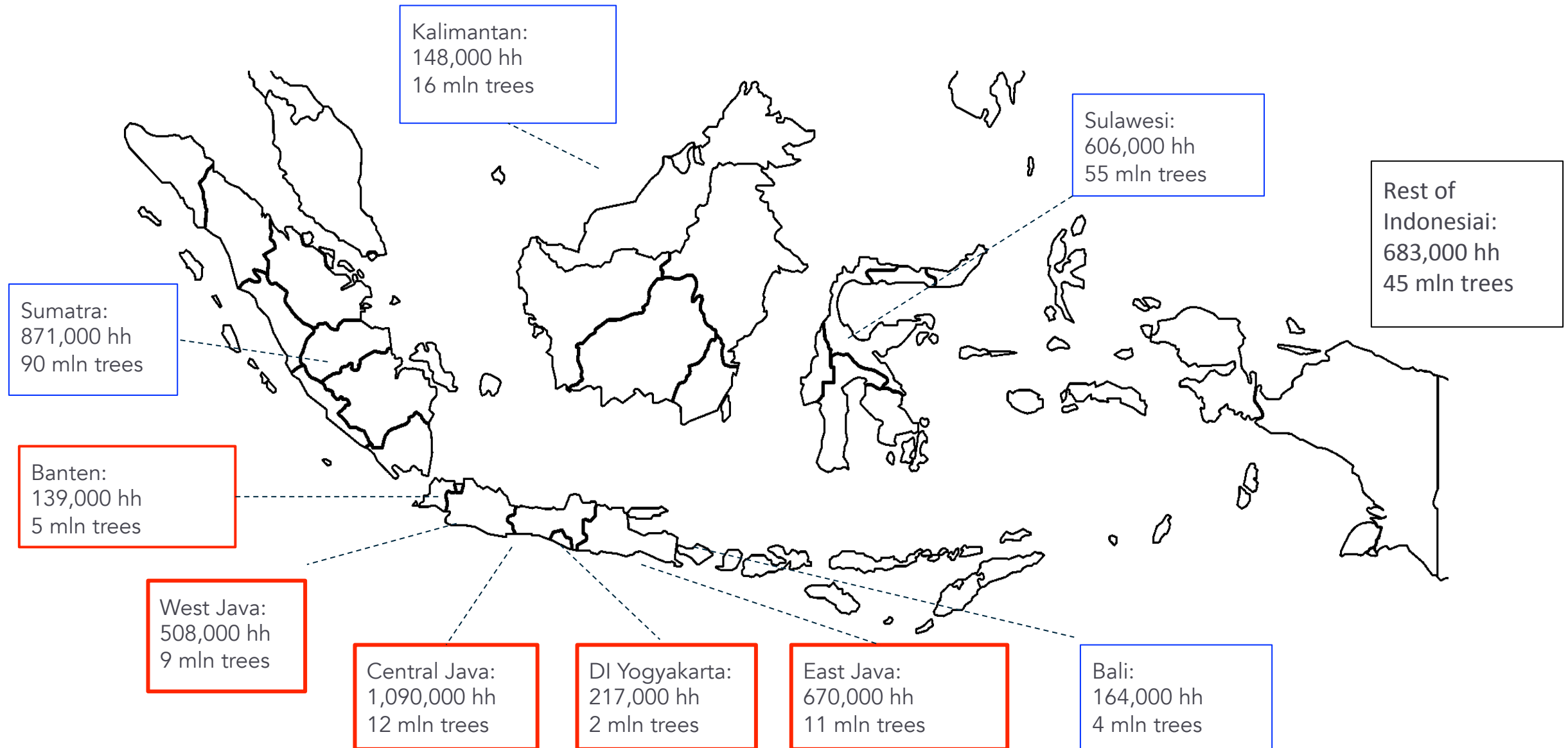
Market background

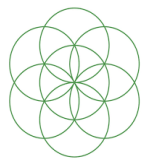
The supply chain of traditional, coconut block sugar (known as Gula Jawa or 'javanese sugar') has been governed for centuries by the same social dynamics as other commodity crops in Indonesia. Farmers produce block sugar, sell it to village collectors, who then sell it on to regional collectors with connections in retail chains, wet markets and big cities. Historically, the demand for this sugar comes from households and covers a range of local foods, sweets and sambals.

This collection chain is marred by 'ijon' relationships between farmers and collectors, wherein the latter supply up-front cash to farmers in exchange for exclusivity and lower prices. Given the economics of the multi-actor supply chain, this relationship can often lead farmer households into debt and poverty traps.

With the expansion of the packaged food industry in Indonesia, processed sweet soy sauces have been introduced in the market to replace home-made sauces. The growth of the packaged sweet soy sauce market has been a key driver of growth in demand for coco sugar.

85% of the production comes from 2.5 million households in Java with the rest spread across Sumatra, Sulawesi and Bali/Kalimantan





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Indonesia: Distribution of production by province

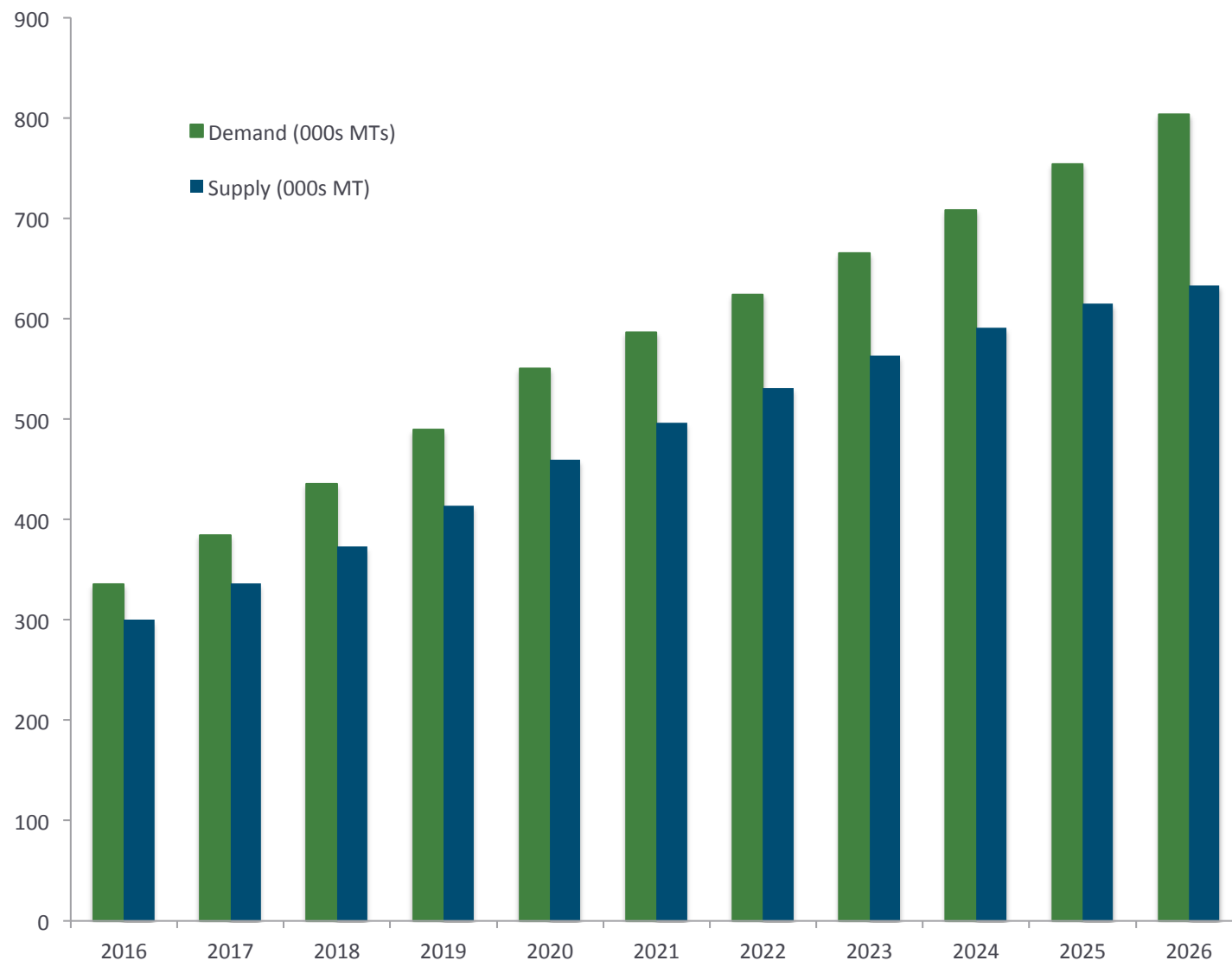
Province	Location
Aceh	Pidie, Loksumawe & Langsa
North Sumatera	Asahan and Simalungun
West Sumatera	Payakumbuh, Pasaman and Sijunjung
Riau	Bengkalis, Indragiri Hilir
Jambi	Kuala Tungkal
Bengkulu	Bengkulu Selatan
Lampung	Gedong Tataan, Lampung Timur & Lampung Selatan
West Java	Sukabumi, Pangandaran, Cianjur , Tasikmalaya & Garut
Centra Java	Purworejo, Cilacap, Banjarnegara, Banyumas, Purbalingga, Semarang
Jogyakarta	Kulonprogo
East Java	Banyuwangi, Bangkalan
West Kalimantan	Mempawah, Sambas & Pontianak
Central Kalimantan	Sampit
South Kalimantan	Banjar
Central Sulawesi	Ampana, Una-Una
Gorontalo	Buolemo, Suwawa
North Sulawesi	Minahasa Tenggara & Selatan
Maluku	Masohi
North Maluku	Tobelo & Halmahera
Papua & West Papua	Manokwari & Marauke



With 3.5 million hectares of coconut growing area, 5 million households, and 20 million Indonesians are involved in cultivating coconut trees

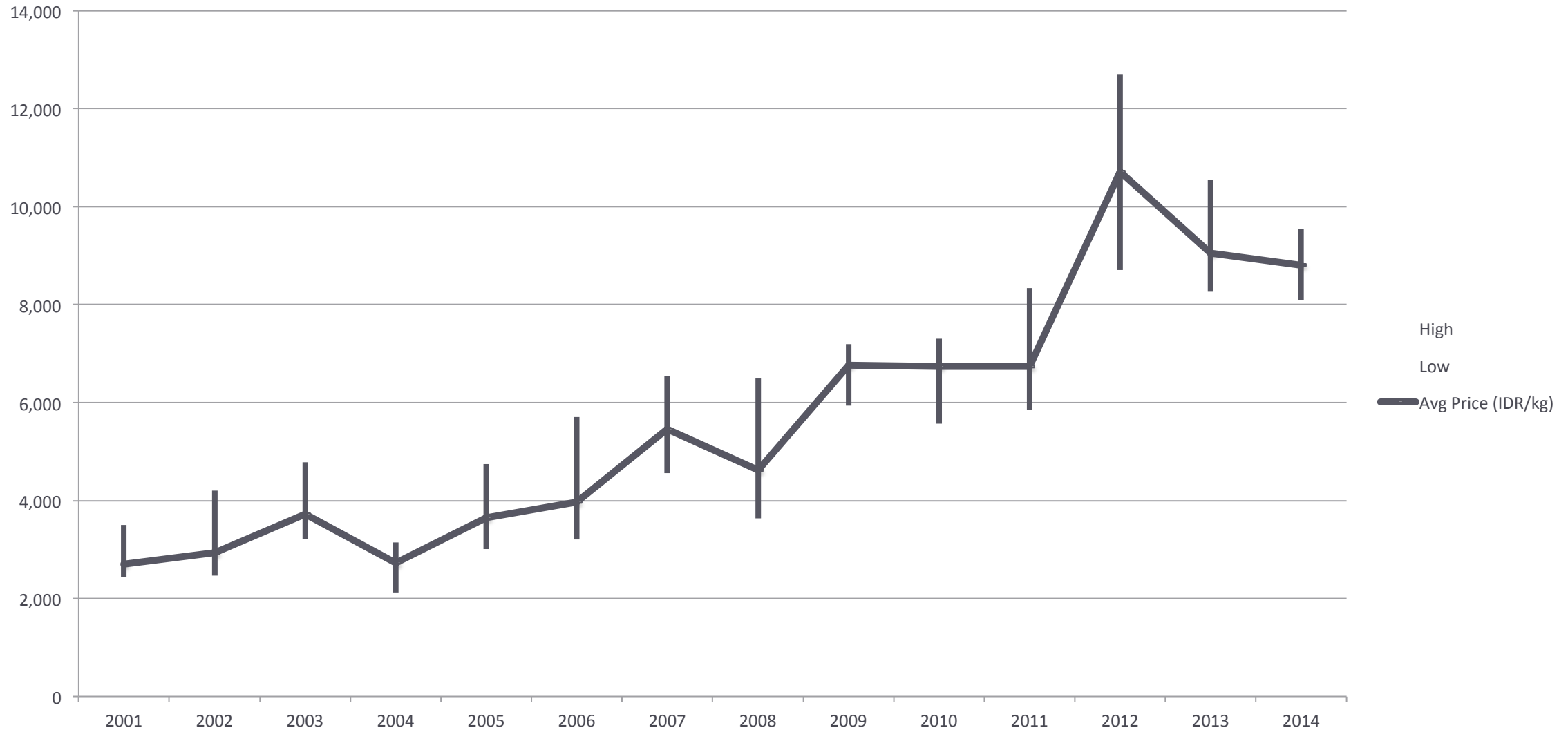
- Indonesia has the largest coconut growing area in the world, about 3.5 million hectares (estimates vary, some show 3.8 million hectares). It is the largest producer of coconut sugar in the world, with about 300,000 tons produced annually.
- About 5 mln households in Indonesia, or 20 million individuals, cultivate coconut trees.
- Number of households producing sugar is at best 5% of that figure, or 250,000.
- Each household tends an average of about 20-25 trees, giving a rough estimate of 100 million productive trees across Indonesia
- With each tree producing about 3 litres of sap per day, yielding 0.4kg of sugar. Total potential for production could be well over 800,000 tons annually.
- Number of coconut palm trees in Indonesia is 250 mln (APCC, 2013). Total number of palm trees tapped for sugar production is estimated at 12,500,000.

Indonesian market growth is projected to continue apace, but despite production potential, supply will likely not be able to keep up given current production base and practices, intensifying competition for supply channels



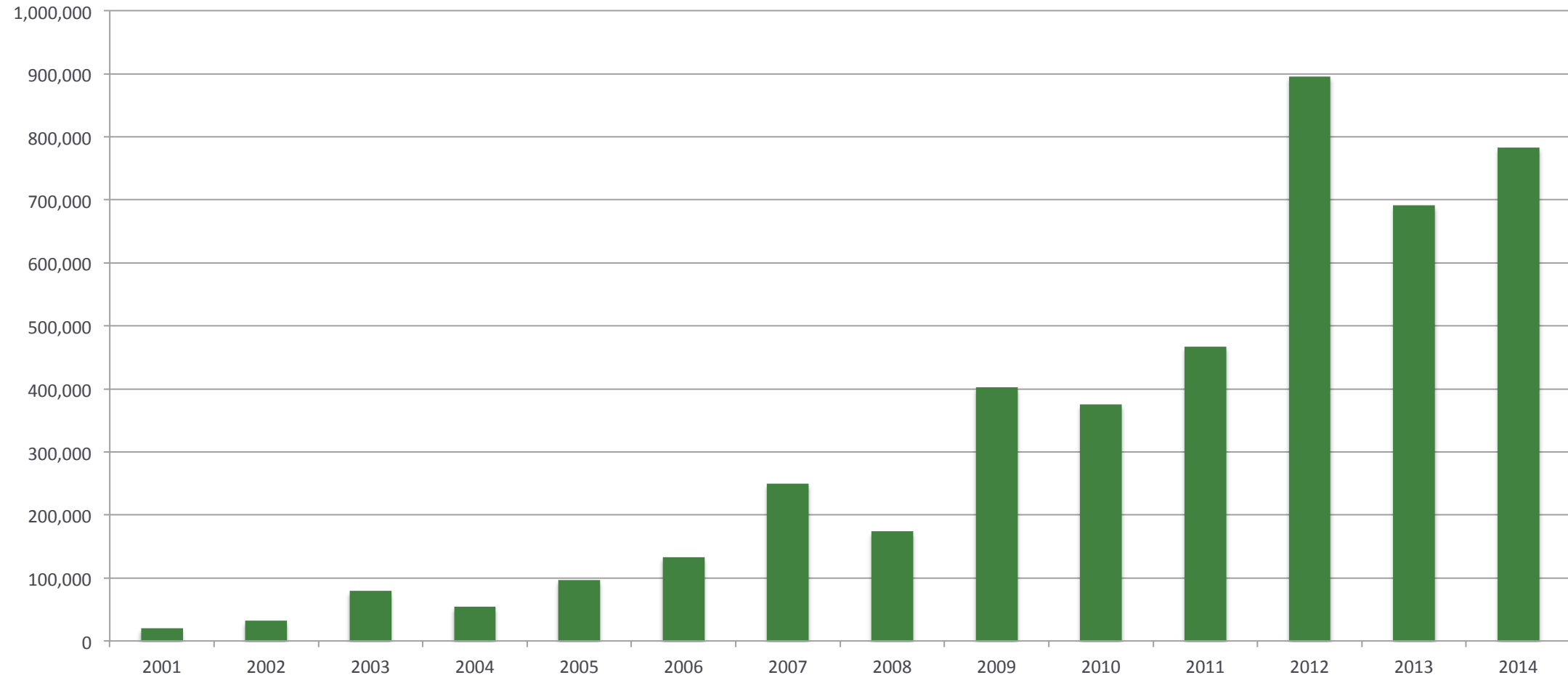
- Currently 20-25% of total production, or around 60k-75k MT was absorbed by wet markets to fulfill household consumption
- The balance of 75-80%, or 225k-240k was sold to SME food processors or large scale manufacturing: Unilever, Indofoods, Wings, Heinz, Sari Sedap
- Current installed capacity of soy sauce factories is for 250k MT
- Annual industry growth projected at 15%

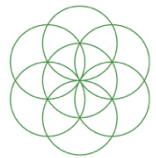
Rising demand has led to a 4 fold increase in prices since 2004. Prices are highly volatile -- fluctuating by nearly 40% in any given year. A continued gap between supply and demand is expected to continue upward pressure on farm level and retail prices



The combination of rapidly rising demand and increasing prices has resulted in a massive expansion of total domestic market value

Market Value (IDR 000s)





Export market development

Following the 2008 report by the Philippines that announced low glycemic index in coconut sugar, US demand took off. The Indonesian coconut sugar sector started a gradual shift towards organic powder coconut sugar.

At the time (2008) there were just two exporters of granulated Coconut Sugar. However, following the low GI announcement and clear growth signals from the US market, bi-lateral development organizations started to support the value chain, in partnership with the trading arms of their embassies. In 2012-2014, with the rapid growth of the overall coconut products market in the US and other parts of the world, more players started to enter the high-end market.



Export market development

In 2008, the Indonesian sugar appeared at Biofah fair in Nuremberg, the biggest organic fair in the world, as apparently first sugar of such kind to reach there. For that, an organic certification was required. It was impossible to certify 1000s of farmers, so the players established the first cooperative, KSU Jatirogo (Jaringan Petani Kulon Progo). Nothing was sold, however.

Suddenly, the US announced the coconut sugar has a range of health benefits. The demand shot up. Boom started in 2011, with demand increasing almost exponentially. Initial players went from selling 2 containers to 4 to 8 monthly. Now the demand from US is about 20 containers per month (x 20 tons = 400 tons monthly.)

Sugar is shipped to East Coast and West Coast, about 10 containers each. There are about 10 major retailers in US, each receiving about 2 containers monthly (40 tons). Considering how many outlets the retailers have, consumption is nowhere near saturation point in the market.

The biggest risk to the business now is the adulteration and fraud in Indonesian coconut sugar – now recognized by the broader consumer, not just by the buyers. Adulteration can occur in either the mixing of coco sugar with cane sugar or with the use of potassium sulphite in the preservation of the sap to control the pH levels prior to cooking. Some estimates are up to 40% mixing with cane sugar. Coconut + cane sugar tastes different but doesn't look different to the naked eye.



Indonesia: Value Chain Map

There is very little organization in the value chain, with aggregators still holding much of the market information and transaction power

Powder sugar to retail markets (domestic and export)



Smallholder farmers who own and climb their own trees

Tree owners that do not want to climb or are too old

Plantation owners

Men from the village

Women in the village, often the wives of the climbers / owners

Exporters of Coco Palm Sugar

Local Producer Associations

Women in the village, often the wives of the climbers / owners

Local Producer Associations

Wet market Local retailers Retail chains

Block sugar to wet markets and domestic food processors



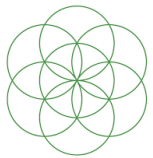
Wealthy member of the village, often a local government official

General trader that sells directly to manufacturer

Unilever, Indofoods, WingFoods, Heinz

Wet markets, local retailers





- Aging base of wild trees
- Low productivity varieties of trees
- Taller trees take longer to climb
- Traditional harvesting methods are inefficient and dangerous for the climber
- Volatility and seasonality due to weather and climate change
- Most climbers are 50+ years old, so available climbers is a major risk in the near future
- Climbing seen as an unattractive job due to low income, physical risk and desire to move to the city
- Use of limestone and chemical anti-fermenting agents
- No finance options for smallholders from commercial banks or MFIs

- Low sugar quality
- High proportion of mixing with cane sugar
- Cooking occurs in the home over a wood fire
- Traditional cooking method is long does not incorporate cooling equipment

- Lack of quality controls along entire supply chain
- Volatility in supply from seasonal swings in local demand

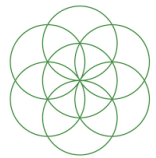


- Village collectors serve as lender of last resort taking high commission for upfront payment
- Poverty trap for many farmers supplying the industrial manufacturers



- Individual farmers usually own the trees
- Three rental models exist: 1.) Kulonprogo: the sap is shared 50/50 between the tree owner and the climber (2 days output to owner and 2 days to climber); 2.) Tembilahan hired labor paid 50g of coco sugar per palm per day; 3.) Cash payment IDR 55,000 for 20kg of coco sugar
- Traditionally, two people do not climb the same tree; farmers have a one-one relationship with trees
- Smallholder farmer with land area of up to 0.5 hectares
- Average tree tending of 25-30 trees
- Average income per tree of \$94
- Average annual income of \$2830 from coco sugar
- Average tree productivity of 140-150 kgs annually, depending on precipitation and use of fertilizer
- Prices of about \$0.75/kg of block sugar, \$1.3/kg of powder
- On average, 6-7 liters of palm sap required to produce 1 kg of sugar (sugar break ratio of 14%)
- Tapping the trees twice a day, cooking takes about 4-4.5 hrs per tap – most farmers will cook the afternoon sap half way and then fully cook it the following morning
- Average age of farmer about 50 years +





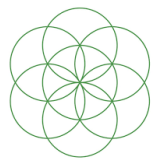
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Indonesia: On-farm economics

Farmer income varies significantly depending on trees tapped, ownership model, and the ability to access block vs. powder markets

			IDR	USD
Harvesting / Production	# of trees	25		
	Daily yield/tree	3 liters		
	Total daily yield	75 liters		
	Sugar yield / Ltr	0.2 kg		
	% powder	30%		
Processing	Block/day	10.5 kg	14,000/kg	11.31
	Powder/day	4.5 kg	19,000/kg	6.58
	Total/day	15 kg	232,500	17.88
Rent	Rent	50% of sap	7.5 kg	8.94
Equipment & Fuel	Equip cost / day	903 IDR	903	0.07
	Fuel	13,333 IDR	13,333	1.03
NET HOUSEHOLD INCOME / DAY			102,039	7.84
Labor	Climb hrs/day	4.2		
	Cook hrs/day	8		
NET INCOME / LABOUR HOUR			8,364	0.64

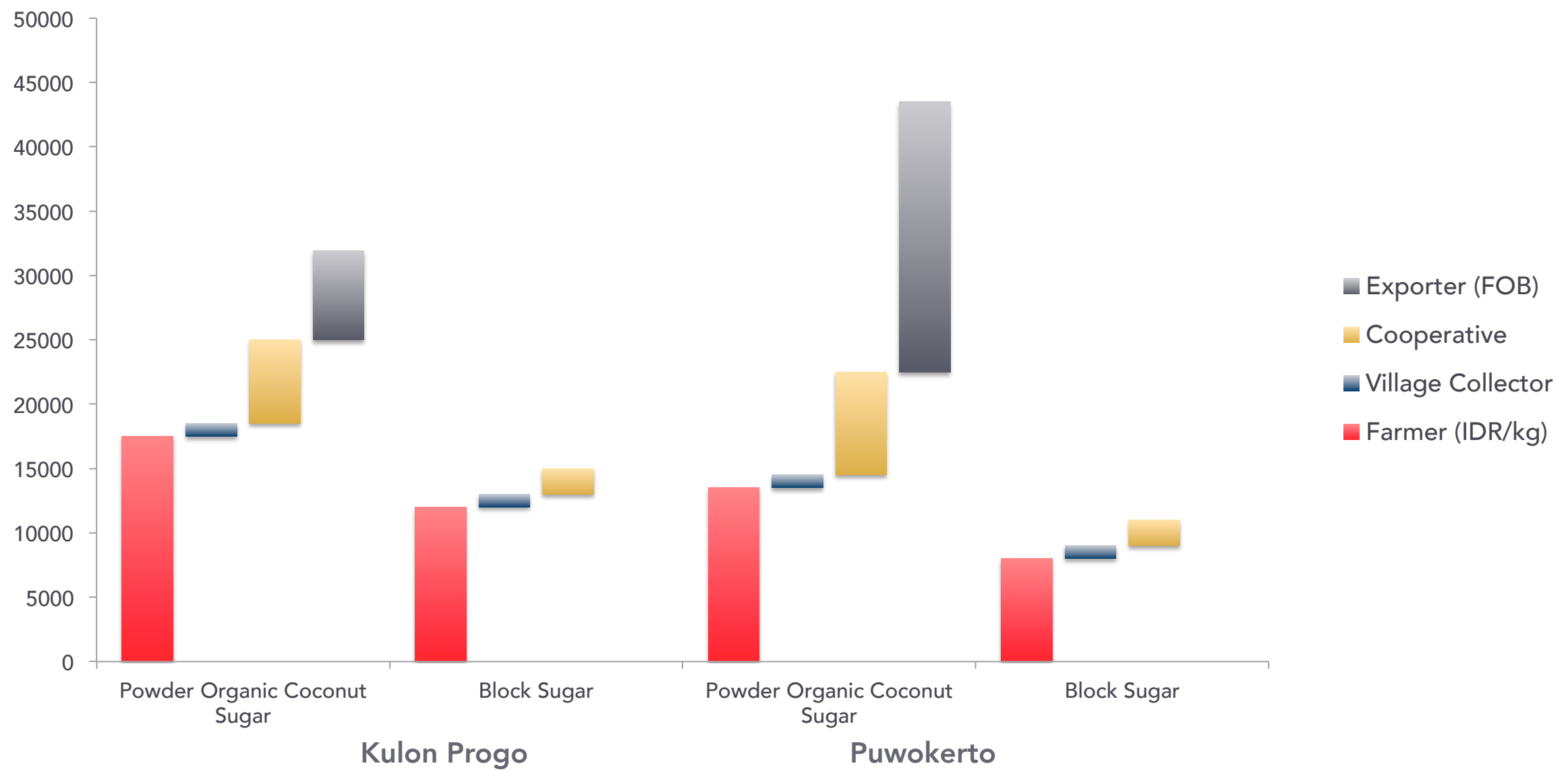




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Indonesia: Value Distribution

Producers are able to earn substantially more when they are able to sell into channels for export of powdered organic sugar. However, those channels are limited and require the presence of significant organizational and technical capacity



Organic powder sugar export models

Technology pioneers

Buying sap or powder, whatever fits best their production technology

Control the quality with modern tools (PH checking, identification of best trees, etc.)

Introduce their own innovative production technology and actively research better production techniques

Buy the land to use labour as climbers only

Seek facilitation from local government and international government representatives

Established 'steady' players

Buying through cooperatives

Purchasing only powder to control the quality

Switch suppliers when necessary (quality or shortage issues)

Have their own established networks both from domestic suppliers and international markets

Rely on traditional and steady production that has moved up the organic value chain, yet are not seeking for any further improvements beyond export and organic certificate requirements

New Entrants

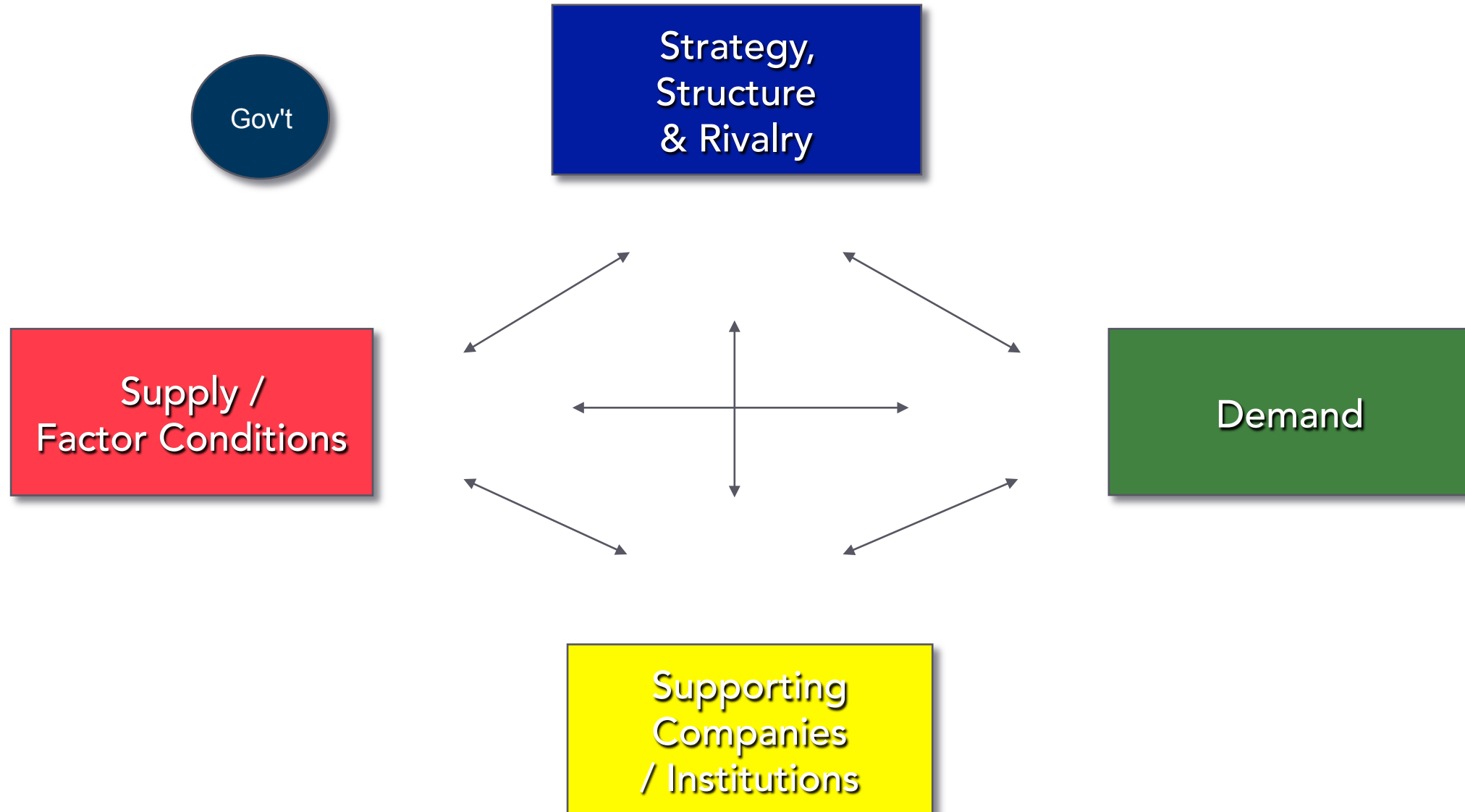
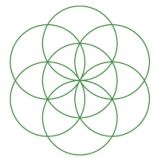
Buying from individual farmers or trying to establish own cooperatives

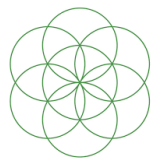
Purchasing powder or block, whatever they can negotiate or source

Limited cash flow and sales expertise, and low international market access

Susceptible to backlash due to door-to-door canvassing for supply and resulting disruption of community and trading relationships

Usually younger, aware of market possibility and seeking to exploit it with energy but low know-how

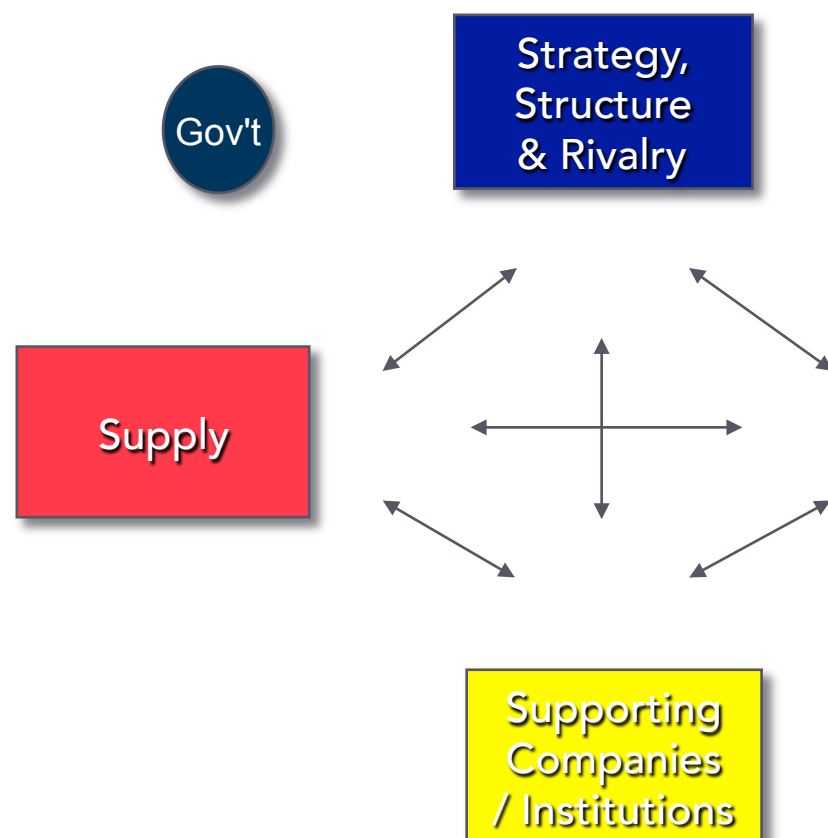




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Indonesia: Market Dynamics

Demand is still driven by domestic consumption with very little price incentive for increased quality or productivity



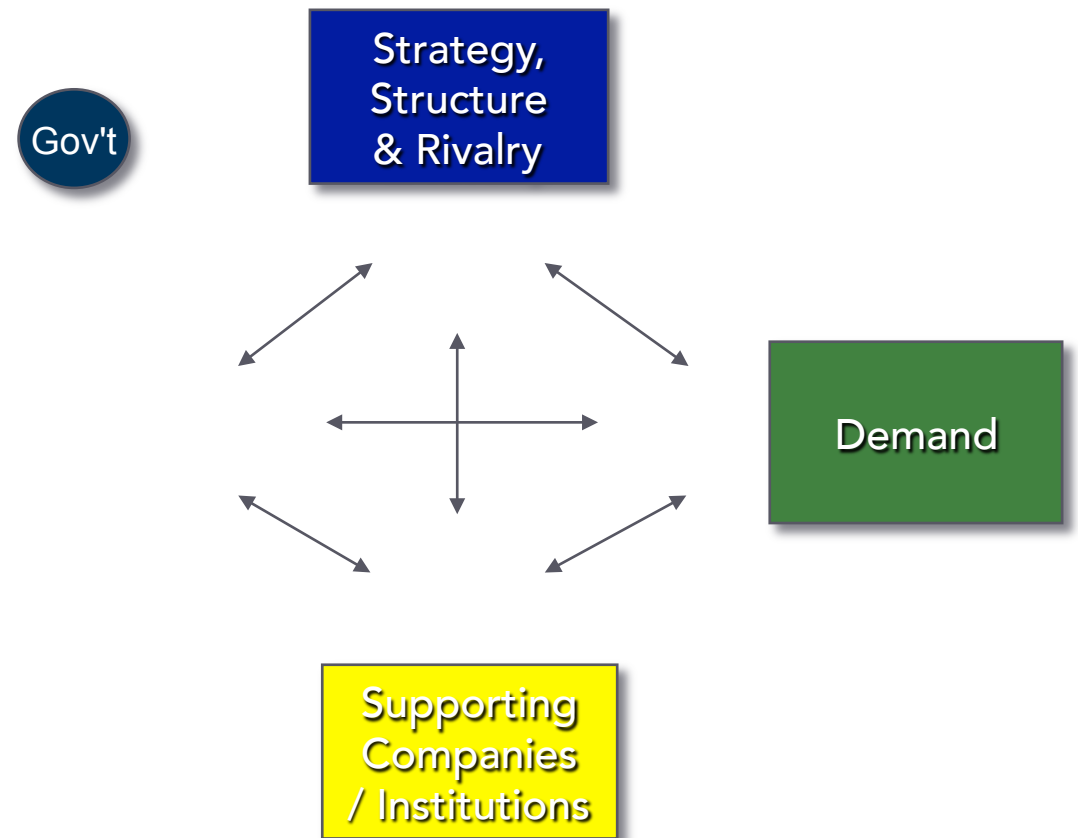
Demand

- Unique flavor compared to cane sugar integrated into many traditional Indonesian dishes very difficult to substitute
- Coconut sugar produced mostly in Java, with slow expansion in Sumatra, Sulawesi
- Negligible Palm Sugar production
- Domestic market demand dominated by industrial sweet soy sauce manufacturers and collector/trader network
- International demand expanding for premium powdered sugar, organic and fairtrade
- Adulteration with cane sugar risks Indonesia's reputation among buyers in US and Europe

Indonesia's supply of coconut palm sugar is produced on basic factors of production with no investment in increases in efficiency and productivity across the chain

Supply

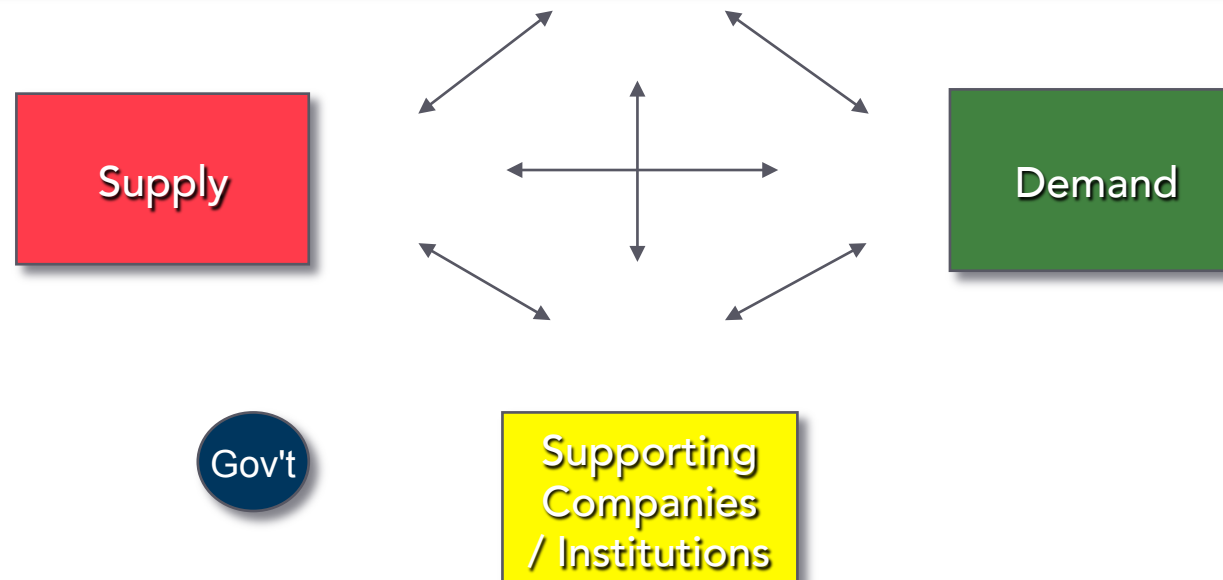
- Aging base of traditional trees
- Limited understanding, cultivation of higher productivity dwarf and hybrid trees
- No active management of trees (use of fertilizers, etc)
- Significant and increasing gaps in productivity compared to international competitors (Brazil, India)
- Immediate opportunities to increase productivity across supply chain through application of new technology and organizational supply chain models
- Yet, most supply chain actors have limited interest in investing in supply chain innovations



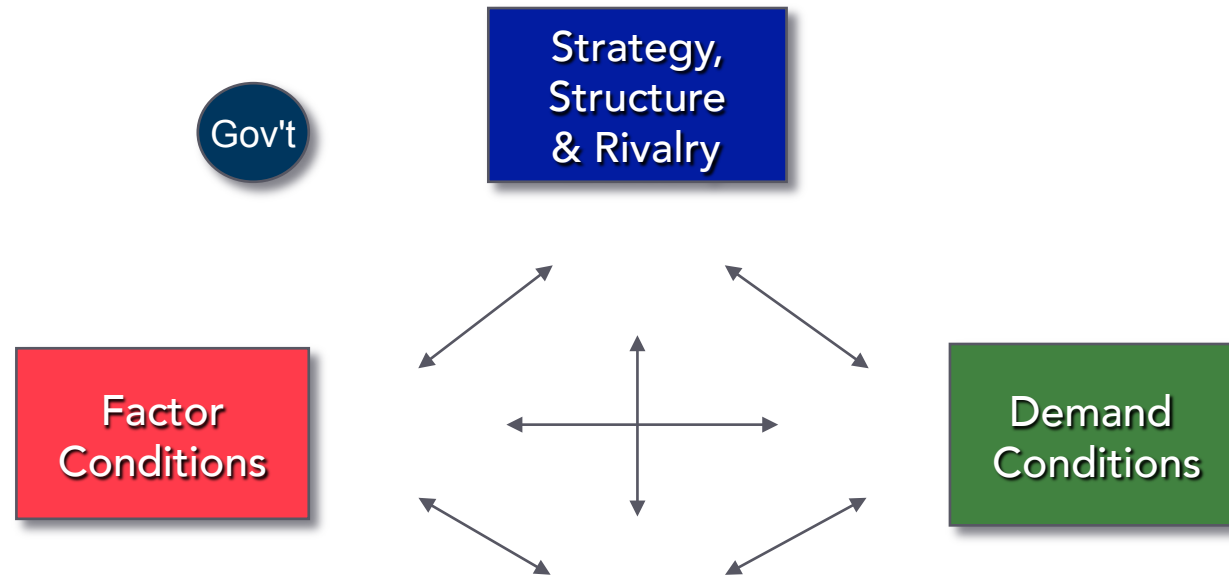
Competition is based on price and relationships rather than investment and innovation

Strategy & Rivalry

- Increasing demand and constrained, volatile supply result in fierce competition among industrial manufacturers of sweet soy sauce
- Very few examples of market players investing in innovations and market development to increase productivity and performance
- Traditional network of collectors and traders, many of whom are local government officials, is holding back direct linkages from producers to manufacturers and slowing the adoption of new practices



Government is not playing an enabling role in the expansion of the sector



Related / Supporting Companies & Institutions

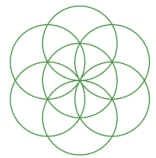
- All international standards and certifications are available in Indonesia, but at significant costs of both resources and time to the farmer groups and exporters
- Limited government support for the sector in research, organization, and regulation with some local governments actively questioning the value of coconut sugar processing for farmers livelihoods

Country Analysis: The Philippines

- National Context
 - History and background
 - Market size and growth
 - Current product portfolio: characteristics, quality
 - Pricing and seasonality
- Productivity & Production Models
- Value Chain Mapping
 - Inputs
 - Harvesting, Processing, Route-to-market
 - Cost economics
- Market Dynamics

Philippines is among the largest producers and exporters of coconut products globally, but top agricultural coconut exports have declined in recent years

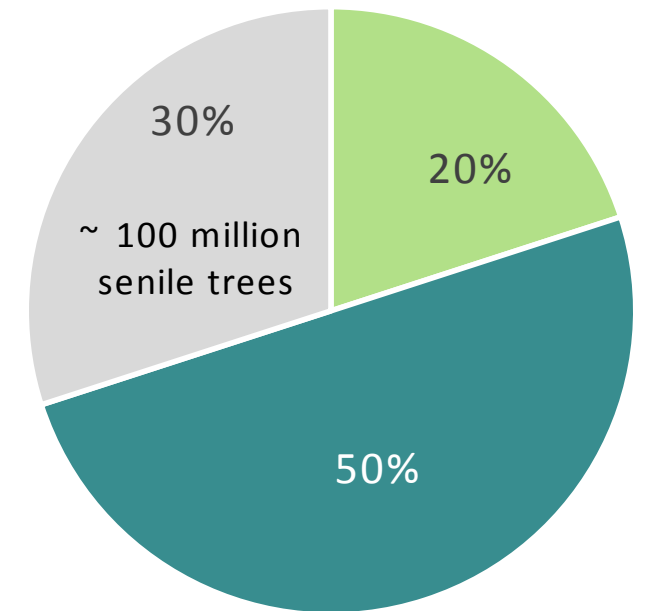
- Philippines is the 2nd largest coconut producer, producing >15 million MT of coconut annually ¹
- The Philippine coconut industry is export-oriented, with 70% of total production being exported.²
- It supplies ~45% of the coconut export market (and >55% of European and 74% of US coconut oil requirement).³
- Coconut oil is its top agricultural export. ⁴ But the Philippines has also diversified beyond oil. Non-traditional products (e.g. coconut milk, glycerin, coco water) account from ~USD100 million annually
- Coconut sugar exports are a small fraction of non-traditional coconut products, estimated to be over P 100 million or USD \$2m annually
- In recent years, top agricultural coconut exports (coconut oil, desiccated coconut, copra cake) have declined by -12.57% (2010-2014 CAGR) ⁵



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Low yields and natural disaster are threatening Philippine's leading position in the global market

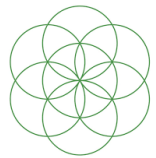
- Philippines coconut yields are 30%-60% lower than competitors
- An aging, unproductive tree population limits productivity. Nearly a third of coconut trees are senile (producing 30-50% of full capacity) and 20% are not yet mature.
- Frequent typhoons, drought, and coconisap infestations are also severe threats to coconut trees in the Philippines.
- 10% of the total tree stock was destroyed in 2013 by Typhoon Haiyan and coconisap infestation. At current replanting levels, it will take an estimated 10 years to fully restore production.
- To keep up with increasing global export demand, the Philippines would have to improve yields of existing trees by >100% or plant ~50 million seedlings annually until 2025.¹



% of coconut trees

■ Young ■ Mature ■ Senile





Low returns from coconut farming and low farmer investment also threaten the future of the Philippine coconut industry

- Given the low returns from coconut farming, it is not the primary source of income for households
- ~65% of coconut farmers are tenant farmers. Tenant farmers receive only 30% of the potential return from their coconut crop.
- Despite potential to increase farmer income by over 200%, less than 25% of farmers intercrop. Intercropping is limited by inability of tenant farmers to plant new crops, preferences to invest labor elsewhere, and unfamiliarity with farming practices and market demand for such crops.
- Despite potential to increase yields by at least 50%, less than 5% of coconut farmers use fertilizer. Those who use fertilizer use the free salt provided by PCA.
- Most farmers (~90%) produce copra as a result of existing, long-term relationships with traders and transportation difficulties associated with whole dehusked nuts.
- Indebtedness to copra traders, which affects 30-50% of coconut farmers, limits farmer's return on investment (indebted farmers receive lower prices from traders).

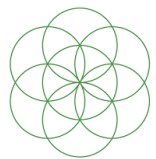


Fortunately, the Philippine government is particularly active in supporting the coconut sector but significant changes are needed to help Philippines retain its leading position

- The Philippine Coconut Authority, a government agency responsible for developing the industry, is supporting value-added coconut products (e.g. through large agro-industrial hubs and village-level coco processing hubs).¹
- The first National Coconut Sap Sugar Industry Congress was held in 2012² and a Coconut Road Map was approved in 2013.³ Objectives of the Coconut Sap Sugar Industry Roadmap included capturing “at least 1% of the projected average world requirement of diabetics for alternative sweetener.”⁴
- USD\$12m of funds from the coconut levy trust to experiment on projects to support small holder farmers
 - Projects on Alabat Island and Mindanao to set up CPUs financed building and equipment with stalls and equipment and owners of the land have supplied ladders, bamboo bridges
- Third Coconut Congress to be organized in the coming 1-2 years to include international players to stress the integrity of the product because of risk adulteration in Indonesia presents to the global market
- PCA committed to continue to position coconut sugar as a premium product competing with Aspartame
- To tackle the shortage of climbers PCA is working with Vocational Training Agency to set up farmer school in each municipality to train next generation of climbers

As Philippines seeks to maintain its position in coconut export markets, an eco-system of standards and certifications is emerging to support on-going competitiveness

- Traditionally, coconut sap is collected for coconut vinegar and wine (Lambanog)
- Coco sugar production is mainly in powder format for table consumption or export. However, Unilever is piloting initiatives to grow the industry of coco sugar block, which is an industrial format that would be easier to produce compared to powder.
- The Philippine National Standards for Coconut Sap Sugar (PNS/BAFPS 76:2010) sets the minimum requirements for physical characteristics, chemical properties, and microbiological characteristics; classification; contaminants; hygiene; packaging; marketing and labelling of the product.
- Exporters must comply with this standard. Regular inspections of processing plants are conducted to ensure the quality and safety of coco sugar.
- The Organic Certification Center of the Philippines covers coco sugar as one of the commodities that it inspect and certifies.
- The government has supported a number of cooperatives, including Samahang Magniniyog ng Pikit Cooperative (SMPC) and Aroman's Women Natural Food Producers Cooperative, with the construction of processing facilities and equipment.¹
- There are also companies with plantations planted exclusively for coco sugar production and who also work with surrounding coco farmers.

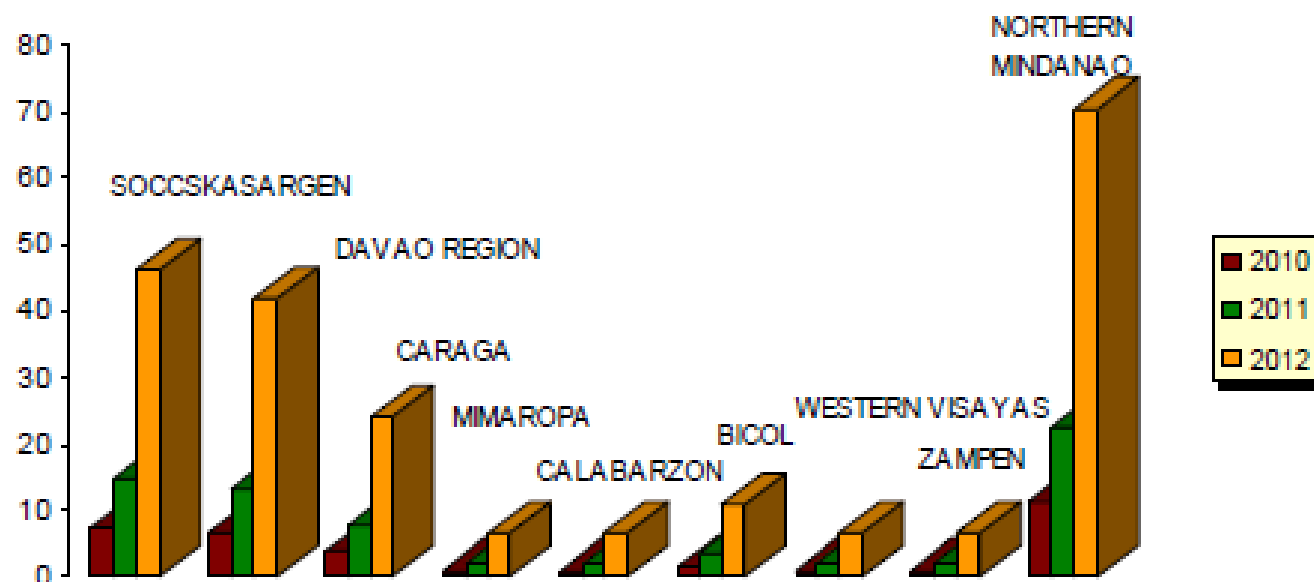


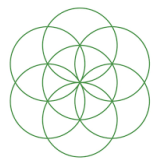
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Philippines: Market Context, History and Background

Northern Mindanao is the main coco sugar producing region in the Philippines, followed by Soccsksargen and Davao Region

- Coconut sugar industry is estimated to be over P 100 million or USD \$2 million per year¹
- Approximately 86% of coco sugar producers come from Mindanao.
- Northern Mindanao has the highest share of production, accounting for 32% of national production. This is followed by Soccsksargen and Davao Region, which account for 21% and 19% of national production respectively.²



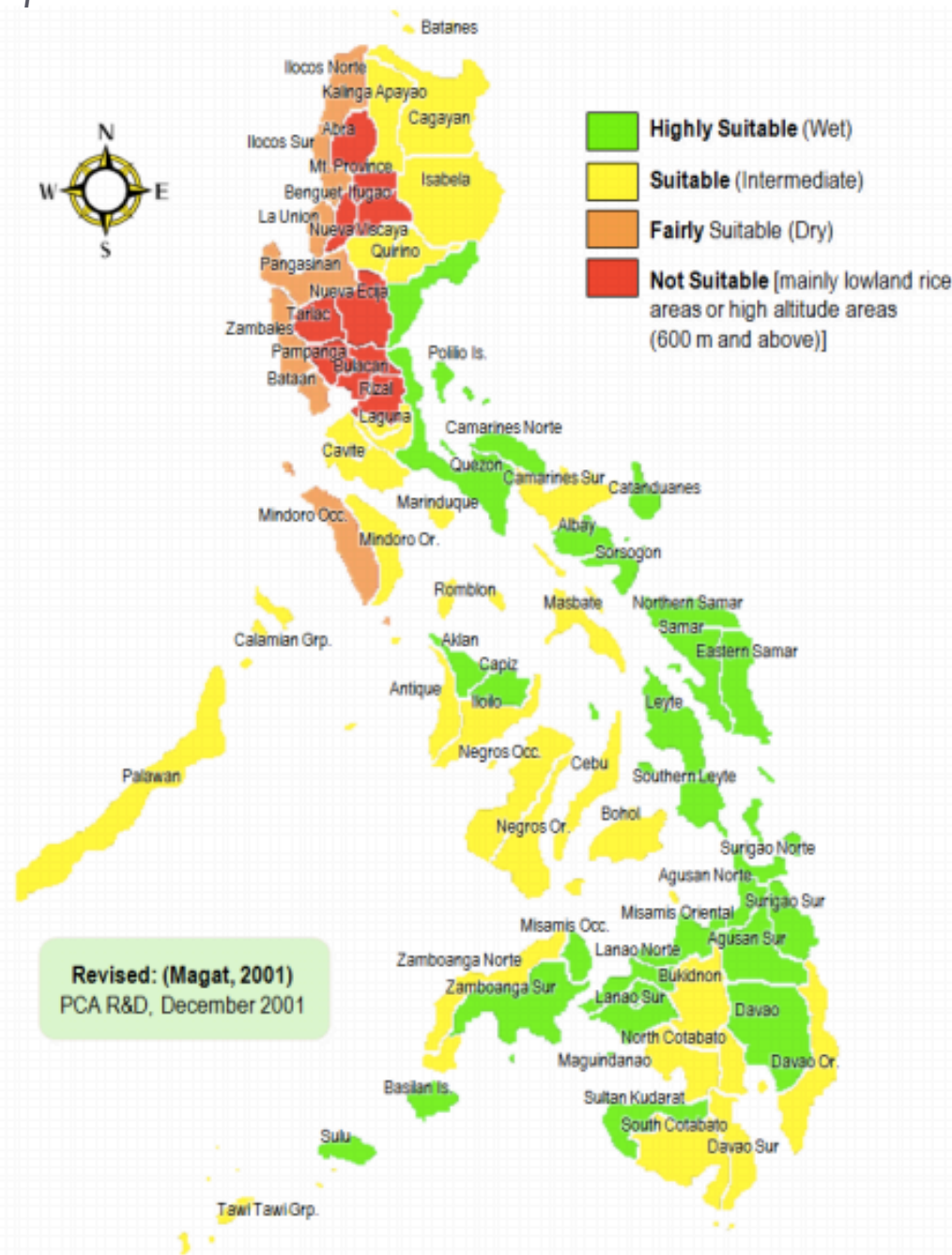


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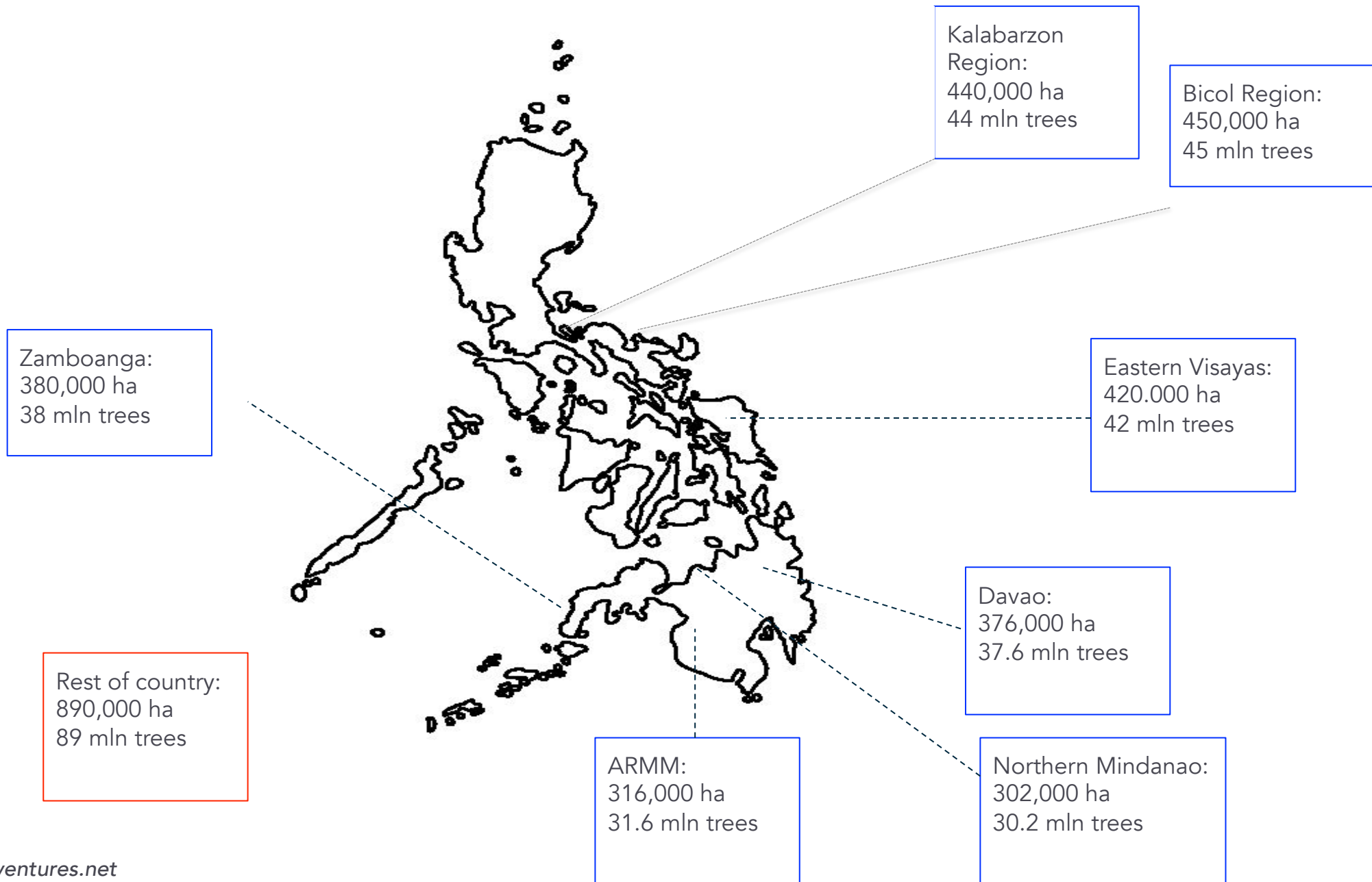
Philippines: Market Size and Growth

68 out of 81 provinces are coconut areas, with an estimated 329.9 million coconut bearing trees over 3.517 million hectares in 2015 ¹

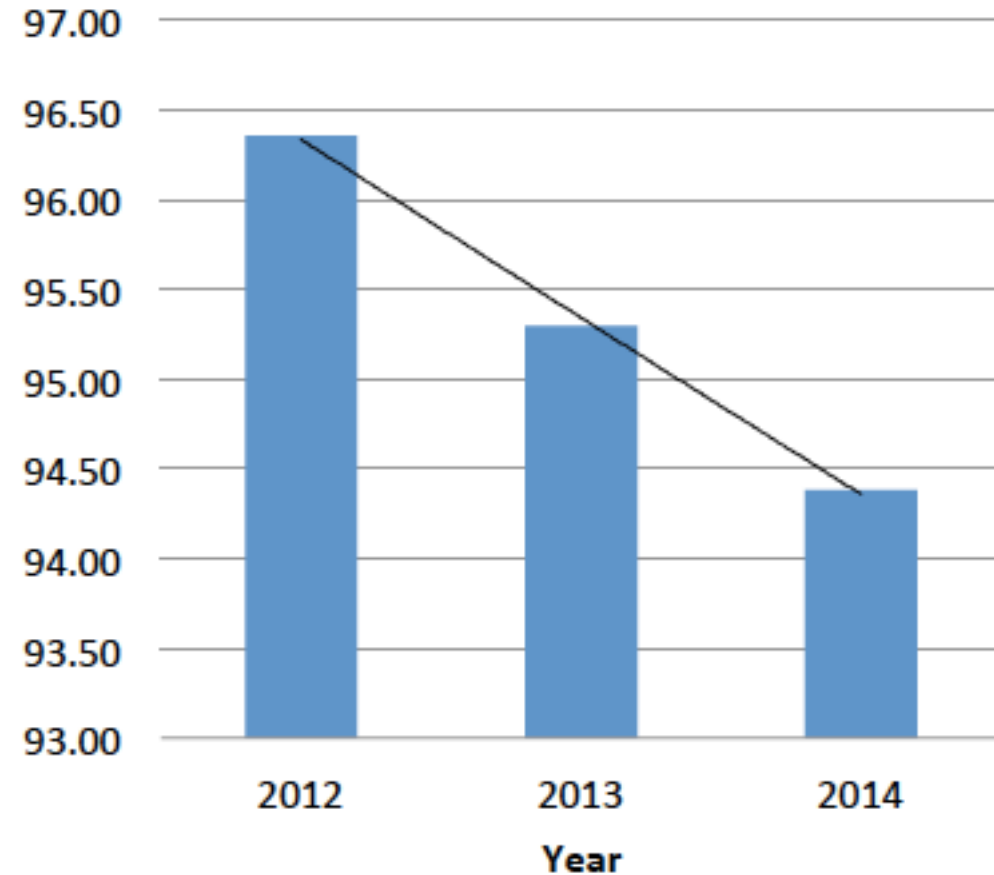
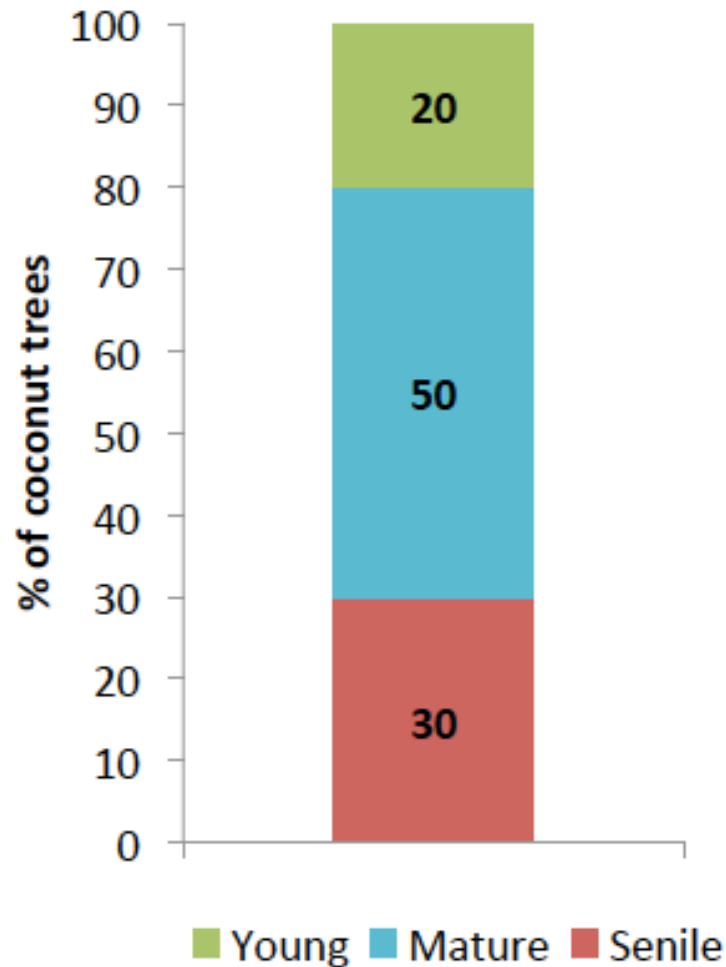
- Reliable data on Philippine coco sugar production is not available. Estimates vary between hundreds of MT annually to tens of thousands. We believe it is safe to assume a production range of 13,000 - 17,000MT annually.
- Average coco sugar production is 140 MT per month according to Unilever.²
- Philippines first started exporting coco sugar in 2007 to the US, expanding to Japan in 2009. The two markets remain Philippines' largest two export markets
- It also exports to South Korea, Hong Kong, Norway, Canada, Switzerland, France, Australia, New Zealand, and the Middle East.³
- From an export volume of 11.2MT in 2009 it reached 220MT by 2012.⁴ PCA targeted a production capacity of 15,000MT by 2016.



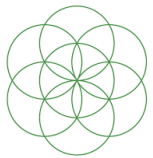
*Most of the production is concentrated in Mindanao and Kalabarzon region of Luzon.
(2012 data; assume each hectare x 100 trees)*



70% of coconut trees in The Philippines are either mature or senile and plantation owners and farmers are not investing at a sufficient rate to maintain the tree stock



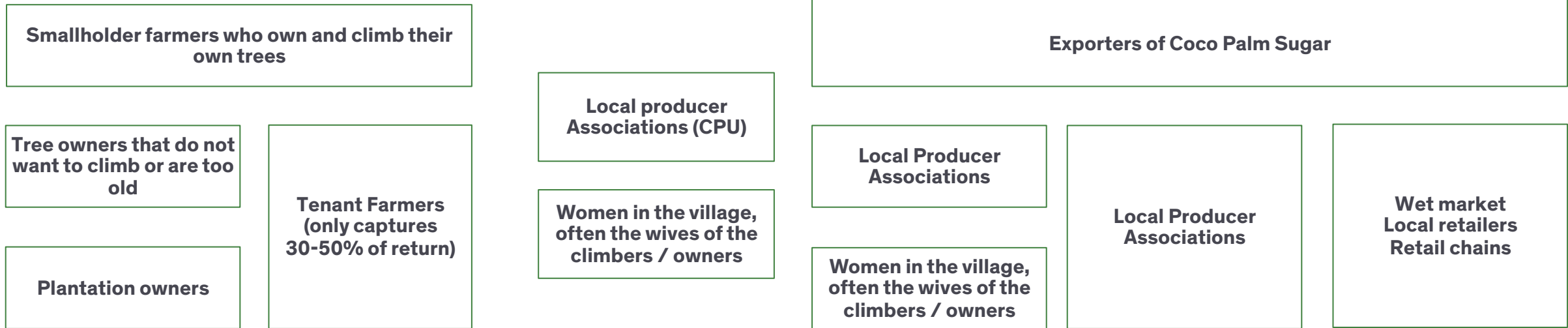
■ Number of Bearing Trees per Hectare
 — Expon. (Number of Bearing Trees per Hectare)

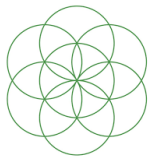


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Philippines: Value Chain Map

The value chain in The Philippines is export-oriented





Cultivating Trees

- Most of the tree stock planted in the mid-20th C
- Aging base of trees, many of which are already senile
- Low productivity varieties of trees
- Taller trees take longer to climb
- Plantation structure of trees allows for bamboo bridges and increase productivity in tapping
- Trees highly susceptible to severe weather patterns
- Climbing seen as an unattractive job due to low income, physical risk and desire to move to the city
- No use of anti-fermenting agents requires 4 taps per day
- Strong support from PCA is leading to higher productivity stock replacement

Harvesting

Cooking Sap to Block Sugar

- Nearly all sugar processed is for export
- All sugar processed is in powder/ granulated form
- Many processors have adopted larger scale centralized processing units, leading to efficiencies in scale

Processing to Powder

Aggregating

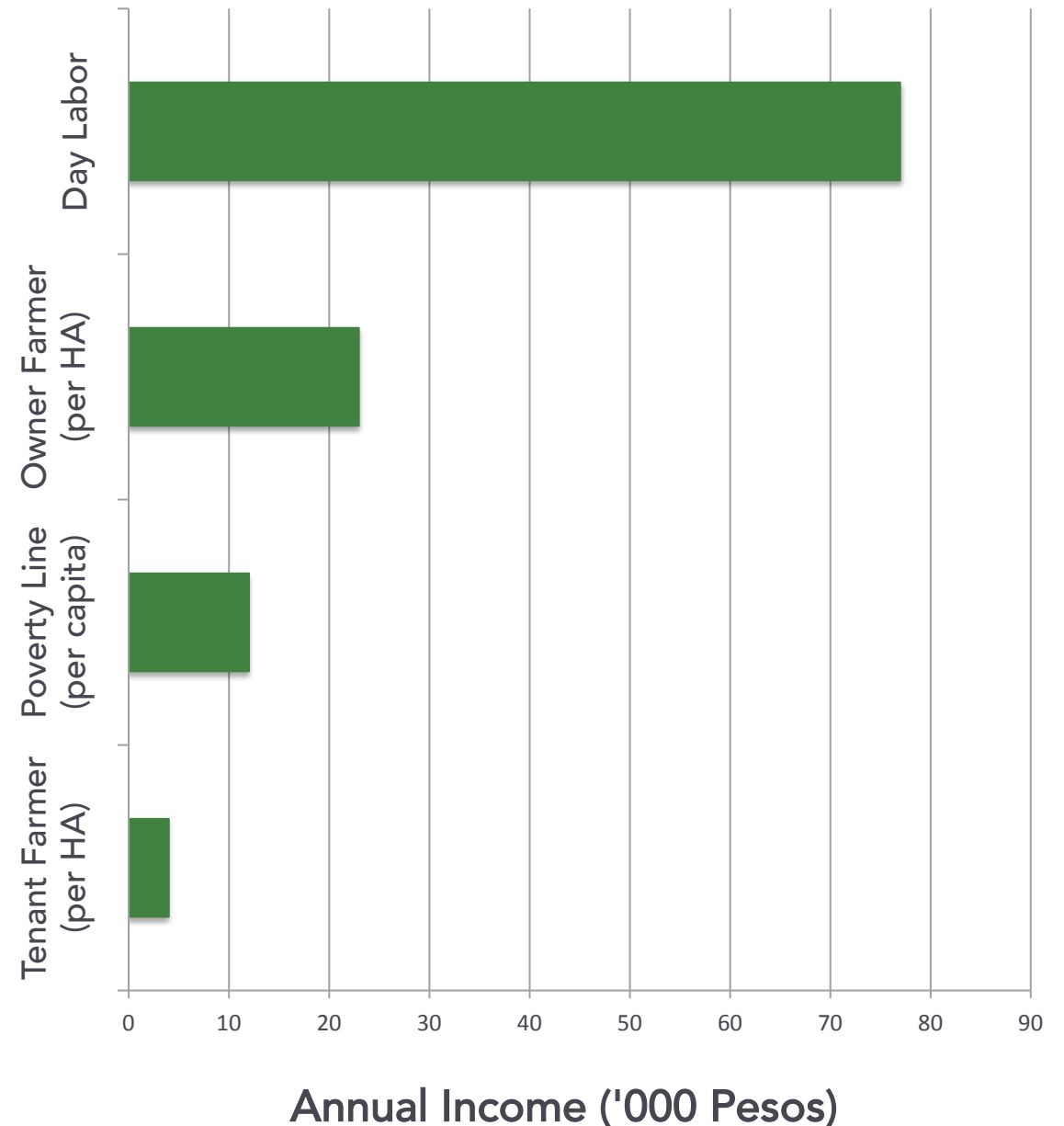
- CPUs allow for better quality control
- Limited domestic demand results in an export oriented industry, able to respond quickly to changes in global markets

Packaging



A typical coconut farmer in the Philippines faces untenable on-farm economics, squeezed by both the plantation owners and the traders

- Coconut industry provides livelihoods for about 3.5 million farmers and laborers.¹
- Despite impressive sector growth, poverty incidence is high among coconut farmers. According to the 2009 FIES/LFS Surveys, whereas 36% of farmers were poor, an estimated 41 to 60% of coconut farmers were poor.²
- ~65% of coconut farmers are tenant farmers
- Most tenant farmers only receive ~30% of the return
- Farmer indebted to traders tend to receive a lower price per unit
- ~90% of coconut farmers are producing copra



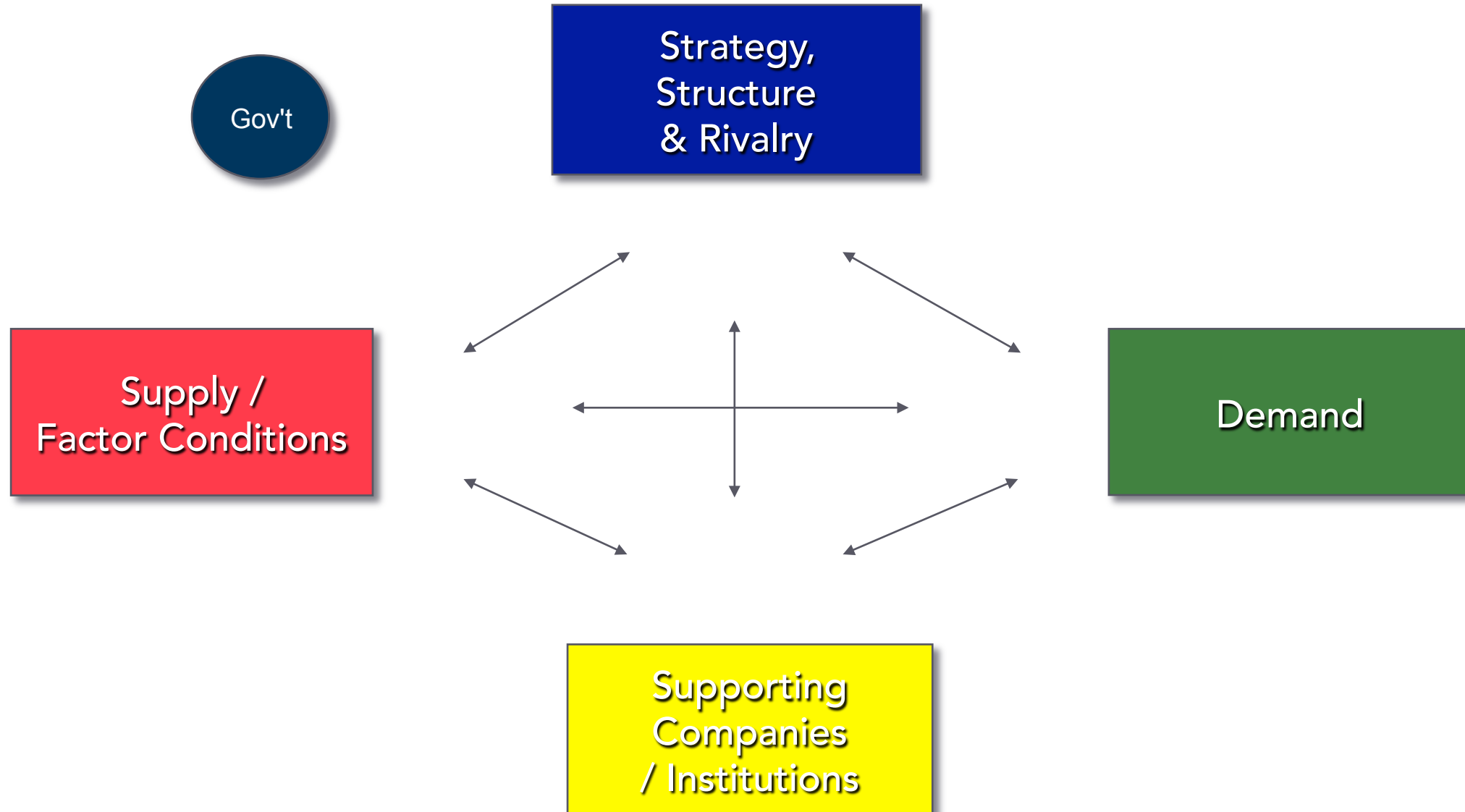
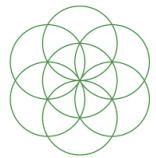


Philippines: On-farm economics for coconut sugar farmer

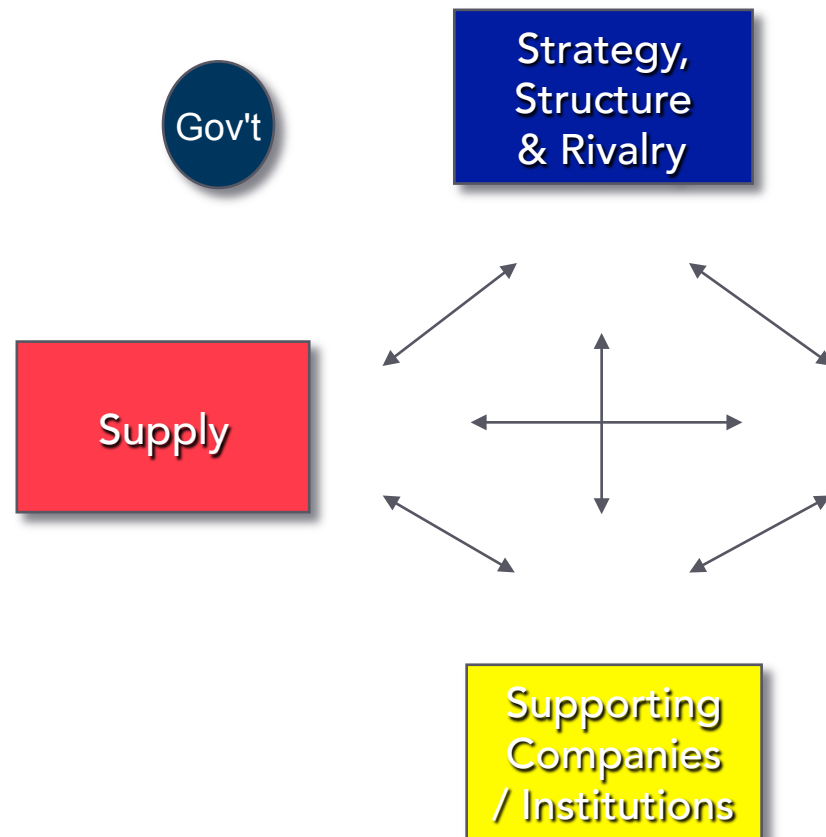
Coco sugar production offers higher, more regular incomes than copra production, coconut wine, and coconut vinegar. PCA estimates that the average annual net income from a one hectare farm is PHP 17,120 for copra production or PHP 631,950 for coco sugar production (nearly 37 times higher).¹ A 2015 VCA study in CAMSUR finds a 20-fold increase.²

			Pesos	USD
Harvesting / Production	# of trees	100		
	Daily yield/tree	4 liters		
	Total daily yield	400 liters		
Processing	Sugar yield / Ltr	0.17 kg		
	Block/day	67 kg	P 35/kg	2,333 47.04
Labor	Mangangapit	3 laborers	P 350	1,050 21.17
	Cookers	2 Cookers	P 350	700 14.11
Equipment & Fuel	Lime, Firewood, Gr Coco	13,333 IDR		100 2.02
NET HOUSEHOLD INCOME / DAY			1,183	23.85
ANNUAL HOUSEHOLD INCOME/YEAR			431,917	8,709





Export-oriented nature of the industry enables it to move faster than Indonesia and Cambodia to invest in quality, productivity and innovation



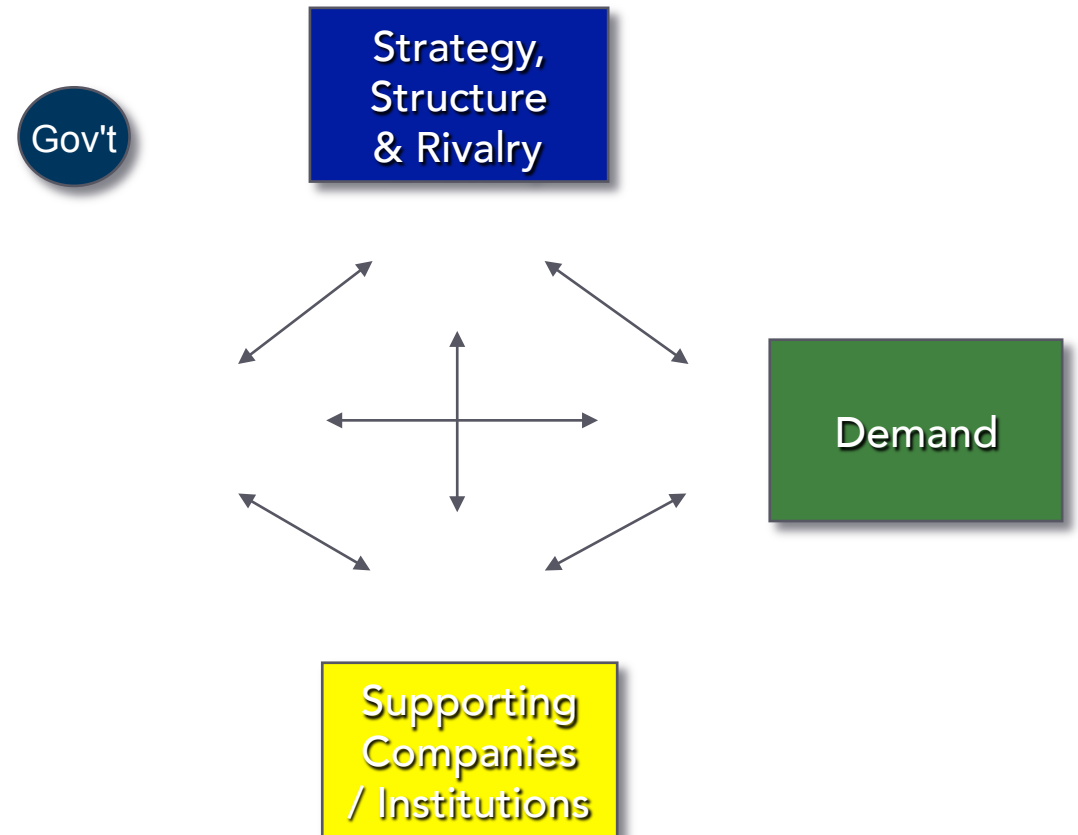
Demand

- Export oriented coco industry
- Traditional Philippines savory cuisine limits domestic consumption
- Lack of in-depth medical research on the health benefits of the product to support market promotion
- Delays in issuing PNS for product quality protection and adulteration of product can affect demand for coco sugar originating from Philippines
- Demand exists for new formats (such coco sugar blocks) with industrial players like Unilever piloting initiative to grow this segment

Despite efforts to replace the aging stock of trees, Philippines is likely to cede share of the global coconut market because supply will not be able to keep up

Supply

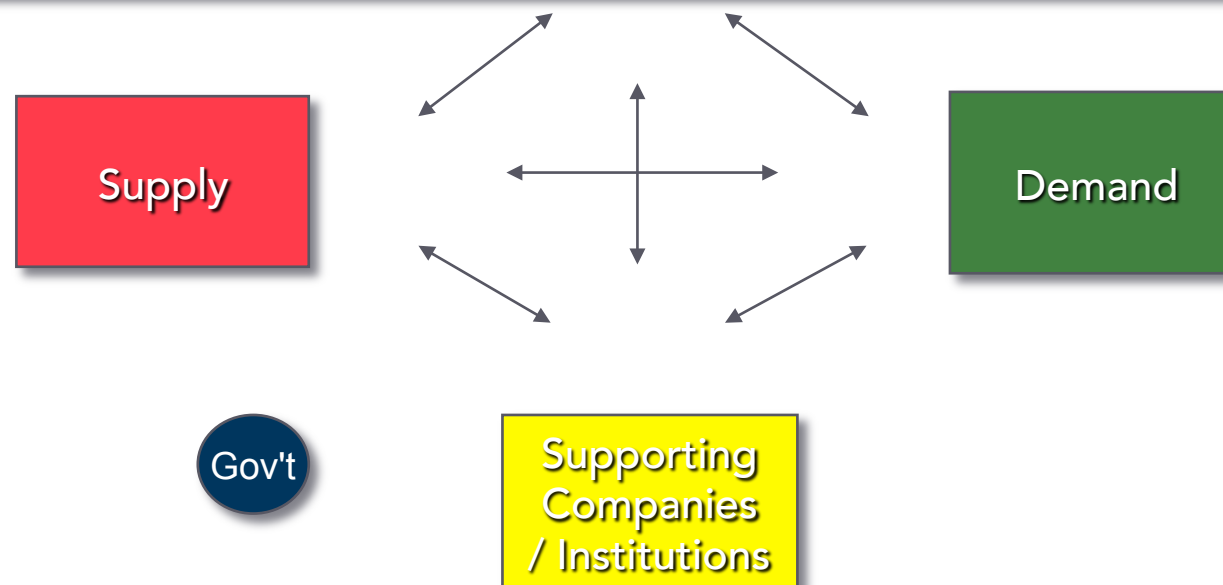
- Aging tree population, destruction from coconut scale insect and typhoons, and illegal logging affect supply of raw material
- Around one-third of trees need to be replaced
- Limited number of nurseries for coconut varieties suited for coco sugar
- PCA replanting programs over the past decades mean that there is large potential as trees in these areas (e.g. Northern Mindanao) reach maturity
- Dwarf varieties have also been planted through government support
- However, some existing areas with dwarf varieties have few skilled farmers and tappers
- Coco sugar is mainly in powder format which is more difficult to produce
- Growing numbers of processing plants but no standard processing technologies



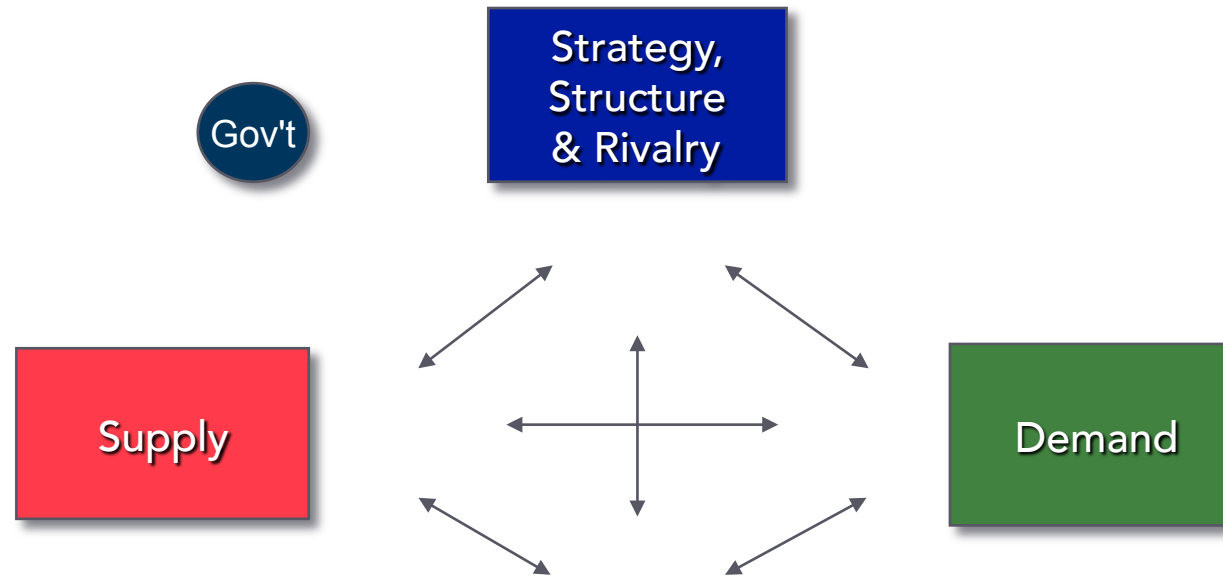
While highly competitive in the global coconut market, Philippines still lags well behind other global leaders such as Brazil, India and Sri Lanka

Strategy & Rivalry

- More innovative, progressive coco sugar sector than other countries. (e.g. as there is no global standard for coco sugar, the Philippine Standard is often used by buyers even for coco sugar originating from other countries.)
- Strong government support for innovation and R&D (e.g. identifying coco varieties for ideal coco sugar, identifying GAP for higher productivity than traditional methods; developing of economically feasible processing technologies and equipment/facilities; formulating accreditation and regulatory systems for quality certified coco sugar)
- Initiatives launched to accredit and organize coco sap tappers, as well as train them in GAP and GMP



There is strong government support for the sector through the PCA and standards / certification bodies



Related / Supporting Companies & Institutions

- Government agency (PCA) dedicated to growth of coco industry and has good visibility over the development of the coco sugar sector (including through the recent 2016 Nationwide Registration of Coco Farmers and Farmers Workers)
- Eco-system forming of supporting institutions for standards and certifications
- Controversial Coco Levy Trust Fund, if released, could provide significant funds to support the entire industry (including for agro-industrial hubs)
- Coco Sap Sugar Industry Roadmap, with clear objectives and targets, was presented at the 1st National Coconut Sap Sugar Industry Congress in 2012

Country Analysis: Cambodia

- National Context
 - History and background
 - Market size and growth
 - Current product portfolio: characteristics, quality
 - Pricing and seasonality
- Productivity & Production Models
- Value Chain Mapping
 - Inputs
 - Harvesting, Processing, Route-to-market
 - Cost economics
- Market Dynamics

History of the industry

The Sugar Palm is an iconic tree in Cambodia, well recognized for its presence in the Cambodian landscape through the expression, “the Sugar Palm is a shelter of the Khmer house.”

Similar to other parts of Southeast Asia, palm sugar production is a traditional activity practiced in Cambodia for centuries. Palm sugar has been used as a natural sweetener in traditional cuisine and the other parts of the tree are used in various aspects of daily life.

There are about 3 mn Arenga trees, out of which 1 mn are tapped. There is an estimated 13.4 mln coconut trees, with approximately 80% in the southern coastal strip. Although there are many more coconut trees than sugar palms, no coconut sugar is produced in Cambodia at this point. This is attributed to the traditional use of coconut for its water and milk. Today, the majority of coconuts consumed domestically are for coconut water.

History of the industry

Prior to 2005, there was very little production and export of palm sugar for the formal market. Traditional production is in either paste or block form with limited trade potential. With assistance from the Government of Cambodia and some development interventions, farmers have begun producing granulated sugar and selling it to exporters.

Certain geographic regions of Cambodia are well-known for their optimal conditions for Palm Sugar cultivation. Kampong Speu province, with sandy soils and low rainfalls is particularly well-known for its tasty, concentrated and aromatic sugar, and is in the process of obtaining Geographic Indicator (GI) status in Europe.¹



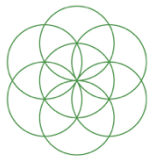
Export of organic palm sugar is delivering increased prosperity to a small number of palm sugar farmers. Further farmer organization is needed to keep up with demand

Over the past ten years, as international demand has grown for palm and coconut sugar, producers in Cambodia have started moving up the value chain to produce powder sugar for export.

Domestic consumption is estimated at 5kg of paste per household annually. With 2.8 million households, total annual consumption of paste is estimated at 14,000 tons. Exports of granulated sugar are minimal by comparison, estimated at 100 tons in 2014 for a value of between USD \$190k and USD \$290k. Export prices for organic palm sugar range from USD \$2.70 – 2.90 / kg. Non-organic sugar sells for between USD \$1.40 – 1.60.¹

With annual tree productivity at 60-80 kg of granulated sugar, the total estimated production potential is 240,000 tons in the country. The largest producer by far, is KSPA at 14,000 tons, demonstrating substantial industry growth potential.

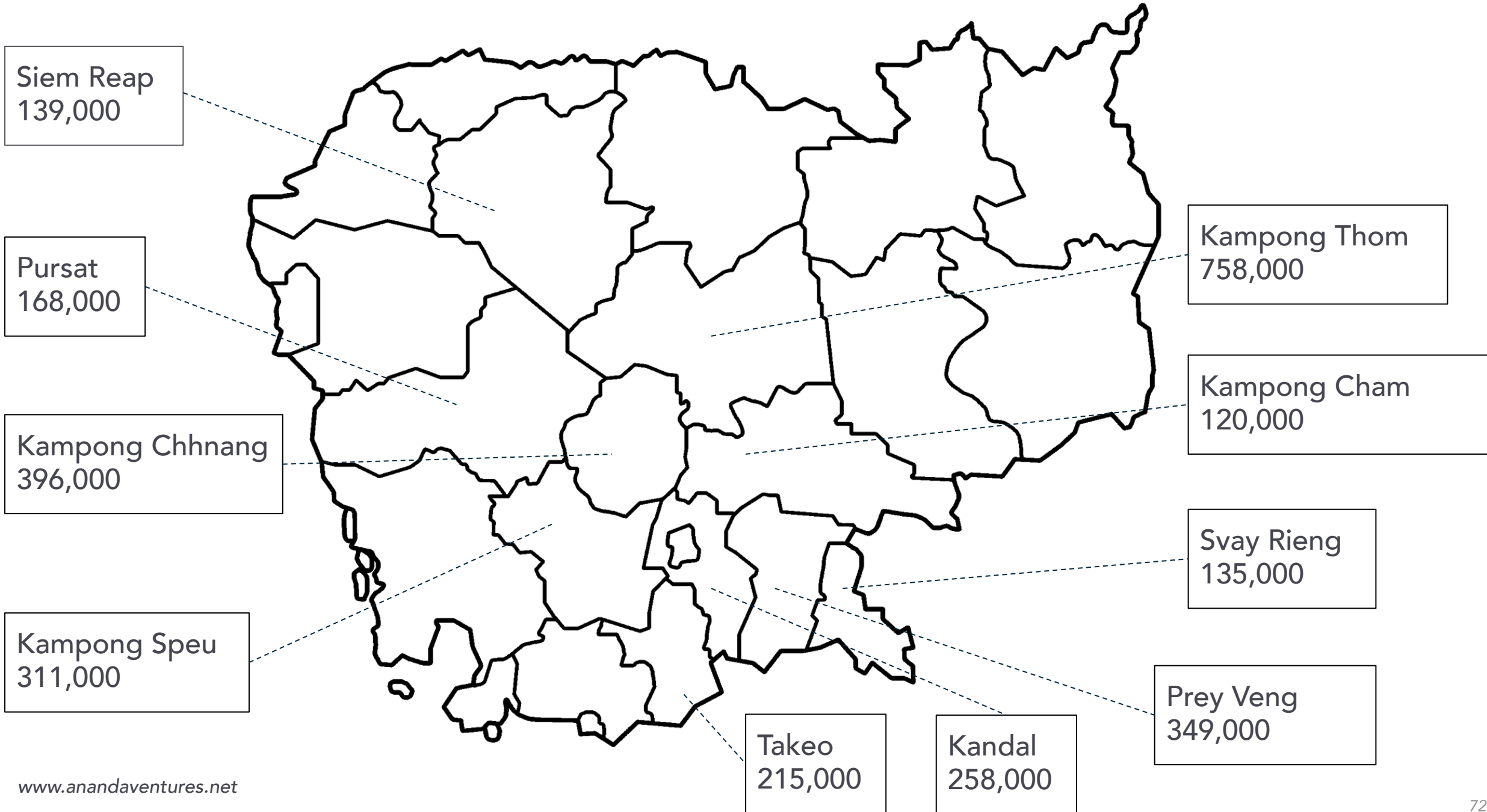




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Cambodia: Market Size and Growth

3 million Arenga palm trees in total



Cambodia's production base is so small, that it will be fully tapped by two large international buyers. Further expansion is possible and necessary to maintain growth

There are just seven companies operating in Cambodia that buy, package and sell granulated palm sugar. Many of them buy from the farmer cooperative in Kampong Speu, KSPA, which includes 142 households across 15 villages.

In 2016/17 two large international buyers have entered the market with substantial orders for both granulated and block sugar. These two players are likely to buy up all possible production and trigger more organization of the farmers to respond to increased demand.

Despite the history and heritage of the product, palm sugar remains an under-developed industry with many opportunities for productivity enhancements

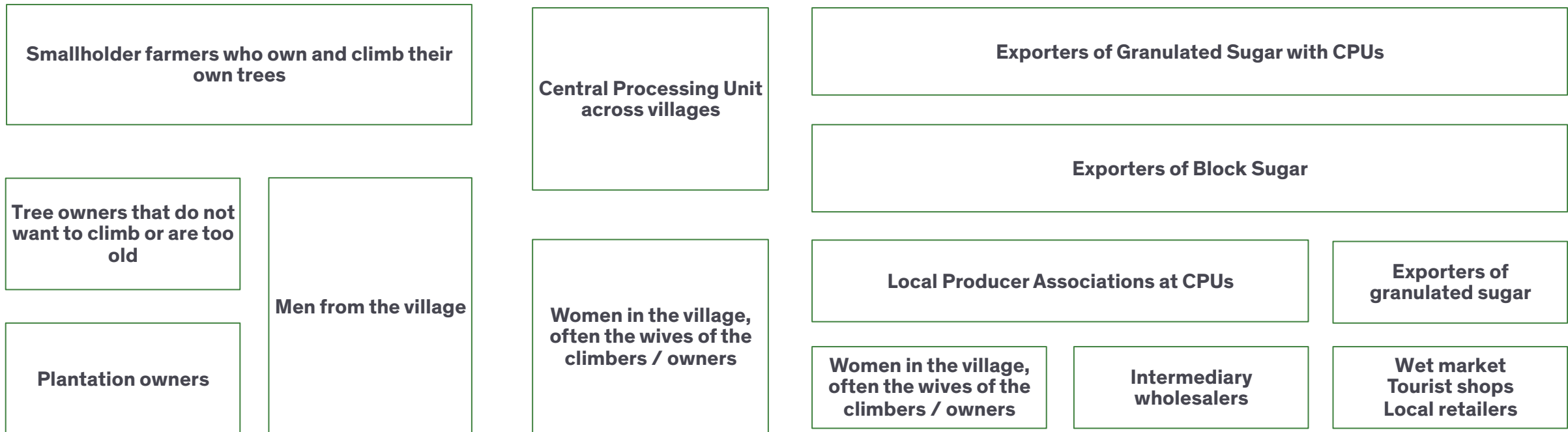
- Harvesting season from December to May
- No large scale plantations, though attempts have been made and more are planned
- Farmers initially sceptical of CPU but now more and more want to join
- Use of higher efficiency stoves triggered by international NGO Geres
- Production chain: sap is transferred to 30 liter containers, then transferred by bicycle or cart to a CPU. Households are in a radius of 3 km from CPU, but individual trees may be further out
- Local soy sauce makers prefer Chinese artificial sweeteners
- Current prices are 5200R per kilo for organic sugar and 6000 for GI sugar
- The harvesting season is between December and May. In the wet season farmers do not harvest. Apparently the flowers are gone
- Smallholder farmers selling to associations who then sell onto exporters.
- Some organisations produce non-organic powder sugar and sell into the local market
- Typically trees are considered productive if they are above 1 m tall and at least 1-2 years old. They are tested for productivity and if their sugar break ratio is 10%, they are fully tapped into. Trees are not climbed if they grow above 30 meters tall.
- Popel wood is used as an anti-fermenting agent. Confirel is experimenting with a substitute, CaCo₃, it is being tested for effects on human health.

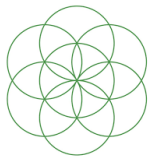


Cambodia: Value Chain Map

Cambodia's palm sugar value chain is still oriented to local markets and household consumption with only a few players operating at scale

To retail markets (domestic and retail)



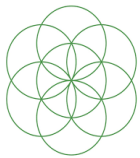


- Significant base of untapped trees: 2 million Arenga trees and 25 million coconut trees
- Low productivity varieties of trees
- Stock mostly taller trees that take longer to climb
- Traditional harvesting methods are inefficient and dangerous for the climber
- Short harvesting season: 4 months per year
- Most climbers are 50+ years old
- Climbing seen as an unattractive job due to low income, physical risk and desire to move to the city
- No finance options for smallholders from commercial banks or MFIs

- Most cooking still occurs in the home over a wood fire
- Traditional cooking method is long does not incorporate cooling equipment
- Some emerging models of centralized processing

- Lack of quality controls along entire supply chain
- Volatility in supply from seasonal swings in local demand





Characteristics of Cambodian Palm Sugar Producers

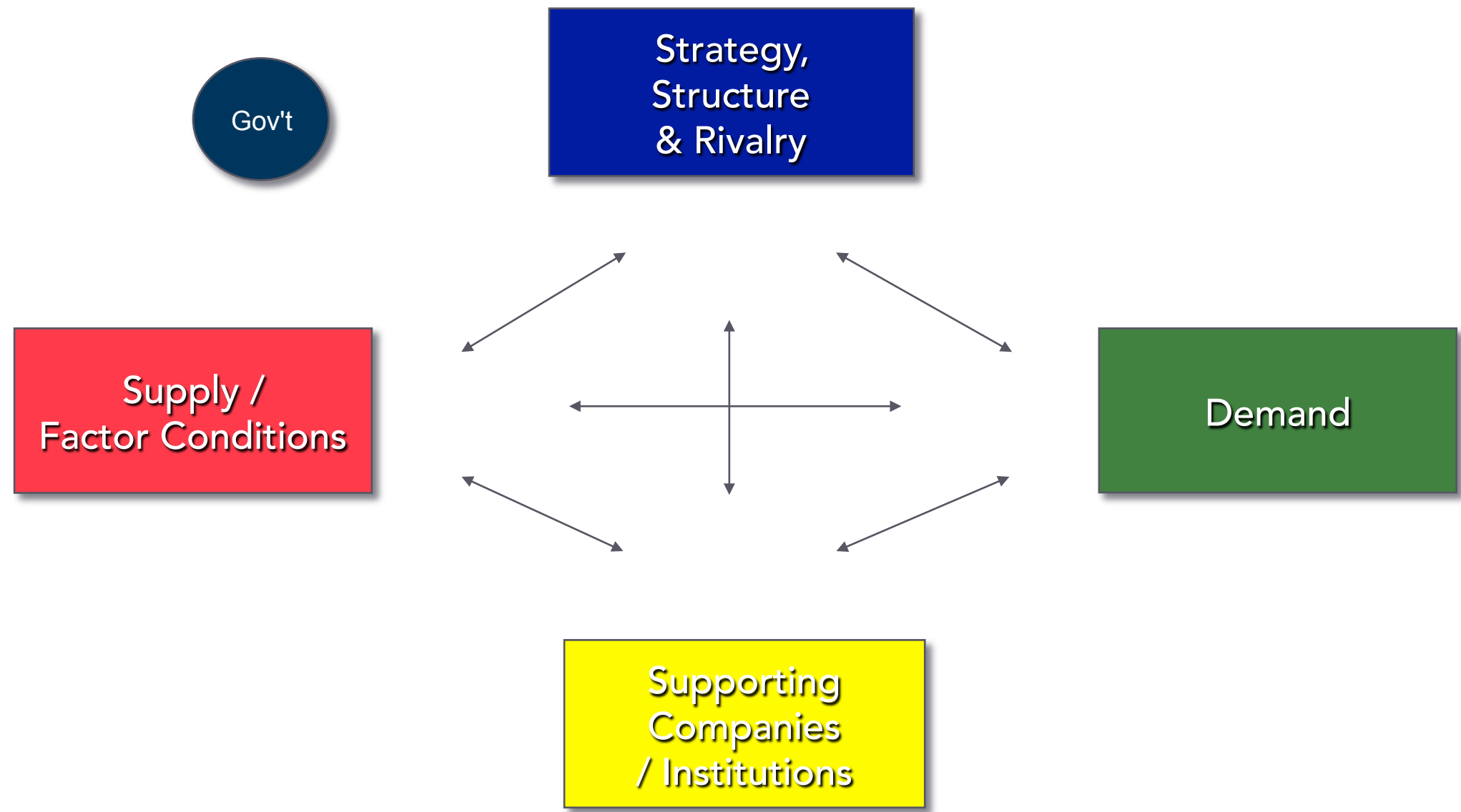
Province	Avg Age	Avg HH Size	Soil Type
Svay Rieng	40.2	5.2	Sandy-loam
Kampong Thom	42.3	5.9	Sandy-loam
Kampong Chhnang	41.2	4.7	Sandy-loam
Kampong Speu	48.2	5.6	Sandy
All (n=90)	44.5	5.4	

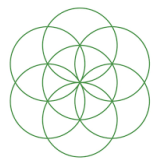
- Smallholder farmer with land area of up to 0.5 hectares
- average tree holding of 30
- Rental price is 5kgs of cooked sugar per season
- average income per tree of 50 \$
- average annual income of 2,500\$
- average tree productivity of 60-80 kgs annually, depending on precipitation
- Prices of R5,200 per kilogram of organic sugar, R6,000 for GI sugar
- On average, 10 liters of palm sap required to produce 1 kg of sugar (sugar break ratio 10%)
- Tapping the trees twice a day, cooking takes about 4-4.5 hrs
- Farmers lacking ladders, anti-fermenting agent and cooking fuel
- Average farmer age of 43.5



Summary statement about the on-farm economics

			Riel	USD	
Production	# of trees	30			
	Daily yield/tree	8.5 liters			
	Total daily yield	225liters			
	Sugar yield / Ltr	0.1 kg			
	% powder	10%			
Processing	Block & paste/day	20.25 kg	3000/kg	60,750	14.80
	Powder/day	2.25 kg	5.200/k	11,700	2.85
	Total/day	22.5 kg		72,450	17.65
Rent	Rent	5 kg of sugar/year	(3000/kg*4.5 + 5200/kg*0.5)*0.5	8,050/y	2/year
				40.25/d	0.01/d
Equipment & Fuel	Equip cost / day	3786 Riel		3786	0.07
	Fuel	7524 Riel		7524	0.92
NET HOUSEHOLD INCOME / DAY			61,100	15	
Labor	Climb hrs/day	6.5			
	Cook hrs/day	6.3			
NET INCOME / LABOUR HOUR			4,473	1.17	

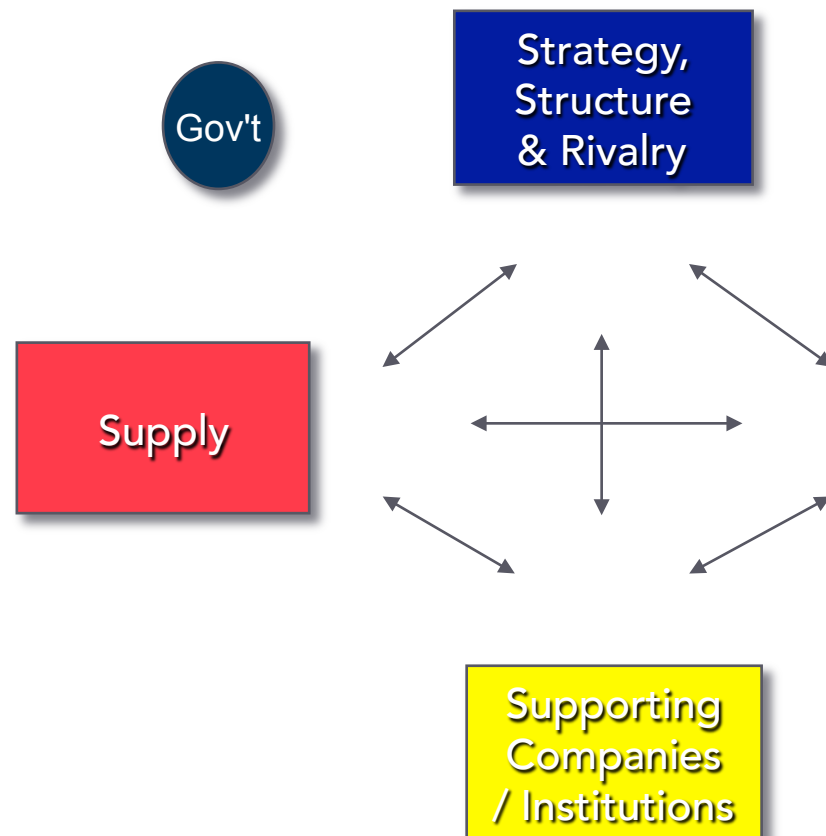




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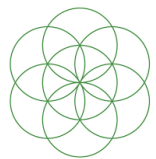
Cambodia: Market Dynamics

Recent arrival of international buyers thirsty for palm sugar is reshaping the market and creating immediate opportunities for Cambodian farmers, aggregators and processors



Demand

- Domestic demand for coconuts dominated by fresh coconut juice, holding back value added products in the local market
- Demographic wave and high economic growth in Cambodia is fueling growth across consumables in domestic market
- Regional and international markets are growing across coconuts category creating opportunities for Cambodian producers
- Impending registration of European GI classification will enable access to high value European market
- Low marketing expertise and information is holding back many players in accessing high value markets
- International buyers see Cambodia as an underdeveloped source of palm and coco sugar



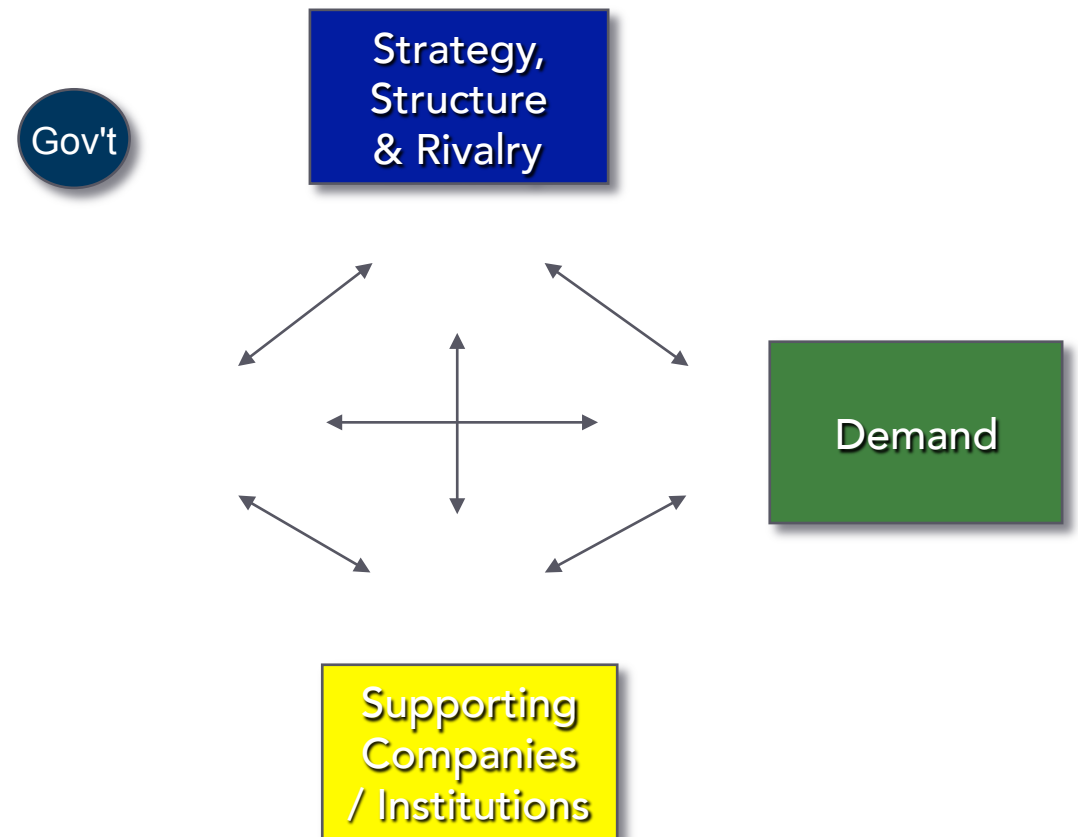
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Cambodia: Market Dynamics

Cambodia has all of the basic factor conditions to cultivate palm and coconut at scale; however, many of the advance conditions to compete with Indonesia, Philippines and other global players are still missing

Supply

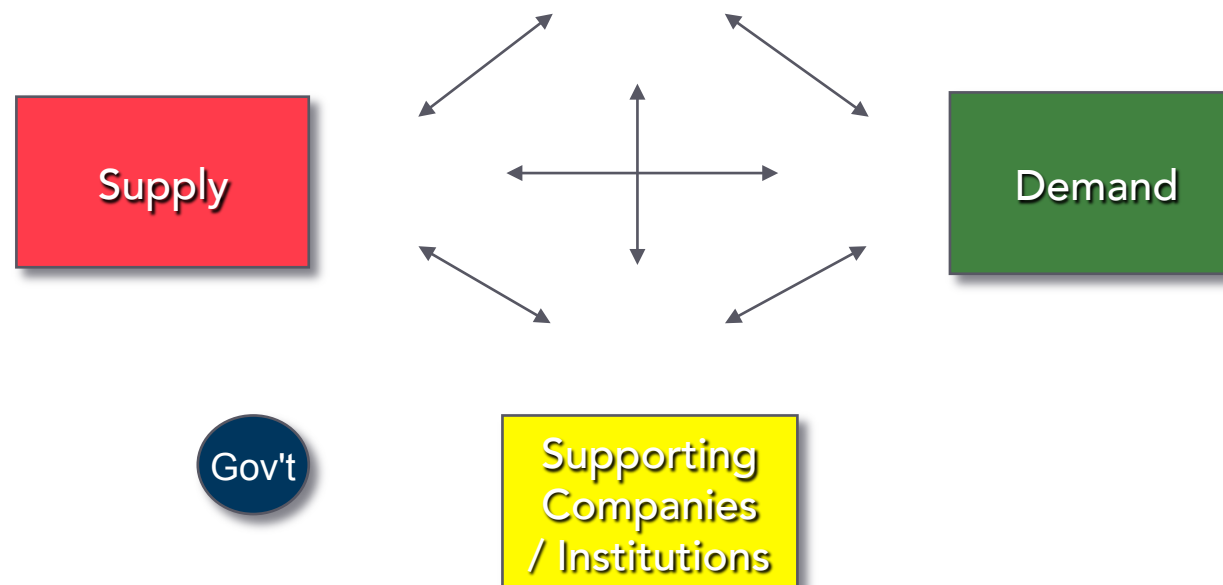
- Abundant availability of land
- High cost of electricity
- Low level of infrastructure development
- Changing conditions of the Mekong (increased salinity) are making Cambodia more fertile for coconut trees
- Climate, rainfall and soil are all positive factors of production for Cambodia
- Low capital requirements
- Lack of good agronomists and crop specialists
- Sugar palm largely resistant to drought
- Tree requires minimum inputs and environmentally beneficial to soil
- Few farmers are organically certified
- Traditional collection and cooking technologies
- Risky collection process for climbers
- Weak quality assurance systems
- Land issues as government is selling land with sugar palm trees that farmers have relied on



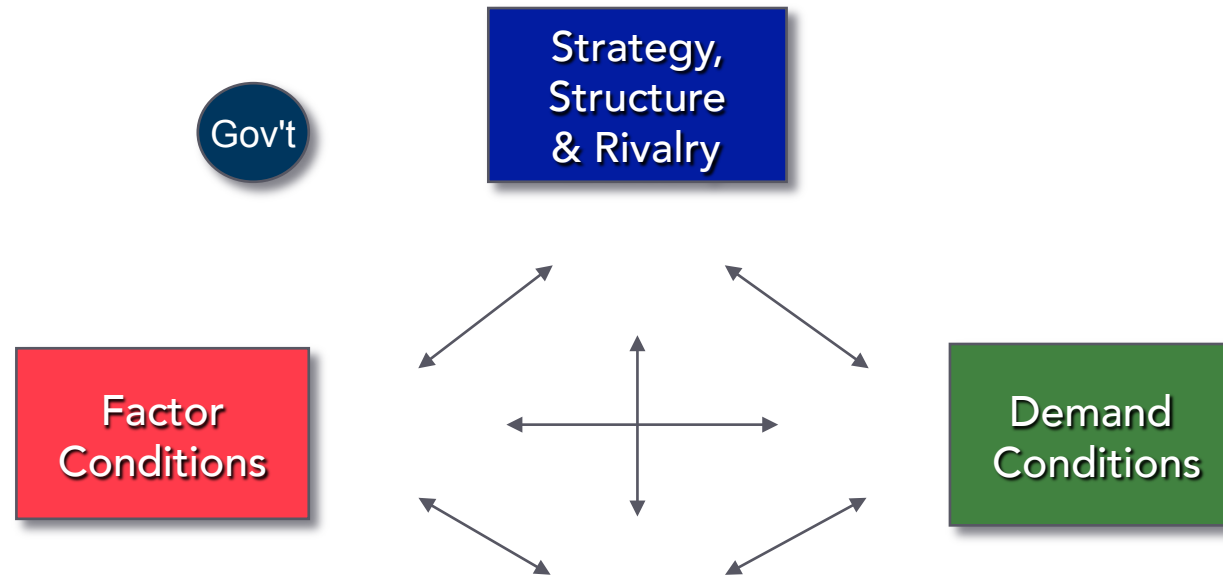
Palm sugar processing for export is still in its infancy with very few value-added players able to meet the conditions to bring the product to the global market at scale

Strategy & Rivalry

- Very little domestic competition, with only two branded products on the market and no domestic buyers at scale for use in processed foods
- Recent entry of international buyers/traders for export markets likely to stimulate organization and investment in the value chain
- Ministry of Agriculture has included coconut on its list of priority crops in its strategic plan which is expected to galvanize government attention
- Lead processor is innovating in product development oriented to international tourists and export markets



Related and supporting companies and institutions necessary to compete regionally and globally at scale are absent in Cambodia, increasing the burden on lead firms



Related / Supporting Companies & Institutions

- Farmer associations still in the early stage of formation and organization
- Very few research and consulting organizations that are familiar with the sector
- No secondary private sector extension
- Government is prioritizing coconut and sugar palm as a high-potential sector for agriculture development, which could increase attention and enable the sector to address many of its constraints to productivity

Country Research: Myanmar

- Market Context
- History and Background
- Current product portfolio: characteristics, quality
- Productivity & Production Models

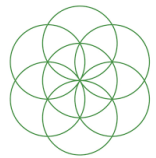


While historically an important industry in central Myanmar, farmers are increasingly shifting away from palm sugar production

- Historically, palm sugar production is a major industry in the Dry Zone and an important income source for farmers. Palm trees are plentiful in this region and are well adapted to the hot and dry eco-system.
- The largest number of palm trees are found in NyaungU and Kyakpadaung townships in the Mandalay region.¹ These two townships produce 1000 MT of jaggery annually, contributing to 60% of national consumption.²
- As a result of low prices, farmers across Myanmar have been shifting away from palm sugar production in recent years. By 2013, the number of sugar palm farmers had dropped to approximately half of the number from ten years before.³ There is currently also a shortage of labourers for the collection of toddy sap.⁴

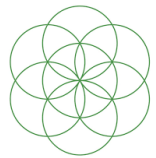
There is, however, some support from the government and universities to promote the production of value-added toddy products

- The Department of Small and Medium Enterprise has conducted a series of workshops with the aim to develop value-added toddy palm production. In 2016, they announced that they were ready to provide technological support to producers interested in value-added products.¹
- Research is also being conducted by Yangon University and Mandalay University on the production of toddy sap-based food products. They plan to cooperate with the International Toddy Sap-based Foodstuffs Association to seek out modern technologies and investment for toddy products.²
- Unilever has also been piloting a palm sugar sourcing initiative in Myanmar in order to supply its factories in Indonesia.



- Traditionally, palm sap is collected for **jaggery (htanyet), toddy wine, and toddy syrup** (for preparing indigenous traditional medicines).¹
- There are specific localities in all producing areas which are known for manufacturing specialty jaggery. Jaggery is considered a sweet which is eaten by children and adults, usually in the afternoon or after a heavy meal to help with digestion. It is often referred to locally as Burmese chocolate.²
- Depending on the area, jaggery can be mixed with candy coconut, plum puree, or sesame. There is a wide array of local snacks and relishes which use jaggery. Jaggery is also used in Burmese cooking.³





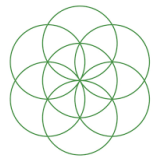
- Palm sugar production in Myanmar is seasonal, with no sap being produced during the off-season which lasts from October to December.¹
- A single palm tree produces approximately 80 grams of jaggery per day.²
- Debt traps are a major issue for landless palm tenants who rely heavily on informal credit from jaggery brokers. Loans are used for both production and consumption. Brokers use this as a mechanism to lock palm tenants into jaggery production (despite new expanded job opportunities outside the villages).³



A worker in a red shirt and green cap is stirring a large metal pot filled with brown granules in a factory setting. The pot is part of a larger industrial machine. In the background, there are metal railings, a staircase, and large windows. The scene is dimly lit, with light coming from the windows.

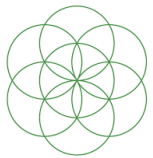
Enterprise Spotlights

- Aliet Green, Coconut Sugar, Indonesia
- PT Gunung Hijau, Palm Sugar, Indonesia
- Confirel, Palm Sugar, Cambodia



- *PT. Gunung Hijau (PTGH) Masarang is the largest, most advanced Arenga palm sugar company in Indonesia*
- *Connected to the Masarang Foundation, established about 30 years ago, PTGH owns all the forest land they harvest the trees on -- bought parcel by parcel by the foundation*
- *Over many years, the company managers have systematically evaluated and improved productivity levers across the production chain and accumulated technical knowledge on cultivation, harvesting and cooking*
- *PTGH Arenga palm produce an average of 25liters per tree per day. PTGH has researched how to control the volume of sap from the tree. Trees can be pushed up to 100l/day, but this level of tapping drains, and eventually kills the tree*
- *PTGH has a steady amount of sap per year as the Arenga tree (palm sugar tree) grows over 12 meters deep into the soil, and is always able to get enough nutrients, by contrast, coconut trees do not grow roots so deeply and as a result yields vary throughout the year*
- *PTGH works with 1,500 farmers. The whole land is divided into areas, each with a coordinator and a 'ranger', who always follows the drivers who collect the sap and test the quality of sap at harvest point, including PH*
- *Sap is boiled immediately to delay fermentation, then transferred hot to central processing unit*
- *Cooking of sap takes place in a central facility which includes 12 cooking pans, 2 evaporators, dryers and packers. They've investigated the best parameters for sap cooking and the best method of sugar production, including the simple tools for cooling of sap at an appropriate period of time. These techniques can shorten the cooking time by more that 50%*
- *The facility is powered entirely by renewable energy, using waste steam from a geothermic source that comes from Pertamina (state oil & gas company).*
- *PTGH also has their own nursery and deliver seedlings to different areas*





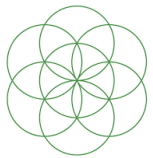
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Spotlight: Aliet Green, Indonesia



- Established in 2007, Aliet Green coconut products include: organic coconut sugar, spiced coconut sugar, cold-pressed coconut oil, coconut blossom syrup
- Buys from 2 villages, 1000 farmers, 3 processing units that buys cakes from the farmers and makes granulated sugar
- Only 40% of the farmers granulate – know-how + ‘laziness’
- Average age of climbers is 55
- Soon AG will have a centralized kitchen that makes its own granulated sugar so will only buy block
- Revision of US food and safety standards last month is forcing higher costs on them to comply by September
- HACCP no longer the focus – moving to HARP-C with focus on preventative control
- AG intention to expand in the same area – Kulon Progo
- Will be planting 5000 – 10000 new species trees from Sulawesi (Min of Ag) smaller with higher productivity (increase from 2 liters / tree / day to 4-5L/tree/day)
- Safety of the climbing is a concern – they are trying out the use of carabiners and rope to improve safety but the biggest constraint is the cost of the rope
- Rotation of harvesting and nut growth possible, but it takes 3-4 months for the transition to get back to normal quality
- Market constraints: consumer knowledge/understanding of the labor intensity of coconut/palm sugar as well as the environmental benefits vv cane sugar (no fertilizers, no monocropping, etc)
- Longer term contract 3-5 years with farmers
- Certifications: IMO, EcoCert, Fair for Life, FLO Cert

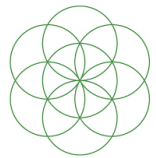




- Set up in 2001 with a main purpose to develop products from the Sugar Palm tree
- Confirel was the first company in Cambodia marketing powder palm sugar
- They now have 25 palm products in their portfolio exporting to Europe, Japan, China, Taiwan and Hong Kong. Customers can range from bakeries, restaurants (especially in Japan) for bulk and branded sugar for retail distribution
- Current annual exports exceed 300 tons
- In spite of strong international demand for organic palm sugar, the production capacity is limited by number of active producers, tapping season and central processing facilities
- Confirel investing \$6mln in a new processing building (85% of processing there will be mechanized)
- Confirel buys through farmer organizations: KPSA & KAMPATRACO
- They spent about 15 years building the supply chain and quality of sugar
- Established strong relationship with farmers through setting up a fair trade practice and a minimum price guarantee
- Average production figures: 25 trees/household, maximum production 90kg/tree/year, season between January and May, sugar break ratio 8.5 liters to 1 kg of sugar (almost 12%).
- In the rainy season, sap is not sweet enough and people are busy in the rice fields
- they are tapping into 4 flowers per tree



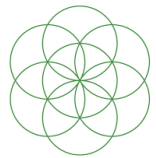
Grow Asia Action Agenda



1. Work with international trade authorities to assign a separate trade code for coconut and palm sugar
2. Support regional / national industry groups and governments to adopt and enforce standards and certifications
3. Support cross-market consolidation and learning of best practices
4. Support initiatives to increase on-farm productivity (technology and process design competitions, knowledge & training platforms, etc)
5. Encourage the use of mobile technology in the organization and logistics of the value chain to solve market failures in information flow and coordination

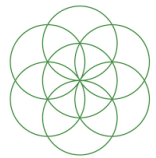






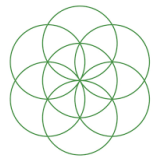
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