

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

Wageningen 14 december

Michiel Vos (CocoPallet)

Wolter Elbersen, Edwin Keijsers

Ardi Simpala (Indonesia)



# Aim

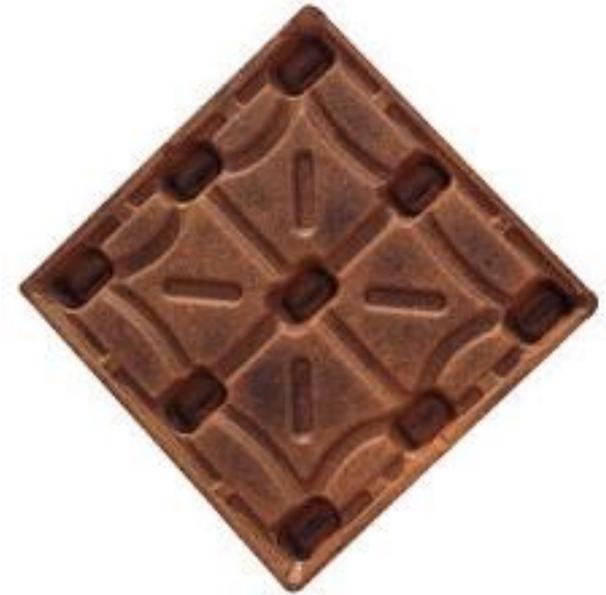
To contribute to the implementation of coconut residue to added value products in Indonesia and the formation of a consortium (or more) between coconut producing parties and SMEs that use the residues for production of added value products.

# 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

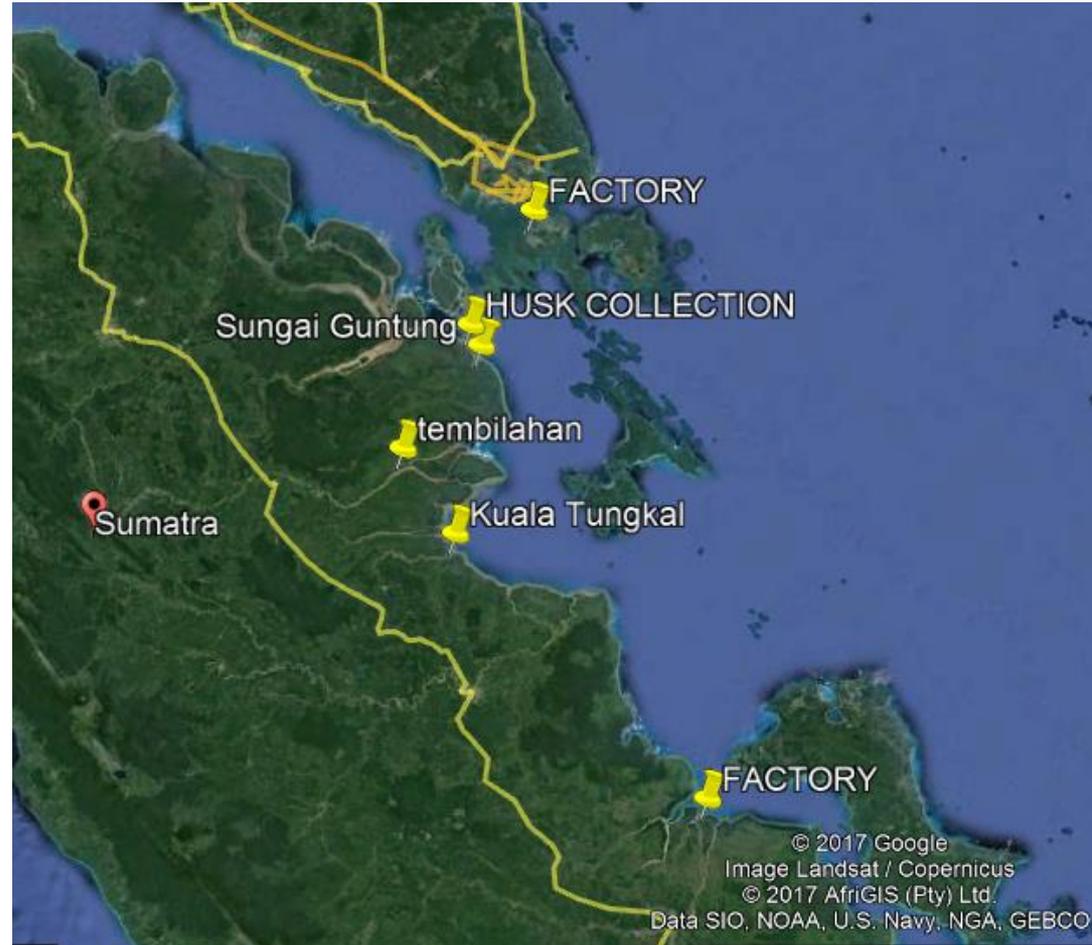
The Goodhout factory will also need to have an initial size of about 10.000 tons per year

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)



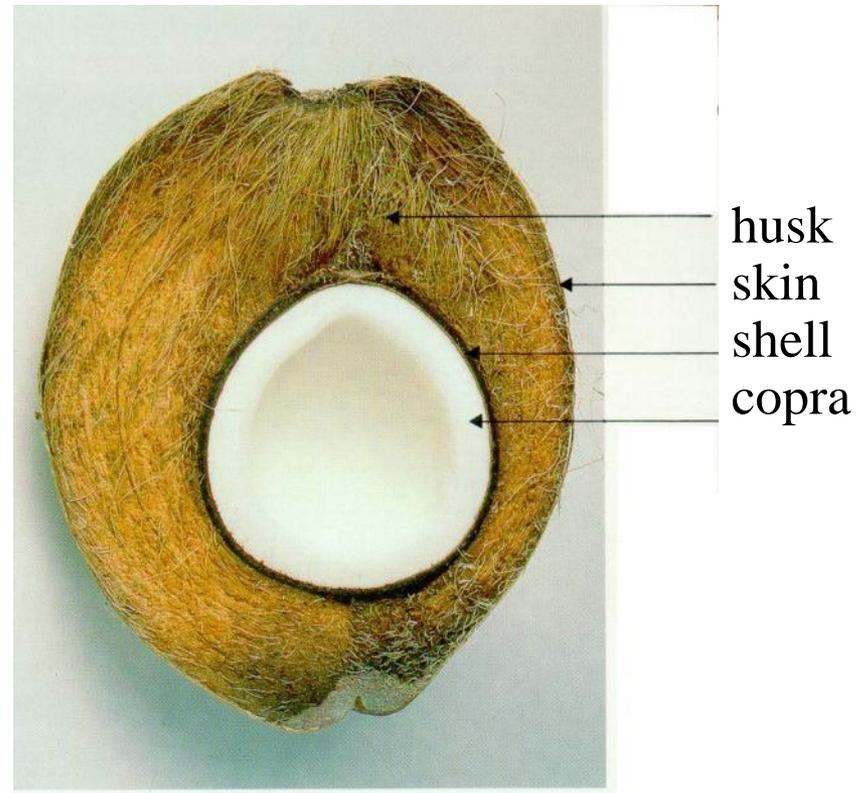
# Quality control of raw materials

- 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

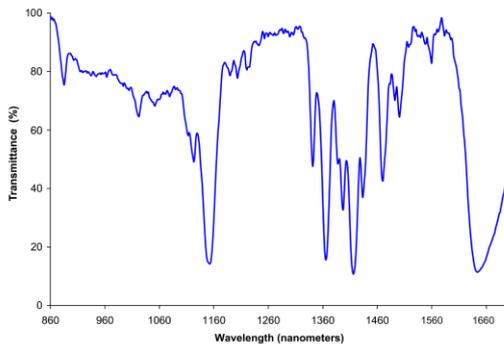
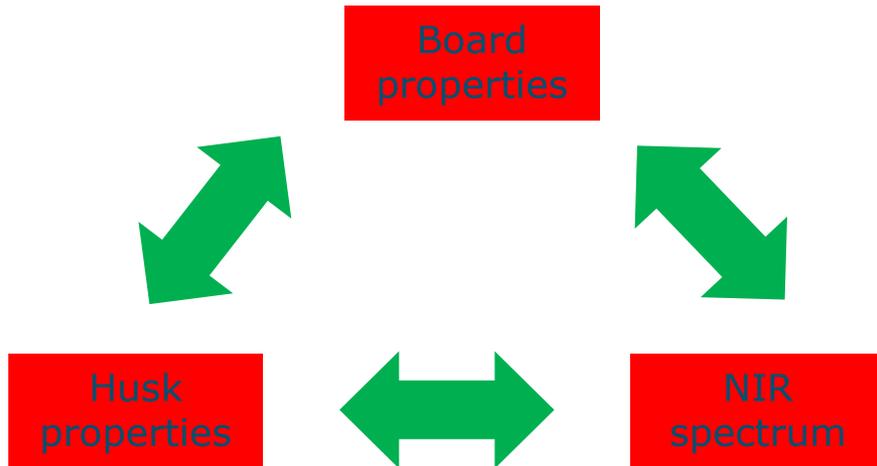


# Possible quality measurements Husk

- 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?

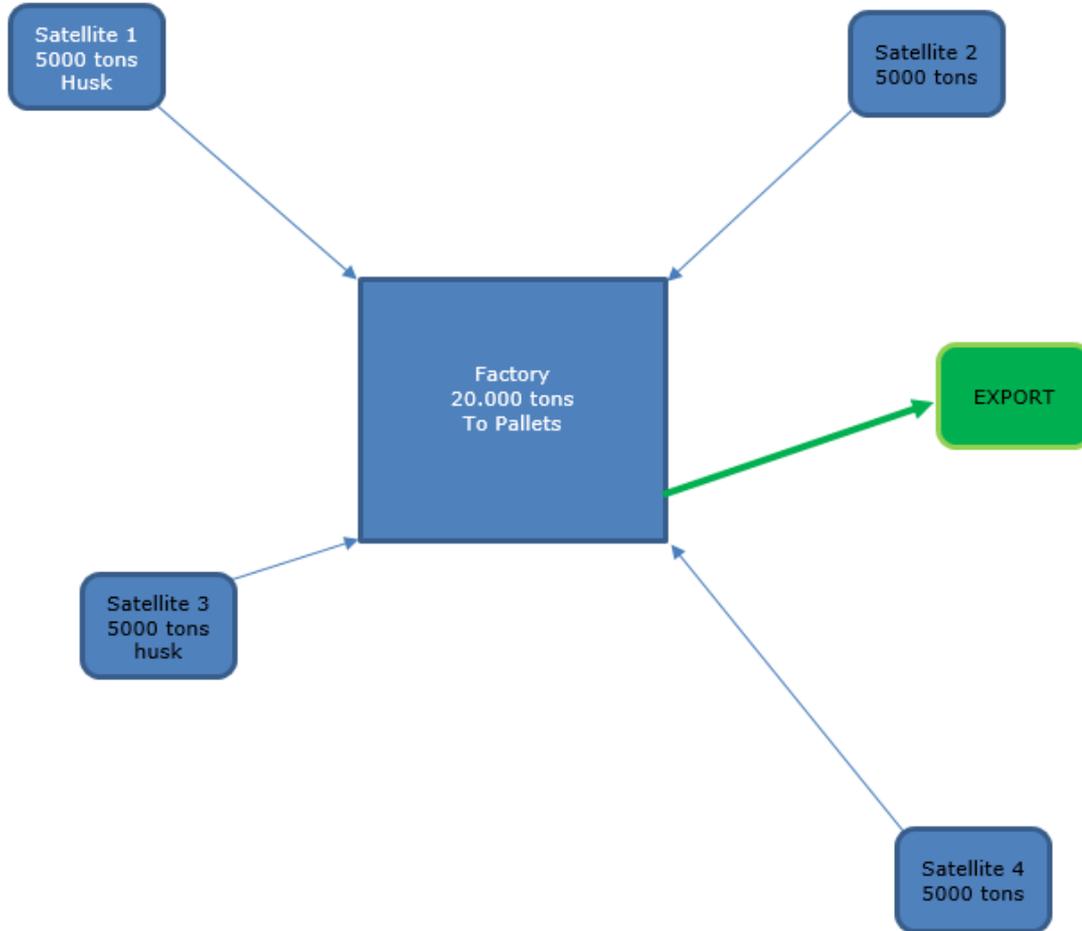
- Scalable

# 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

Michiel Vos

Wolter Elbersen

Edwin Keijsers