EXECUTIVE SUMMARY

Preliminary research verifies that the palm oil and kernel oil markets in the Kigoma region of Tanzania are highly constrained, lack transparency for actors, lack formal or informal groups to access expanded market function, and lack any standardization or quality assurance. The oil palm value chain is underdeveloped and faces several confounding constraints that can be categorized as: low productivity from local trees, lack of investment in the industry, and weak market function. These are essential areas where Seed Change Tanzania should focus efforts to improve market function and foster value chain development. The palm oil market benefits from three fundamental features present in Kigoma: conducive climate, fertile land, and political support for the promotion of palm oil. With limited remaining unused land in countries which have historically dominated the international oil palm market, Kigoma is a prime region to service its own country’s demand for palm oil as well as the East Africa region.
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INTRODUCTION

This report details the results of an analysis of the palm oil value chain in the Kigoma region of Tanzania. The report draws on participatory research in villages in rural Kigoma as well as from local market actors based in Kigoma town. This study was commissioned by Seed Change Tanzania to better assess the palm oil value chain in Kigoma, as there are no reputable studies or reports specifically focused on the regional value chain.

Palm oil has been cultivated in Kigoma for over a century however there has been little development of the value chain during this period. Palm oil is a highly lucrative, highly demanded crop both nationally and internationally. Tanzania is a net importer of palm oil, ~520,000 tons per year (worth $354,000,000).\(^1\)

Palm oil is one of Tanzania’s top imported items, however little successful investment has been made to modernize the industry and support developing domestic supply. In the Kigoma region palm oil is grown on smallholder farms and processed manually. The main point of sale for Kigoma palm oil is local and in crude form. The visible manifestations of a stunted and constrained market were the justification for Seed Change Tanzania to commission this report to further understand the existing market; where and to what degree value-added product transfers appear and if there are broken links or blockages in the value chain that are keeping the palm oil industry in Kigoma in an underdeveloped state.

Figure 1 Palm oil sold locally in recycled water bottles
STUDY OBJECTIVES

This study was commissioned to create a comprehensive picture of value-adding product transfers, actors’ roles, and governance structures involved in the oil palm market with the intention to provide recommendations for future action and informed strategic plans for Seed Change Tanzania.

To properly serve smallholder farmers of Kigoma it is essential to understand the market they participate in. The objective of this report is to assess the actors and value-added transactions that exist in the markets for palm oil and kernel oil. Research was comprised of semi-structure interviews with various persons from each active actor class in the value chain. Data was collected on average sales price, volume, and sales frequency as well as purchase prices and incidental costs. Palm oil was traced from its rudimentary state in fresh fruit bunches (FFBs) to its final point of sale. Similarly, for kernel oil the market was mapped from kernel to end consumer. Both chains follow the crop through many changing hands from base producer to final consumer.

MARKET TRENDS

Local consumption of palm oil in Kigoma is high, with an estimated per person yearly consumption at 6.7 litres.\(^2\) With approximately 2.2 million people living in the Kigoma region – this accounts for 14,870,000 litres of palm oil a year.

In global markets, palm oil consumption has risen by 290% over the past ten years.\(^3\) This rise has resulted from a variety of factors including; the use of palm oil as a replacement for trans fats and the expansion of the middle class in large countries (such as Indian and China) who now consume a greater portion of processed and packaged food, much of which contains palm oil. Over ten years the price per litre has risen 52.91%, reaching $531 per metric ton in January 2016.\(^4\)
Fresh fruit bunches (FFBs) from oil palm trees yield crude palm oil (CPO), crude palm kernel oil (CPKO), and several other useful byproducts. The graphic below details all commodities that can be harvested from an oil palm tree; however, the focus of this report is on the value chains for CPO and CPKO.
OVERVIEW OF THE OIL PALM VALUE CHAIN

CRUDE PALM OIL MARKET

Crude palm oil is a red/orange liquid that comes from pressing the fresh fruit bunches (FFBs) of palm oil trees. Palm oil is extracted from the mesocarp of the fruit and kernel oil from the kernel. In its unrefined, crude state palm oil is used locally for cooking. International markets demand refined palm oil, which is used in a wide variety of products mainly owing to its stabilizing properties. Palm oil is used in items from shampoo to bread to ice cream and can legally be identified by 25 names by the United States Food and Drug Administration.

![Detailed bisection of an oil palm fruit](image)

In Kigoma, palm oil is traded and sold in its most basic form and currently no value-adding processes are undertaken. Palm oil is typically traded in 20 litre reusable containers and at the market level is sold in plastic bottles ranging up to five litres.

Men are manly responsible for management of palm oil farms and sales of palm oil. While women are involved in the production and processing of palm oil, few take full ownership of the entire process. In research and discussions for this report it was found that there are no female middlemen or traders of palm oil. Subsequently, this section of the report will refer to farmers and middlemen as male.

FRESH FRUIT BUNCH PRODUCTION

The crude palm oil market in Kigoma can be described as rudimentary at best. Smallholder farmers (classified as famers with less than two and half hectares of land producing mainly for subsistence consumption) grow oil palm trees on unstructured plots, with little care or attentive given to their trees. Often, oil palm is the only cash crop a Kigoma smallholder will grow. The trees they grow are a dura variety. The dura tree is low yielding, giving less than two litres of palm oil per tree per year. Farmers use
family labour to harvest fresh fruit bunches (FFBs) which are harvested year round. Ten kilograms of local FFBs produces between one and one and a half litres of palm oil.

At the initial stage of crop production there are two types of farmers. The first type of farmer (Farmer 1) sells all of his/her FFBs directly to a middleman (Middleman 1) for TZS 800 to 1,200 per FFB. This price will fluctuate depending on the oil content of their fruits. Information on oil content of fruits is not accessible to farmers and they must trust the valuation given by the middleman.

The second type of farmer (Farmer 2) harvests and processes their FFBs. This farmer will either own a Burundi expeller, a local palm oil processing machine, or pay to use a neighbor’s machine. A Burundi expeller costs approximately TZS 100,000 to build. To use a neighbor’s Burundi expeller, a fee of TZS 2,500 to 3,000 or two litres of oil is usually charged to occupy the machine for three to four hours. Once the oil is processed it is placed in 20 litre containers. At this stage the palm oil is crude palm oil (CPO).
CRUDE PALM OIL SALES

Crude Palm Oil (CPO) is sold in 20 litre containers at in a central area – for Kigoma town this is Kahabwa centre on the edge of town. Farmers will either: sell direct at the centre or sell to middleman (Middleman 2) or sell directly at a centre for Kigoma town. In certain villages farmers rely solely on middlemen due their remoteness from a sales center.

Middlemen are the price-setters in this sales transaction. If a middleman receives a high price for palm oil at a sales centre, he will pay the farmer more the next time he visits. If a middleman sees or “senses” the price is falling, he will pay the farmers less. Price setting is an imprecise process and little-to-no information is shared amongst smallholder farmers about recent sales prices, they depend wholly on information from middlemen and the price they set.

To purchase CPO, middlemen irregularly visit farmers and travel across villages when they hear that farmers in a specific area are harvesting their FFBs and producing palm oil. This increases the level of dependence of farmers on middlemen. Middlemen go directly to village farms to purchase oil and thus farmers incur no transportation costs when selling direct to middlemen.

The following is a schedule of prices a farmer may receive at this stage (with price fluctuation due to wet/dry seasonal variation).

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>September to December</th>
<th>January to August</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPO sold to Middleman</td>
<td>TZS 1,250</td>
<td>TZS 1,000</td>
<td>TZS 1,350</td>
</tr>
</tbody>
</table>

**Chart 4 CPO Sales Price in Villages**

If a farmer elects to bypass the middleman and sell CPO directly at a sales center, he will face a series of costs.

- **Levies**
  - TZS 300 levy per 20L of CPO.
  - Paid to village council where the oil was processed; this levy can be dodged if a farmer starts their transport to the center at night.

- **Transporters**
  - Paid TZS 300 to 500 per 20L of CPO.
  - Farmers may seek hired labour to assist in transporting their oil to the center (Transporter 1).
  - Transporters use bicycles and carry four to six 20L containers at a time.

- **Salesmen**
  - Paid TZS 1,000 per 20L of CPO.
  - Farmers may hire a salesman (Salesman 1) who is responsible for transporting and selling their oil at the center.

**Chart 5 CPO Sales Fees and Levies**
At a sales centre, prices for oil palm are slightly higher than at the village level.

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>September to December</th>
<th>January to August</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPO sold at sales centre</td>
<td>TZS 1,425</td>
<td>TZS 1,350</td>
<td>TZS 1,500</td>
</tr>
</tbody>
</table>

**Chart 6 CPO Sales Price at Sales Centre**

**STORAGE AND REPACKAGING**

There is no stage of value-adding in the CPO value chain in Kigoma, however some middlemen with surplus capital store their CPO until the price reaches its maximum point. Oil can be stored for two to five years. Few middlemen appear to have surplus capital and this sales technique that could result is price smoothing is considerably under utilized.

At the market level, market middlemen (Market Middleman 1) purchase palm oil and repackage it in five litre containers and one litre recycled water bottles. Five litre containers of palm oil are sold at local markets for TZS 10,000 (including the container) or TZS 8,000 without container (TZS 1,600 per litre). Prices fluctuate depending on prices at the sales center. Market middlemen transport their palm oil via local buses incurring a small transport fee. Market middlemen must pay a TZS 300 per day to sell at the major market in Kigoma, Mwanga Market; irrespective of how much they sell.

**INTERNATIONAL TRADE**

The Kigoma region is bordered by Burundi to the north and accessible across Lake Tanganyika by the Democratic Republic of Congo. Both countries are in the bottom decile of the Human Development Index and are net palm oil importers although both have regions suitable for oil palm cultivation. Burundian and Congolese traders infrequently travel to Kigoma to purchase palm oil. Trade is not dependable or reliable due to political volatility in both trading regions. Data is near impossible to collect on how much palm oil is sold to these traders and is exported from Kigoma to these countries.
KERNEL OIL MARKET

Kernel oil, (crude palm kernel oil – CPKO) a much lower value byproduct of fresh fruit bunches, is processed and sold in Kigoma. Unlike palm oil, kernel oil does undergo value-adding processes in Kigoma and is exported out of the region. Oil palm tree kernels cannot by processed by manual, “local methods” due to the force required to crack the kernel shell, so mechanized processing is necessary to trade this byproduct. Kernel oil is most commonly used in soaps and cosmetics. In Kigoma a nascent soap making industry exists. This value chain produces soap for local consumption, for export to Dar es Salaam and for export to other cities across Tanzania.

Oil palm kernels are traded by a measurement of “one tin”. One tin is simply a 20 litre container filled with kernels, approximately 2,000 kernels per tin. Kernel collection, processing, and sales are dominated by women. Since it is viewed as a low value product of palm oil, the CPKO value chain involves many female actors versus CPO value chain, although traders are still pre-dominantly male. In this section of the report will refer to farmers as female and middlemen as male.

KERNEL SALES

Farmers sell oil palm kernels to kernel-specific middlemen (Middleman 3). Farmers must sell their kernels as machinery to extract kernel oil is prohibitively expensive and kernels cannot be processed manually. When dried, kernels can be stored for up to five months before losing their oil content. A middleman will purchase kernels in quantities of 20 litres containers (one tin) at TZS 10,000 to 12,000 per tin. Depending on available capital, a middleman usually collects two to three bags of kernels (one bag is six tins – 12 to 18 tins). He will hire local transportation (Transporter 2) to take the kernels to the Small Industry Development Organisation (SIDO) in Kigoma, a parastatal organisation which has a privately operated kernel-processing machine on its property. The middleman pays TZS 3,000 per bag for transportation and a council levy of TZS 1,000 per bag for moving the kernels into the town core. At SIDO the middleman pays a service provider to use a kernel-processing machine at a rate of TZS 1,500 per 20 litre container (or tin). The kernel processing machine runs on electricity, is valued at approximately TZS 10 million, and can produce 2,500 litres of kernel oil per day.

Like CPO, CPKO price varies by season, however CPKO exhibits a much smaller variation. The price remains in the TZS 1,850 to 2,250 per litre range year round. Middlemen dry their nuts on large tars, process the kernels, and then sell the oil directly to the 15 to 20 privately owned soap-making operations located at SIDO (Soap Makers). Some middlemen elect to make their own soap, although this requires further capital and inputs. CPKO is also sold in its crude form for local cooking. A major byproduct, nut cake, is sold at TZS 2,500 to 3,000 per bucket and used as animal feed (Nut Cake Consumer). There is no middleman or market for nut cake and those who wish to purchase it must come directly to SIDO.

VALUE-ADDING PROCESSING

Soap can be made either manually or electrically and requires a mixture of a two to one ratio with a caustic soda dilution. Dye and perfumes can be added to increase value. There are three main sellers of
caustic soda in Kigoma, which costs TZS 16,800 to 18,000 per kilogram. Soap is poured into wooden boxes or metal tables and takes two days to harden. The soap block is cut and packaged in a variety of sizes. 24 small square bars cost TZS 2,000, 20 long skinny bars costs TZS 10,000, and 20 large bars cost TZS 20,000.

Market middlemen (*Market Middleman 2*) come to SIDO to purchase soap waste direct from the soap makers (a significant amount of soap “scraps” are accumulated during the soap making process). They purchase this waste at TZS 1,000 per kilogram. If they purchase a small amount they will carry this to their homes, if they purchase a large amount (20kg or more) they will take a local bus. At their homes, the soap is re-melted and formed into small, skinny bars. 20 kilograms of soap waste makes approximately 120 bars. The bars sell for TZS 200 each (*CPKO Local Market*). Soap market middlemen pay a daily council levy of TZS 300 to sell their soap at the local market.

A very small proportion of soap made in Kigoma is sold in Dar es Salaam (*Dar Market*). Transportation by truck to Dar es Salaam costs TZS 100 per kilogram where soap is sold at a much higher rate, TZS 36,000 for 20 large bars. Congolese and Burundian buyers purchase soap directly from soap makers at SIDO. In Kigoma, soap prices do not experience large fluctuations but some variations arise from changing kernel oil prices and kernel availability.

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**KERNEL PALM OIL MARKET MAP**

*Chart 8 Kernel Palm Oil Market Map*
WEAKNESSES IN THE PALM OIL VALUE CHAIN

Kigoma smallholder oil palm farmers face specific challenges that hinder their ability to mobilize into a strong producer base, thereby handicapping the value chain from modernization and expansion. The remote location of Kigoma compounds many of the palm oil value chain constraints. These limitations can be categorized into three groups. Each constraint is inhibited by the previous constraint:

1. Low productivity – With low yielding trees and little-to-no agricultural input use, the Kigoma region produces drastically less palm oil per hectare than any other commercial palm oil region.
2. Lack of investment – There is little-to-no private investment in palm oil in the region due to the prospect of slight/negative returns. There is little public investment in infrastructure or the palm oil industry as well.
3. Weak market function – There are serious issues of incomplete information in the value chain which compound with the constraints of low productivity and lack of investment to result in a poorly functioning market.

Addressing this first constraint by changing to farming a commercial variety of palm oil is the key to unlocking and encouraging investment in the region which will organically aid in the improvement of market function creating a thriving palm oil market in Kigoma.

LOW PRODUCTIVITY

TENERA VS. DURA – THE NEED FOR COMMERCIAL OIL PALM CULTIVATION

Farmers in Kigoma exclusively cultivate a local, dura variety of palm oil which is extremely low-yielding. The low yield of these local trees is the most significant challenge to market development. The trees are prohibitively low-yielding such that the amount of FFBs and oil content in the fruit bunches that the trees yield is too low to support mechanized processing. The cost of diesel and labour to run a mechanized mill cannot be financially supported by relying solely on feedstock (FFBs) from local, dura trees.

Over the past half decade several companies have pioneered engineering of oil palm seeds that maximize both FFB yields and oil content in FFBs. This commercial variety of seed – tenera – has been used to develop the oil palm industries across South East Asia. The hybrid, high-yielding tenera variety takes advantage of both the dura tree – the local variety farmed in Kigoma which is native to Africa and acts as the parent material for many of the commercial varieties used around the oil palm world, and the pisifera tree. Tenera is a hybrid of dura and pisifera varieties which gives a higher yield (tons of FFBs) and higher oil content in each fruit. The dura tree yields one to three tons of FFBs per hectare and has an oil content under 8%. Improved commercial varieties of the tenera variety yield 12 to 40 tons per hectare with an oil content of 25% to 30%. When smallholder farmers grow a high-yielding, commercial crop they become an attractive source of feedstock for new value-chain actors, which allows for organic development and expansion of the oil palm industry.
Without cultivating *tenera* trees the Kigoma palm oil industry will never be viable beyond its current subsistence/cottage existence. Industrial processing facilities of any size will not be economically viable unless the quantity and quality of FFBs are greatly increased through planting *tenera* trees.

Figure 6 Three species of oil palm tree. *Tenera* combines the large flesh (mesocarp) of the *pisifera* with the mid-sized kernel of the *dura*.

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**ADDITIONAL BENEFITS FROM AGRICULTURAL INPUTS**

Farmers use little or no agricultural inputs in their palm oil cultivation. Kigoma has model physical requirements – soil, climate, and rainfall – to be a bountiful palm oil producing region, however the proper use of agricultural inputs could dramatically increase yields. In interviews, Kigoma farmers...
reported not using any fertilizer, pesticide, or irrigation method on their palm oil farms. Correct application of these inputs can result in a 40% increase in overall yields. Although the first priority and necessity to modernizing the oil palm industry in Kigoma is to cultivate tenera oil palm trees, remedying the lack of use of agricultural inputs is an easy barrier to breakdown and would unlock even greater yields for oil palm farmers, allowing for the value chain to develop.

LACK OF INVESTMENT

MODERNIZING PROCESSING METHODS

Low-yielding trees are the major impediment to investment and development of a modern palm oil industry and mechanized processing of oil palm in Kigoma. Currently farmers rely on unpaid family labour and the use of Burundi expellers to extract palm oil. This method extracts less palm from each fruit and is not a viable option for value chain development. Trapped in a cycle of low-yields (from dura trees) and low-returns (from Burundi expellers) the Kigoma oil palm industry cannot expect to develop beyond the existing cottage industry.

Mechanized mills are a requirement to break this cycle but with the current low-yielding, non-commercial crop as the only available feedstock, mechanized mills are not economically feasible. The costs of production (diesel and labor) are higher than revenue received from oil sales. Traditional methods of processing do not incur diesel and paid labour costs and will continue to out-compete any mechanized mill until high-yielding trees are introduced, making the palm oil value chain unattractive for any private sector processor.

IMPROVING POOR INFRASTRUCTURE

Other factors which compound the unattractiveness of private sector investment in mechanized processing are poor infrastructure in the region. In the current market, all oil palm sales outside of the region rely on buses or trucks to reach major markets. Kigoma lacks the infrastructure that exists in other agricultural hubs, there are no existing major agricultural ventures in the region. Inputs must be purchased and shipped from Dar es Salaam and major government/financial transactions are slow to complete in Kigoma and most easily dealt with in Dar es Salaam. A poor rail system means the easiest connection to the capital 1,200 kilometers away is by road or by air which is serviced only four times per week. Unreliable electricity and internet coverage also hinder private sector development.

WEAK MARKET FUNCTION

DEVELOPING FARMER ASSOCIATIONS

Major palm oil exporting countries rely on production from large plantations, networks of outgrowers, and farmer associations of smallholders. Across different crops and different countries farmer associations allow smallholders to work together to increase yields, improve communication, and
strengthen bargaining power. In Kigoma functioning palm oil farmer groups do not exist. Palm oil farmers stated that they have never been involved in or known of any group or association exclusively for oil palm farmers. Kigoma smallholders function independently and thus suffer greatly from incomplete information in the sales market and from the inability to band together and utilise economies of scale to bring down production and sales costs.

In interviews farmers stressed that they are restricted in their position in sales interactions as price-takers (versus price-setters) due to limited information on price. Middlemen also discussed their susceptibility to external market forces and seasonal price fluctuations arguing that they set their prices solely based on their most recent sale and do not price gouge unempowered farmers.

Both groups discussed issues of capital – that there are no sources for lending money internal or external to their transaction chain (middlemen must pay cash up front to farmers – who cannot afford to loan money) and that this hinders their ability to fully function within the market. Across smallholder communities, farmer associations frequently also act as formal or informal lending groups allowing farmers to access credit.

Encouraging the development of farmer associations for Kigoma palm oil smallholders will open up channels of communication for increased bargaining power, allow for farmers to access economies of scale to bring down production costs, and generate means by which farmers (and middlemen) can access credit to grow their businesses. Farmer associations are a foundational component of a modern palm oil value chain and are fundamental to support a sustainable, smallholder-focused industry.

**ENCOURAGING PRACTICAL GOVERNMENT SUPPORT**

Practical government support for the palm oil industry would help achieve the goal of a fully developed palm oil industry. Currently there is a lot of “good will” for the palm oil industry communicated verbally at high-level meetings in sweeping comments without any specifics, details, or actionable plans. Little tangible action takes place at the regional policy level or at the local implementation level.

At the policy level, there is strong support for prioritizing and promoting palm oil in Kigoma. This may be signaling a policy window for the future development of initiatives focused on the industry; however, there has been little-to-no notable progress in this area.

At the local level, farmers in one central village, Mahembe – closely located to Kigoma town, reported that they had never received a visit from government extension workers to give farming information or advice. There have been no local capacity builders or forums for information exchange present in the village in their memory. Farmers from Bitale, another village closely located to the town centre, mentioned one extension visit that was never followed up and that the visit did not add any value to their existing knowledge, market chain, or processes. Bitale farmers mentioned their repeated requests to the government for information, assistance, and improved seeds have gone unanswered. Smallholder palm oil farmers know what they want (more training and group facilitation) and know what they need (improved seeds) but have had little support from the government to obtain what they need to improve the function of the market.
An analysis of the Kigoma palm oil chain paints a depressing picture. In its current state, production is rudimentary with little trade or product refinement. However, this report highlights several strengths of the region – conducive growing conditions, a large national market for palm oil, and regional political will. The clear impediment to growth is the lack of production in the region. Local, *dura* trees simply do not produce a sufficient volume of palm oil per hectare.

Low-yielding trees are the main barrier to investment and thus a modern palm oil industry developing in Kigoma. Globally palm oil is a both a high-value, high-demand crop. Kigoma has an opportunity to build a smallholder-centered industry to meet growing national and international palm oil demands. For Kigoma to join this lucrative market, commercial tree varieties are a prerequisite.
ABBREVIATIONS LIST

- FFB – Fresh Fruit Bunch
- CPO – Crude Palm Oil (palm oil)
- CPKO – Crude Palm Kernel Oil (kernel oil)
- TZS – Tanzanian Shillings

FREQUENTLY USED TERMS

- Smallholder farmer – a farmer with less than two and half hectares of land producing mainly for subsistence consumption.
- Burundi expeller – a local palm oil processing unit that is made from an old oil drum with a wooden press placed in side. It is operated by man power to press the oil and fair to boil water added to the fresh fruit bunches as they are condensed to release oil.
- Local processing – Local processing refers to the Burundi expeller method of processing, or other methods that do not require mechanization.
- Modern processing – Modern processing refers to oil press machines that use mechanization (whether diesel or biomass operated) to press palm oil fruits.

CONVERSIONS AND RATES

- 20 kilograms of FFBs = 2 to 3 litres of oil
- 8 FFBs (or 10 small FFBs) = 1 drum = 30 litres of oil
- 3 buckets of kernels = 20 litres of oil
- 20 kilograms of soap waste = 120 soap bars
- 1 USD = 2180 TZS
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