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## **I. INTRODUCTION**

Indonesian people has long been acquainted to rattan utilization for their daily life in a number of places rattan has served as supporting elements for the economic development of local communities.

Rattan utilization is invaluable not only due to it has uniqueness but also due to its strength and its versatilities compared to other material. The economic benefits that can be generated from and roles they can play in supporting daily livelihood and people welfare have made them socially acceptable.

On the contrary, those produced at the processing industry are of good quality and competitive in market, and consequently raw materials are concentrated on rattan industry. In addition, products of rattan produced are diversified so that they could contribute more income as compared with profit margins received by farmers.

This Manual provides method of processing rattan to produce various finished products both derived from small- and large-diameter rattans. It is expected that this Manual could be used by rattan farmers to produce high quality raw materials and further develop other centers of rattan industry at other regions.

## **II. ECONOMIC ROLE OF RATTAN**

The most important parts of rattan are their canes. Old rattan canes are widely used as materials for crafts and household utensils. In additions, rattan plantation is also producing other products, such as shoots (umbut) which can be consumed as vegetables. The roots and fruits are used as traditional medicines, white its resin is used as coloring materials for ceramics, and additives in pharmaceutical industries.

Table 1. Some rattan species and its functions

Rattan Species (Local Names)	Uses
Tohiti	Furniture materials, heat isolator in dessert, ship wall, flooring broom etc
Umbut	Webbing materials for baskets making
Data	Webbing materials for baskets and chair making
Terampu tanah	Furniture materials
Jermasin	Bundling rope materials
Taman, irit, cincin. Pulut merah, pulut putih, pulut hijau	Antique chair and best bundling rope, floor mat, curtain materials, etc
Batang, manau	Furniture materials, either hollow or solid
Sabutan, ahas dan danan	Materials for fish traps, raft bundle, etc

Source: Januminro (2000)

## II.1. The Materials For Craftsmanship

The most commercial value of rattan parts are canes, particularly those mature ones. Rattan cane is elastic, spongy, and strong in nature. Thus the cane natural characteristics combined with high artistic attractiveness make artistic household's utensils.

The superior characteristic of rattan cane is in its elasticity which makes it easily be formed as raw materials for crafts making and other similar uses. Hence, rattan with its inherent natural properties for webbing is hardly substituted by other material.

## II.2. Concrete Construction

Rattan has a relatively high strength so as to be able to be used as material for the skeleton for concrete construction. A research reports a concrete bridge containing tohiti rattan was established in Kendari, Southeast Sulawesi in early 1985.

Rattan strength testing covers the ton stress test by applying British Standard method, in which less change in length, viz. from 30 cm to 34 cm on a ton weight of 320 kg on a buffer distance of 28 cm is found. More mature rattan preservation system through frying provides less rupture, which is suitable for concrete material.

### II.3. Vegetables And Traditional Medicines

For Aceh, Jambi, South Sumatera, West Java and Kalimantan ethnics, the young tip portion or umbut, which is more or less 1 m in length, can be used as vegetables preferably originated from large diameter rattans of *Daemonorops*, such as :

- *Daemonorops calepatius* Bl
- *Daemonorops melanochaetes*
- *Daemonorops oblongus* Bl
- *Daemonorops pelembanicus* Bl
- *Daemonorops periacanthus* Miq
- *Daemonorops rubber* Bl

Ways of consuming young canes (umbut) vary from one place to the other. In Aceh, for instance, umbut was grilled on fire until the peels turn blackish, while in Kalimantan uncovered umbut from peels is then boiled in water until it becomes soft and made of vegetable out of it by adding cooking ingredients.

Apart from umbut, rattan seeds and fruits of various species are consumable foodstuffs source. Edible seed of rattan is obtainable from *Daemonorops palembanicus* Bl, while the edible fruit is derived from *Calamus acidus* Becc.

Rattan also contributes to traditional medicines, i.e. the sap extracted from rattan seed of *Daemonorops* family is used for preventing blood flow of wounds. Rattans of *Daemonorops* and *Calamus* families are also consumed in order to prevent stomach ache.

### II.4. Rattan Resin

The resin of rattan is another product that can be extracted from rattan fruit and locally known as Jernang resin. The main source of rattan resin is of genus *Daemonorops*. Especially is *Palmae* families which is the main resin generating rattans. In Indonesia, Jernang resin has a number trade names as to Jernang Mundai, Jernang Beruang, Jernang Kuku, Getah Badak, Getik Warah and world-wide known as *dragon blood*.

Rattan resin is used as material for coloring in the industry, *marmor* (natural-stone floor material), tools made from stones, woods, paper, paint, additives in pharmaceutical industries, tooth paste, and tannin extracts. Provinces well-known as rattan resin producers are Central Kalimantan, Aceh, West Java, West Sumatera, Riau, Lampung, North Sumatera and Jambi.

Table 2. Rattan species and location of the habitat

Rattan Species	Location of habitat
Irit	Central Kalimantan: Sei Barito, Sei Kapuas, Sei Kahayan, South Kalimantan and East Kalimantan
Taman	Central Kalimantan: Sei Barito, Sei Kapuas, Sei Kahayan, South Kalimantan, East Kalimantan, Bengkulu and Jambi
Manau	Central Kalimantan: Sei Barito, Sei Kapuas, Sei Kahayan, South Kalimantan, East Kalimantan, Bengkulu and West Sumatera
Tohiti	South Sulawesi, Central Sulawesi, Northeast Sulawesi, North Sulawesi
Buyung	Central Kalimantan
Pulut merah and pulut putih	East Kalimantan
Seal	West Java and Bengkulu
Korod Pelah Balukbuk	West Java
Ahas	Central Kalimantan and South Kalimantan

Source: Januminro (2000)

### III. PROCESSING OF RAW RATTAN

Harvested rattans by local communities require a number of processing stages in order to produce quality products to meet the purpose of utilization. The followings are processes to have the W&S rattan (Washed and Sulfured) starting from rattan cutting.

### **III.1. Cutting**

Rattan cutting is made in accordance with the lengths and diameters. For instance, for small-diameter rattan cutting is of 5–6 m length and bonded in two folds, while large-diameter rattan is not folded. Sizing of rattan lengths and diameters are based on market demand.

### **III.2. Soaking**

Soaking is made if the scrubbing process is not carried out. Rattans are bundled in 50–100 pieces per bundle. They are then soaked under flowing water for 1 to 7 days.

### **III.3. Washing And Repeatedly Rubbing**

This step is intended to remove the sticky dirt on cane and to keep the quality of cane color.

Coconut fibers are used in washing rubbing.

### **III.4. Scrubbing**

This step is intended to remove the inner epidemic layer and leave sheaths in which the epidemic containing silica are still intact. A number of ways which are usually carried out by local community are as follows:

#### ***First Method***

Rattans are pulled in a hoop among 3 (three) bamboos, then polished with metal chains.

#### ***Second Method***

Rattans are pulled in tandem in a hoop through 2 (two) separated rollers made of *ulin* wood, then polished with metal chains.

#### ***Third Method***

Rattans are scrubbed with hands and then polished until clean.

### **III.5. Scrape Off**

This step is intended to scrape off or to flatten the outer rattan nodes and inter-nodes. This step is not applicable to all rattans but is made in accordance with market demand.

### **III.6. Drying**

This process is very important and is intended to reduce rattan water content to stabilize its dimensions and to prevent mold attack.

The length of drying time depends on rattan species, diameter, length of canes and weather condition as well. Drying process to be stooped after 1–2 days and finished when green color changed into golden yellow.

### **III.7. Straightening Off And Cutting**

The process is made because most natural rattans are not perfectly straight, particularly for large-diameter ones.

### **III.8. Preservative**

This process is intended to maintain rattan quality due to possible pest and disease attack. Ways which are usually used are as follows:

#### ***Soaking under flowing water***

The wet bundle rattan is to soak under flowing water. This process usually is made on basic processing.

#### ***Using preservative solvent***

This process is intended to fill up rattan pores with preservatives in order to remove rattan resin, eradicate pests and diseases and also generate the color of rattan cane. Chlorine is the preservative material which is usually used.

### ***Boil in preservative solvent materials***

This process is intended to increase the strength of rattan and also speed up drying process. First, put rattans into preservatives solvent and boil them until boiling point. The preservative solvent used vary, in this process coconut oil at 15°C boiling point is usually applied.

### **III.8.1. Smoking**

This process is intended to fill up rattan pores with sulfur smokes in order to kill and eradicate pests and diseases attack if rattans are to store for a long time.

This process can also generate the color and improve the quality of rattan products. The required duration of smoking is 12–24 hours.

### **III.9. Quality Controlling**

Sorting process is intended to determine classes and quality of rattan in accordance with standard required by buyers. This process includes classifying round rattans into W&S and those which are to be further processed into semi-finished products.

### **III.10. Bundling, Weighing And Packing**

After rattans having been sorted based on its diameter and quality then they are bundled and weighed into various weight units according to species, quality and the size.

## **IV. RATTAN PROCESSING INTO SEMI-FINISHED PRODUCTS**

In order to be used as a webbing material which has high aesthetical value, W&S rattan is further processed step-wise by scouring, peeling, slicing and thinning.



#### **IV.1. Poles Processing**

Poles processing is applied only to large-diameter rattans in order to make the surface of rattan soft. Raw and W&S rattans are directly scrapped off so as the rattans books get flat. The scouring processes known are hand-debarked and machine-debarked, rattan polishing machine, and rattan auto-round rod machine.

#### **IV.2. Peel, Core And Fitrit Processing**

Peel, core and fitrit (pith) processing can be carried out either by traditional or semi-mechanical processes.

##### **IV.2.1. Traditional**

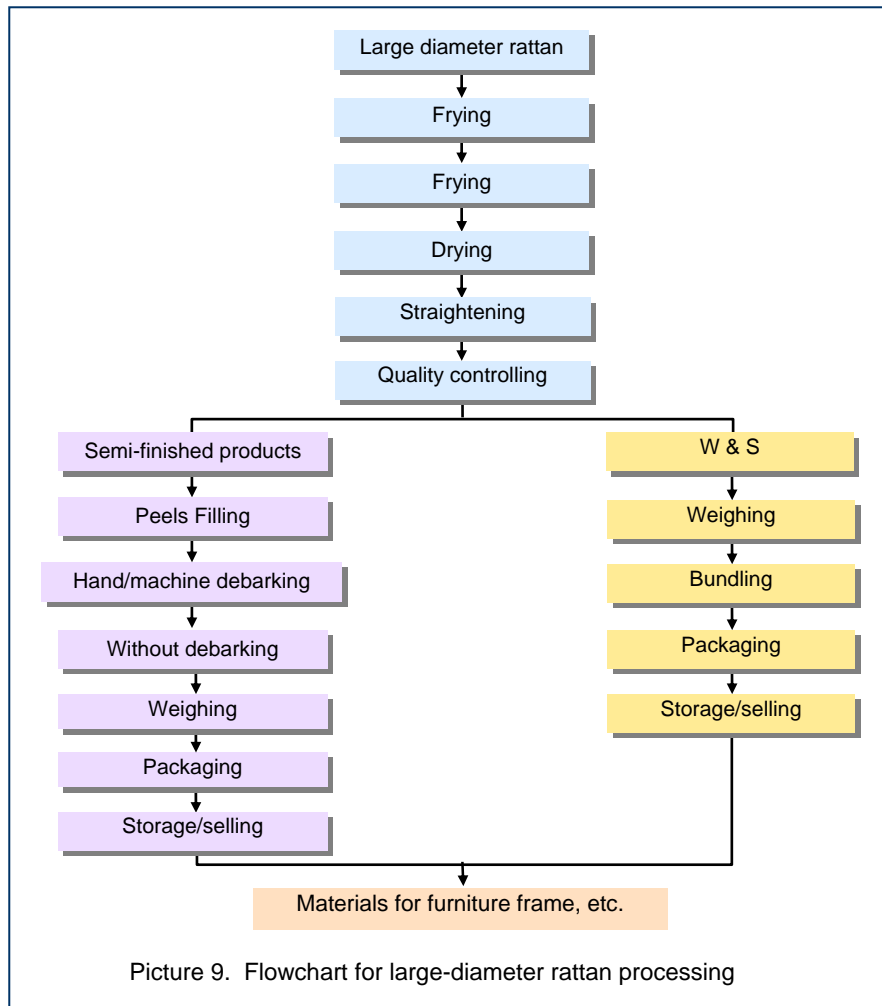
This process is done by using special knife. Rattans are sliced into several parts, depending on the required sliced. One-side slice rattans are pulled and the other sides are held between toes.

Sliced rattans are usually divided into 4/6 portion, depending on rattan cross-section size. Small core of rattans cannot be used as craft materials, while the peels can be used to make lampit (traditional carpet).

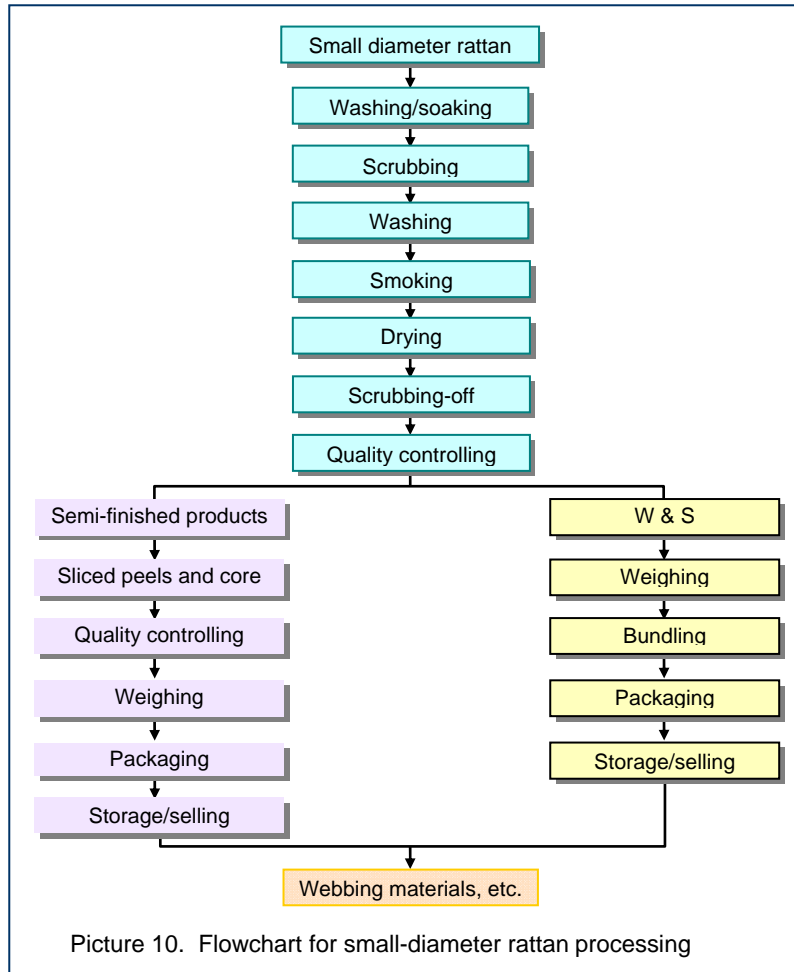
##### **IV.2.2. Semi-mechanical**

Round rattan processing for producing peels, cores and fitrit (pith) by using semi-mechanical processes is as follows:

- Having passed several processes round rattans then be sorted and put into splitting machines.
- Sliced peels of rattans are then further processed by using trimming machine.
- Cut cores of rattans are then put into a coring machine.



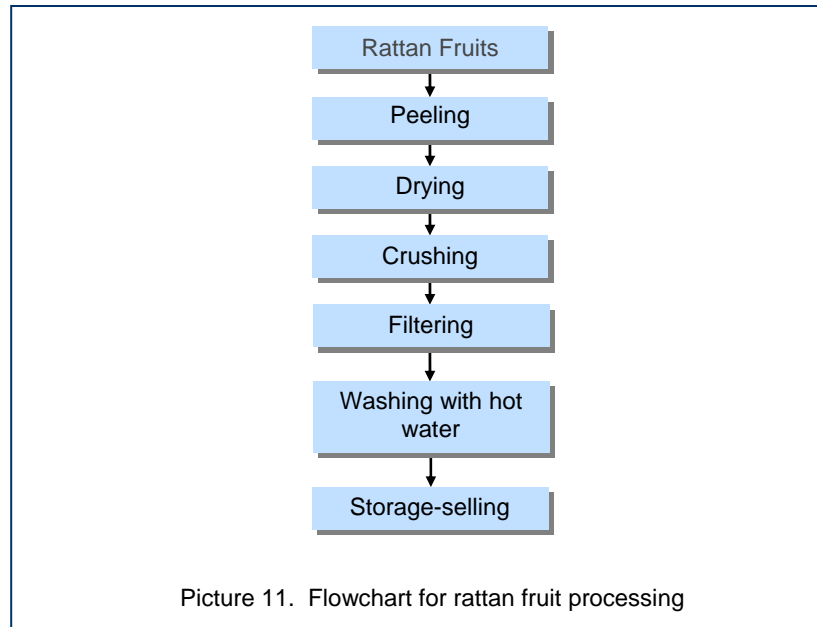
Picture 9. Flowchart for large-diameter rattan processing



Picture 10. Flowchart for small-diameter rattan processing

## V. RATTAN FRUIT PROCESSING INTO DERIVATIVE PRODUCTS

This processing is to produce a type of derivative known as “dragon blood”. Details of this process are documented in a single book *Manual of Rattan Derivative (Dragon blood)*.



## VI. RATTAN PROCESSING INTO FINISHED PRODUCTS

Rattan processing is highly depending on the required finished product and it requires creativity and skill of the operators.

A number of rattan shapes processing can be performed mechanically, such as floor mats making. A shape of finished product should fulfill the following technical factors or aspects:

- Comfort and safety aspect of human physiology
- Efficient use in raw materials
- Should reflect a beauty and aesthetics
- Raw materials used should comply and in harmony with the shape of rattan products.

To obtain the products of rattan which have competitive advantage, suitable technology is required and significant investment for equipments are inevitably needed to minimize production wastes. In addition, skilled human resources, product promotion, and marketing are also required.