

DESIGN AND DEVELOPMENT OF YOUNG COCONUT SKIN MACHINERY TO SUPPORT FRESH MARKETING OF FRESH YOUNG COCONUT IN THE STATE AND EXPORT

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Abstract. The research aims to make the design of a young coconut leather peeler machine to support the marketing of fresh young coconuts domestically and exports. This research is an appropriate technology to help people in young coconut marketing activities sold in the form of fresh or export. This prototype was made simple to be portable and reasonably priced, but the capacity was great and the quality of the results was better. The design approach for designing the machine is using methods compiled by Gerhardt Pahl and Wolfgang Beitz, so that the design approach is based on a functional design approach and structural design approaches. The design stages of this machine include designing and manufacturing of tools, laboratory tests, and field tests. The result of this research is the product of young coconut leather peeling machine to support the marketing of fresh young coconut in the country and export, which is ergonomic, affordable, and ready to be applied, has a working capacity of 80 pieces/hour, the results are more neat and symmetrical compared to manual way.

1. Introductions

Allorerung, D. et al. (2005) [1] explain that coconut is the result of an important plantation because this commodity live millions of Indonesians and become a wealth of valuable land. Coconut is a social and economic commodity, changing the price of the commodity will directly affect the level of life and community life. As a tropical country Indonesia has high potency of coconut production. The area of coconut plantation reaches 3,654,478 ha with a total production of about 3,051,585 tonnes from the area of approximately 99% cultivated by farmers of the people. Coconut commodity in addition used for domestic consumption is partially exported that will bring foreign exchange so that this commodity can be one of the sources of national economy. Sanoso U (2017) [10] explained that the total production of coconut Indonesia about 3,051,585 tons, from the area of coconut palm plantations reach 3,654,478 ha, about 99% cultivated by farmers people. Coconut commodities used for domestic consumption is partially exported that will bring foreign exchange so that this commodity can be used as one of the national economic sources.

In addition to being consumed in fresh form on young coconut, coconut is widely used for other foodstuffs. Alternative products (other than oil) from coconut with added-value high and lead in global market there are 12 kinds, five of which are [1] dry grated coconut (desiccated coconut), [2] coconut milk and canned coconut cream, [3] coconut milk powder, [4] fresh young coconut, and [5] coconut

water; These products are competitive with copra. The other six products are [1] nata de coco, [2] coconut coir, [3] fiber products, [4] fiber dust, [5] charcoal, and [6] activated carbon.

Young coconut and young coconut ice is a drink that is sweet and refreshing makes this one drink to be one of the favorite drinks among the community both inside and outside the country. Drinking young coconut ice is a powerful way to restore the freshness of the body that has been multi dehydration. Young coconut is one of the good business opportunities and promises a big advantage when it is well-managed and has a touch of technology both in the form of packaging and the selection of commodities. In some Asian countries such as Thailand have been able to export young coconut in the form of more attractive packaging. For the sales presentation of young coconut should be properly thought, because the form of presentation will influence customer tastes to drink or eat, to end the restaurant famous restaurants and separate store always make an interesting look inside Sales presentation of young coconut to be able to withdraw customer sympathy. Presentation in a more interesting form still many obstacles in the community because of the limitation of technology to peel coconut skin and molded in such a way. Young coconut peel with conventional is done with manual power using machetes. This way is less efficient because it takes a long time and the shape is less attractive, therefore through the aim of this research will be made of coconut leather peeling machine that has a larger working capacity and produce a nicer form of coconut.

Hope the results of this research can produce a prototype of a young coconut peeler machine that can be applied on the scale of society and farmers because this peeling machine is simple and affordable. In addition, it is capable of the community to develop young coconut entrepreneurs to support food security programs, as well as fresh young coconut marketing domestically and exports, which are ergonomic, affordable and ready to apply.

2. Literatur View

Barilina R (2004) [2] explained that the fruit of young coconut in addition to high economic value, flesh of the fruit has a good nutrient composition, among others contain essential fatty acids and amino acids that the body needs. While coconut water other than as a fresh drink also has a variety of minerals, vitamins and sugar as well as essential amino acids so that it can be categorized as a nutritious soft drink and can cure various diseases. However, for some consumers, consuming coconut water is considered as a drink to relieve thirst. The meat of the fruit is only complementary after drinking the water. Compared with other soft drinks, coconut water containing adequate nutrients can be categorized as a nutritious beverage high, hygienic and natural and has been widely proven to cure various diseases. In the last development of young coconut water is expected to be an isotonic drink for sportspeople.

Haris A, et al (2106) [5] has made a young coconut peeler machine only on the side, this machine has a working capacity of 136 pieces/hour, this machine also uses electric motor drive 0.25 hp. Edi P, et al (2019) [3] also do research modification of young coconut peeling machine with electric motor drive 0.5 hp, 1600 RPM, obtained working capacity 72 pieces/hour.

3. Methodology

The design approach for designing this rice planting tools is done through several stages, among others; Literature review and field, basic data collection and analysis, Design and testing. Stages of making this machine design refers to the methods compiled by Gerhardt Pahl and Wolfgang Beitz (1984) [9] which is described in the book Engineering Design, which includes problem identification, formulation and completion of ideas, selection of draft concepts, analysis and drawing of work drawings. The tests include structural and functional testing at the Laboratory. After doing the field test; adaptation test, functional, and verification. Then for the improvement made the modifications and re-testing.

4. Prototype model

The study was planned to be implemented from March to September 2019. Design activities,

manufacturing of design components, laboratory testing and feasibility conducted at the State Polytechnic Institute of Jember Metal Lab. Kalpakjian, S (1991) [6] explain that manufacturing process should be described components and how they manufacture. Khurmi RS (2002) [7] describe the design strength calculations based on the load and force occurring. The model of young coconut peeler machine is shown in figure 1.

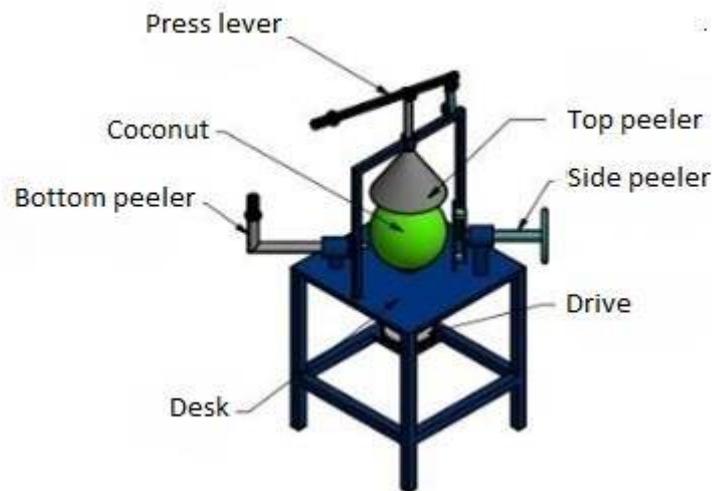


Figure 1. The model of young coconut peeler machine

Based on its function, young coconut peeler machine this has main parts, including:

- Desk, serve to put the coconut to be peeled
- Drive, function for coconut player shaft
- Press lever, function to press the upper blade
- Side peeler, serves to peel the side coconut
- Top peeler, serves to peel the top coconut shells
- Bottom peeler, serves to peel the bottom coconut skin

The working principle of this machine is that the young coconut fruit is placed on a table with a crank nail. Then turn the coconuts by turning on the electric motor, after that move the side blade forward to peel the side coconut shells. After that move down the top knife to peel the top coconut peel, finally move the bottom knife to peel the bottom coconut skin. When you finish turning off the electric motor. The machine has the excess can peel the young coconut skin not only the side but also peel and form the top and bottom. Tool making scheme can be seen in figure 2.

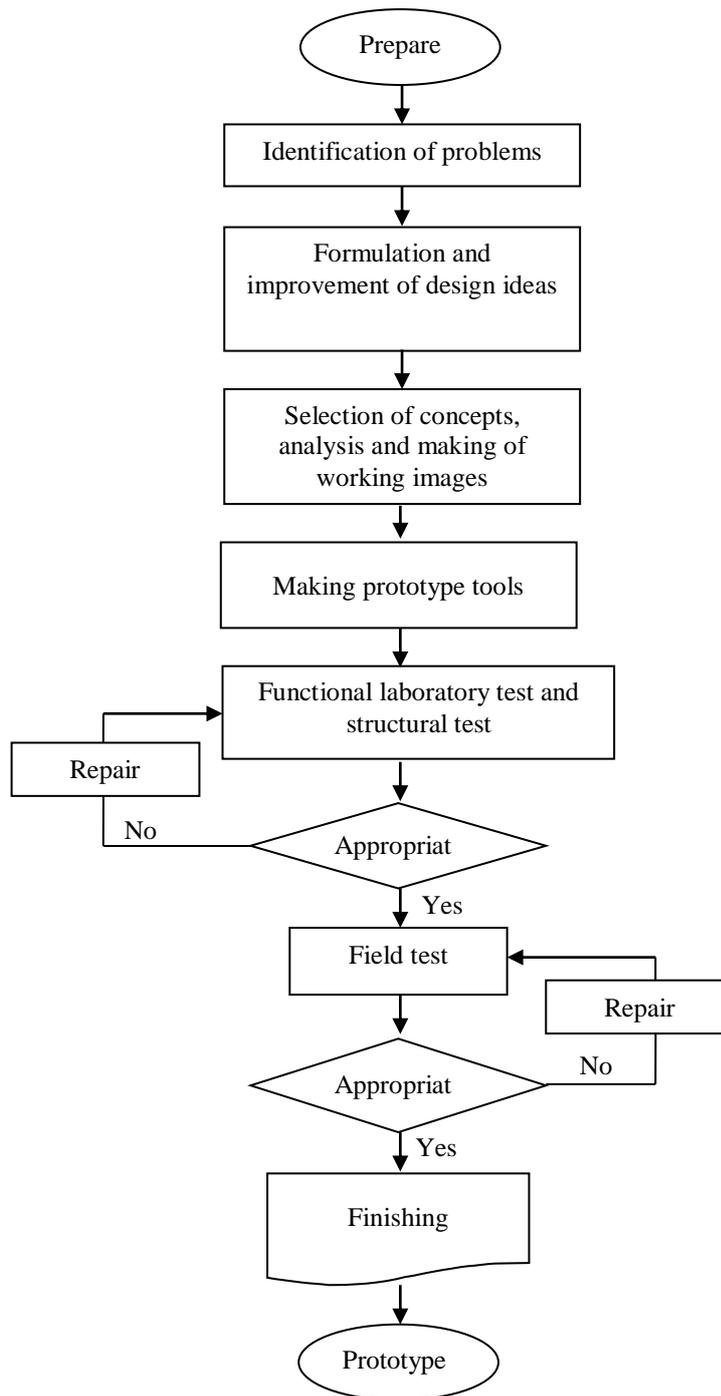


Figure 2. Machine-making schemes

5. Result and discussion

The testing was carried out in two stages, namely laboratory test and field test. Tool design testing includes structural tests and functional tests. Parameters observed included length of stripping, rpm, and stripping result.

This tool is more efficient because it has a working capacity of 80 pieces/hour compared to traditional methods with hands. Besides this tool is more ergonomic because the operation is enough to be pulled by hand, while traditional methods, need energy to move the knife and dangerous.

Old coconut peel can be calculated with the equation (1)

$$Ts = \left(\frac{Fk \times Nc \times Oc \times Z}{\Theta k \times Vc} \right) \quad (1)$$

Ts is long stripping (s), Fk is constant knife sharpness, Nc is coconut rounds constants, Oc is coconut age or hardness constants, Z is thicks stripping (cm), Θk is the knife's straightness of rotation towards the coconut, Vc is stripping knife speed (cm/s).

The prototype young coconut leather peeling machine that have been made has specifications:

- Dimensions (LxWxH): (40 x 40 x 140) cm
- Stripping: side, top, and bottom skin
- Knife material: steel
- Work capacity: 80 pieces/hour
- Power : electric motor 0.5 hp
- Weight : 20 kg

Formulation of a mathematical model according to Murphy G (1950) [8] and France (1990) [4] needed description factors that influence the performance of this tool are angle of knife, rpm, age of coconut, power, and peeler knife speed. Sritomo, Winjosoebroto (2000) [11] explain that making machine should pay attention to the comfort and security of the engine operation.

6. Conclusion

The prototype young coconut leather peeling machine that have been made has specifications; dimensions length 40cm, width 40cm, high 140cm, stripping side, top, and bottom skin, work capacity 80pieces/hour, power electric motor 0.5hp, weight 20kg.

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