

Designing and assessing coconut residue supply chains for added value products SMP17015

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Aim

To contribute to the implementation of coconut residue to added value products in Indonesia and the formation of a consortium (or more) between coconut producing parties and SMEs that use the residues for production of added value products.

Husk to cocopallet factory supply chain

The Cocopallet factory will start at 20.000 ton per year and will grow to 100.000 tons per year- 20 kg per pallet

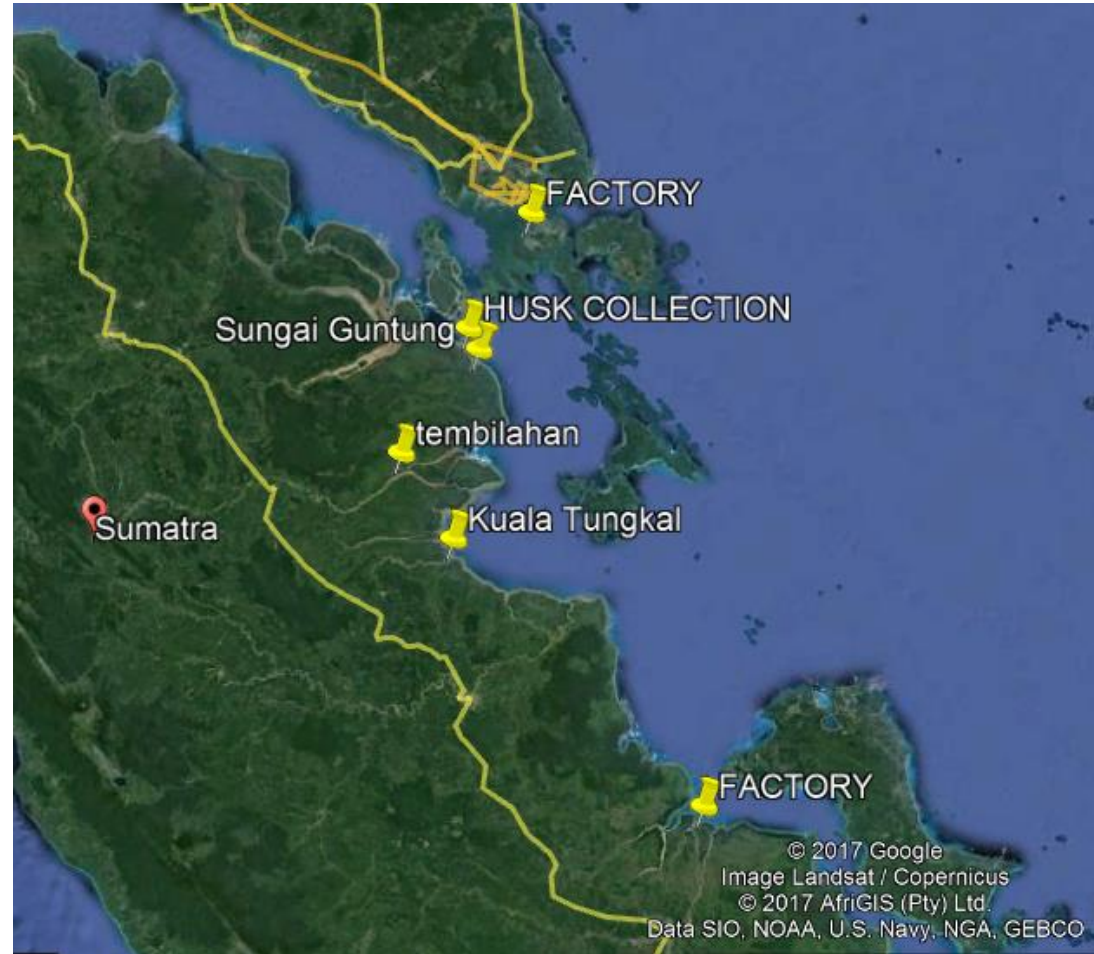
The Goodhout factory will also need to have an initial size of about 10.000 tons per year

Focus om Sumatra Riau. Assessed husk supply options assuming a factory at a large harbour with a low cost container transport options (Palembang, Batam)



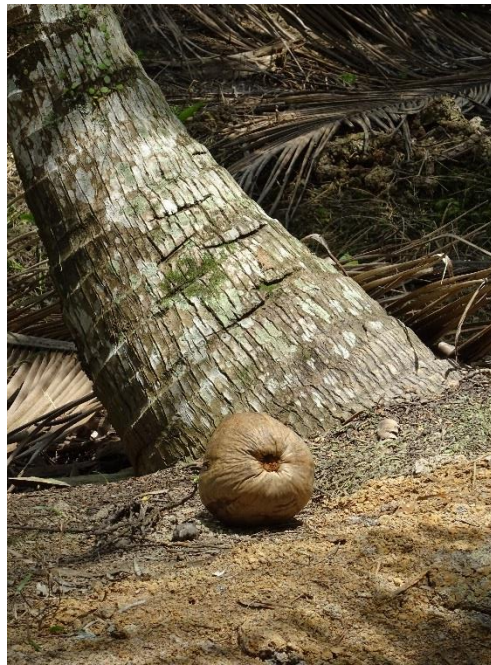
Supply of husk to the factory:

- A factory will require 10.000 to 100.000 tons of husk
- The factory needs a secure supply of good quality husk at a predictable and acceptable price
- Case in Sumatra (Riau)



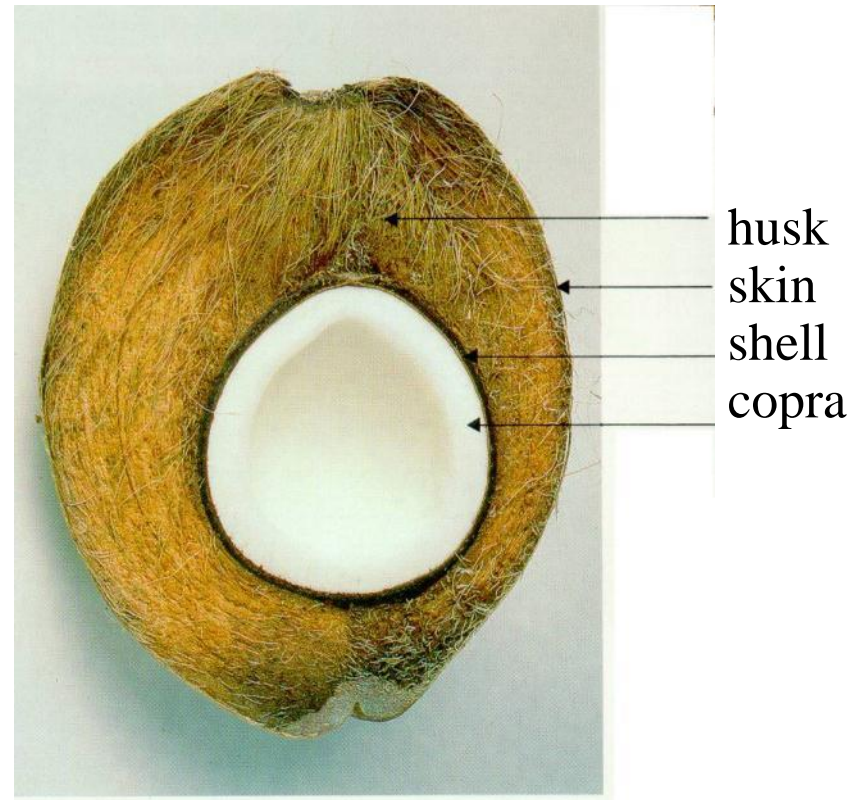
Quality control of raw materials

- Coconut composition
- Quality of Husk
 - Parameters influencing husk quality
 - Data on desired husk quality
 - Quality measurements husk
- Quality of shell
- Quality of pith



Coconut composition

- Parts of the coconut to be used
 - Shell
 - Husk (containing Pith and Fibre)
 - Pith (including short fibre)
 - Long fibre



Parameters influencing quality of husk

■ Maturity

- The timespan the coconut was growing on the tree

■ Freshness

- The timespan between harvest and use of the coconut
- The timespan between dehusking and use of the husk

■ Storage conditions

- Temperature
- Relative humidity
- On land/in water
- Bacterial decay (etc.)

■ Coconut variety



Data on desired quality of husk

- Based on WFBR labresearch
 - Maturity 10-13 months
 - No overdrying (below 10 wt% moisture)
 - *Washing undesirable (to be established)*
 - *Preferable tall coconut variety*
- Based on Field trip
 - Golden fibres
 - Not taken from water, not blackened
 - Maturity and Freshness unknown

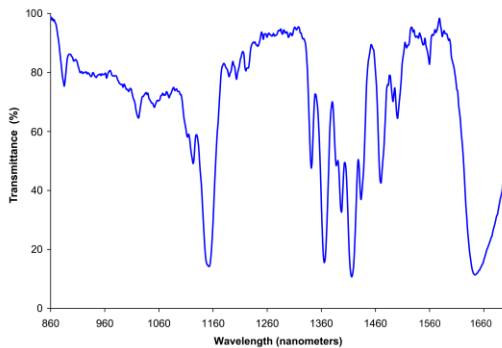
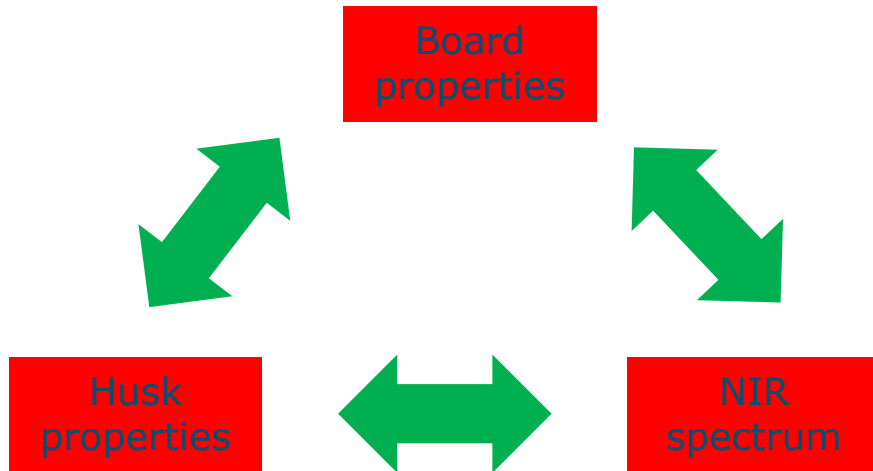


Possible quality measurements Husk

- Quick measurements
 - Water content
 - Near-infrared
 - Colour chart
 - Electric Conductivity moisture
- Lab measurements
 - TGA (volatiles)
 - FT-IR Lignin
 - Water content
 - Board Sample



NIR spectrum



NIR spectrum might show

- Maturity (volatiles)
- Water content
- Biological decay
- Overdrying

To be developed

Correlation between

- NIR
- Board properties
- Husk properties

Data on desired quality of shell

- Main parameter
 - Moisture content of shell
- Based on Field trip
 - Maturity and Freshness often unknown
 - Broken coconuts are included
 - All coconut-qualities are collected and sold
 - Cleanliness
 - All copra residues should be removed



Supply strategies

Factory will have 3 month reserve supply

Supply system options:

A. Direct to factory by independent suppliers.

- Less investment

- Less secure supply

- Less quality control

B. Via satellite/buying station where quality control and pre-processing takes place

- More investment

- More control

- Better bankable?

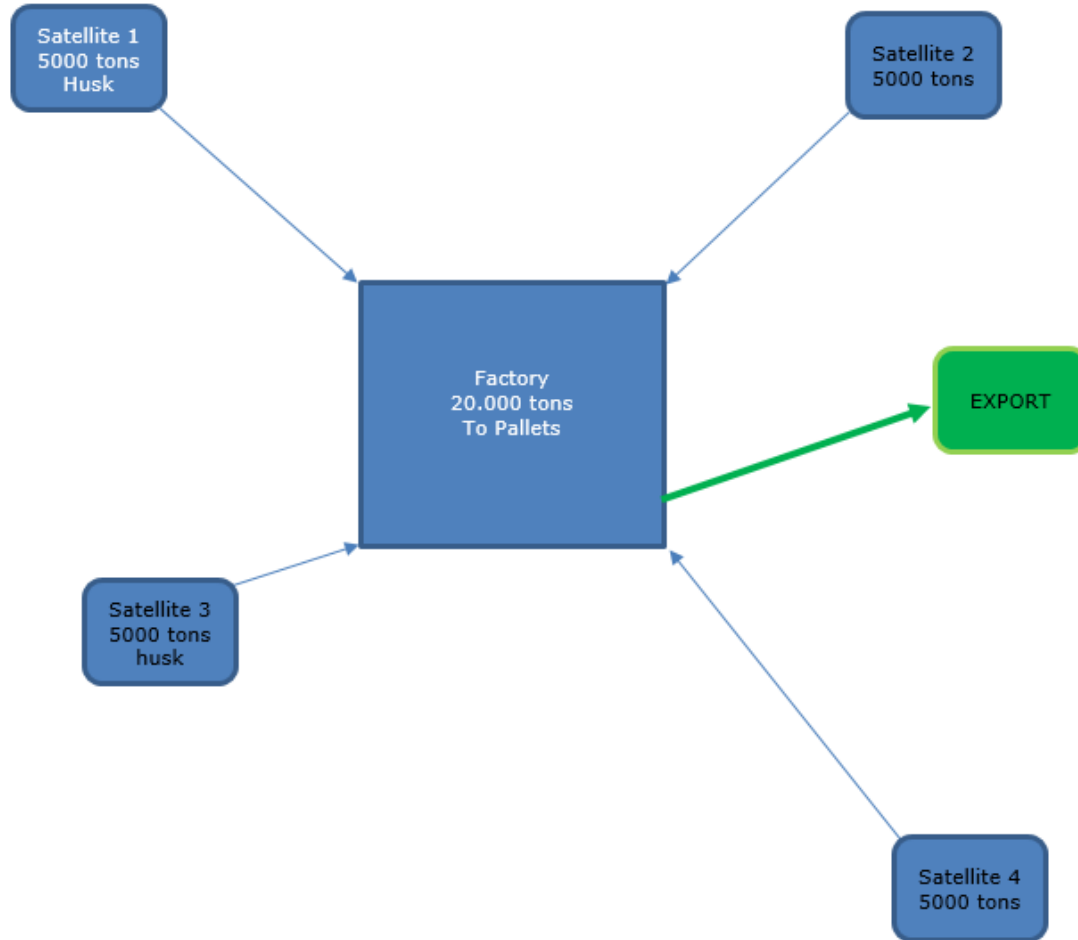
- Scalable

Local husk supply

- Local husk use is negligible (<10%)
- Kusuma (2016) assumes a cost of \$0.70 to \$8.60 per ton husk
- Little fibre production from husk
- Pith from coconut fibre factories can also be sourced: €1 to €5 per ton (if no other uses)



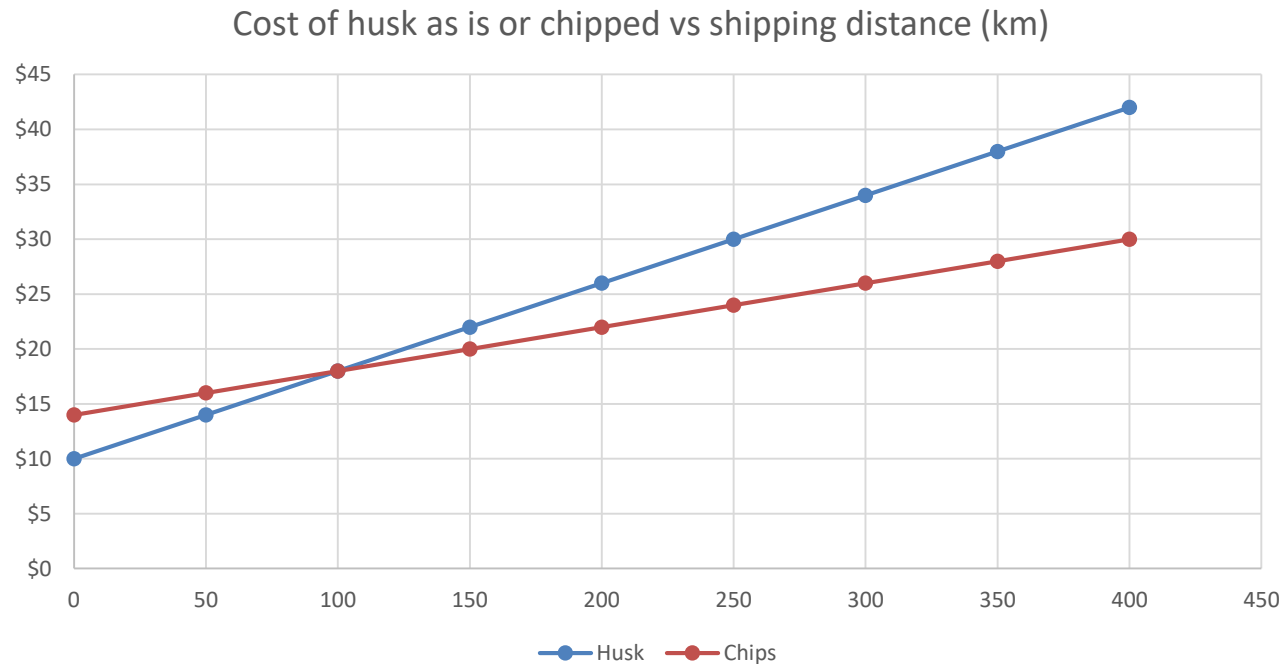
Satellite supply system



Satellite = Barge with collection + processing +
quality control + storage + shipping = 100 tons per week



Delivery cost for different setups (preliminary!)



■ Cost drivers:

- Husk chipping vs no processing (\$5 to \$ 7,5)
- Local buying cost (\$ 0.7 to \$ 10 per ton DW)
- Distance to factory (50 to 400 km)
- Transport cost (\$ 0.4 to \$ 0.8 per ton/km)
- Etc.

Options for lower cost and secure feedstock delivery

- Local compression / chipping before shipping
- Contracting pith from fibre factories
- Moving satellites
- Add fibre extraction to pallet factory and also produce husk fibre

Results

- Quality management options assessed
- Supply set-up options assessed (ongoing) with input from local partner(s)
- Quality management system assessed (EPROD)

- Further steps:
 - Test / develop quality analysis system
 - Assess chain set-up with more local data
 - Test pallet / plate with high pith content

END

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