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Utilization of a Coffee Peeler Machine for Coffee Farmer Groups in Gunung Tua Village Mandailing Natal

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Abstract. Topographically, the Mandailing Natal district is divided into lowland areas which are coastal areas with an elevation of 00 -20 covering an area of 160,500 Ha (24.24%). One of the drivers of economic growth in Mandailing Natal district is plantations. Plantation plants in the Mandailing Natal district can develop coffee, cinnamon, coconut, candlenut, sugar palm, and cloves. However, the level of absorption of agricultural technology is still not as expected, especially for coffee farmers in Gunung Tua village, Mandailing Natal Regency, making coffee productivity from this area less than optimal. From the survey results and discussions with coffee farmer partners in the town of Gunung Tua Mandailing Natal, it was found that there were several problems in the post-harvest process, and one of them was the peeling of the coffee bean skin. So far, most coffee farmers use a coffee peeler manually with a 20 kg/hour capacity and require quite a high operational cost. Therefore, the service implementation team and coffee farmer partners agreed to make a 100 kg/hour coffee peeler machine and an electric motor drive based on these conditions. Test data in the field shows that for a coffee peeler with a capacity of 100 kg/hour, only one liter of fuel is needed to peel 400 kg of coffee beans. This, of course, makes a significant reduction in production costs in the post-harvest process. It is hoped that this machine can work optimally to reduce the production cost of coffee peeling and increase the income of coffee farmers in the village of Gunung Tua Mandailing Natal.

Keyword: Mandailing Natal, Coffee Peeler Machine, Capacity 100 kg/hour

Abstrak. *Secara topografi Kabupaten Mandailing Natal terbagi menjadi daerah dataran rendah yang merupakan daerah pesisir dengan ketinggian 00 -20 seluas 160.500 Ha (24,24%). Salah satu penggerak pertumbuhan ekonomi di Kabupaten Mandailing Natal adalah perkebunan. Tanaman perkebunan di Kabupaten Mandailing Natal dapat mengembangkan kopi, kayu manis, kelapa, kemiri, aren, dan cengkeh. Namun tingkat penyerapan teknologi pertanian yang masih belum sesuai dengan yang diharapkan, khususnya bagi petani kopi di desa Gunung Tua Kabupaten Mandailing Natal membuat produktivitas kopi dari daerah ini kurang optimal. Dari hasil survey dan diskusi dengan mitra petani kopi di kota Gunung Tua Mandailing Natal, ditemukan beberapa permasalahan dalam proses pasca panen, salah satunya adalah pengupasan kulit biji kopi. Selama ini sebagian besar petani kopi menggunakan alat pengupas kopi secara manual dengan kapasitas 20 kg/jam dan membutuhkan biaya operasional yang cukup tinggi. Oleh karena itu, tim pelaksana pengabdian dan mitra petani kopi bersepakat untuk membuat mesin pengupas kopi dengan kapasitas 100 kg/jam dan penggerak motor listrik berdasarkan*

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kondisi tersebut. Data pengujian di lapangan menunjukkan bahwa untuk pengupas kopi berkapasitas 100 kg/jam hanya dibutuhkan satu liter bahan bakar untuk mengupas 400 kg biji kopi. Hal ini tentu saja membuat penurunan biaya produksi yang signifikan pada proses pascapanen. Diharapkan mesin ini dapat bekerja secara maksimal untuk menekan biaya produksi pengupasan kopi dan meningkatkan pendapatan petani kopi di desa Gunung Tua Mandailing Natal.

Kata Kunci: *Mandailing Natal, Mesin Pengupas Kopi, Kapasitas 100 kg/jam*

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1 Introduction

The low ability of the community to use agricultural product processing technology is a priority problem in meeting national needs. So that immediate and appropriate steps are needed to improve the expertise of qualified human resources in processing post-harvest coffee. Based on the results of theoretical calculations that the use of a coffee peeler machine can strip 120 kg/hour to 300 kg/hour if it is made at the maximum rate [1][2][3]. The lack of absorption of agricultural technology, especially coffee farmers, makes the coffee produced less than optimal in Gunung Tua village, Mandailing Natal Regency [4]. Based on discussions and interviews with partners, the main problems that hinder the development of post-harvest coffee cultivation are related to product production and marketing.

Production problems faced related to the lack of capital, especially to buy equipment for production and packaging of production products became more attractive. Some of the common issues faced by partner farmers during post-harvest are the process of peeling the coffee skin, roasting, grinding and packaging as well as product marketing [5]. However, what is discussed in this study is the activities carried out by the USU LPPM implementation team to help coffee farmer partners at the stage of stripping the coffee skin. So far, coffee farmer partners have used a coffee peeler machine that operates manually, as shown in Figure 1. If you use another device, it costs more because you have to travel to another village with an operational cost of Rp. 2,000 for each peeling. one kilogram of coffee beans. In this service activity, a coffee skin peeler machine has been designed, and maintenance training has been carried out so that the device can be used optimally. With this activity, it is expected to increase coffee production, improve the quality of the cleanliness of the harvest by the standards demanded by the market so that it has competitiveness with standard quality and competitive prices.

Figure 1. Manual coffee peeler

The contribution made by partners in service is collaborating with the service team in providing the necessary data, donations of personnel, and facilities that support the implementation of this service activity. In addition, the coffee peeler machine that is made is expected to work optimally to help coffee farmers' partners meet coffee needs and save production costs.

2 Methods

Implementing community service is carried out in several stages, including literature studies, field surveys, discussions, tool design, brief training, and feedback. In general, to realize these activities, several steps are taken, namely:

a. Accompaniment

The Gunung Tua Village farmer group was accompanied by a team of implementing lecturers, final year students, and technicians who have experience in terms of technology.

b. Method of Approaching Capital Problems

The method used is a brief training on balancing techniques between money in and money out by:

1. We are recording the number of coffee harvests in detail and detail based on the level of maturity of the coffee cherries.
2. Making procedures for financial statements to determine the level of profit
3. Develop a financial management system by analyzing financial reports to prepare production plans and necessary corrective actions.

c. Management Problem Approach Method

The method used is a production management approach by setting the following steps:

1. Training on making schedules for receiving and completing orders manually and computerized.

2. Determination of optimizing the maximum incoming orders per unit time for each coffee production.

In general, the implementation of the post-harvest process from coffee beans is shown in Figure 2 [6]. Several procedures must be carried out to sell the coffee in packaged form. The activities carried out by the implementing team are located in section four or dry skin peeling, namely making a coffee skin peeler machine to assist partners in the post-harvest process of coffee beans.

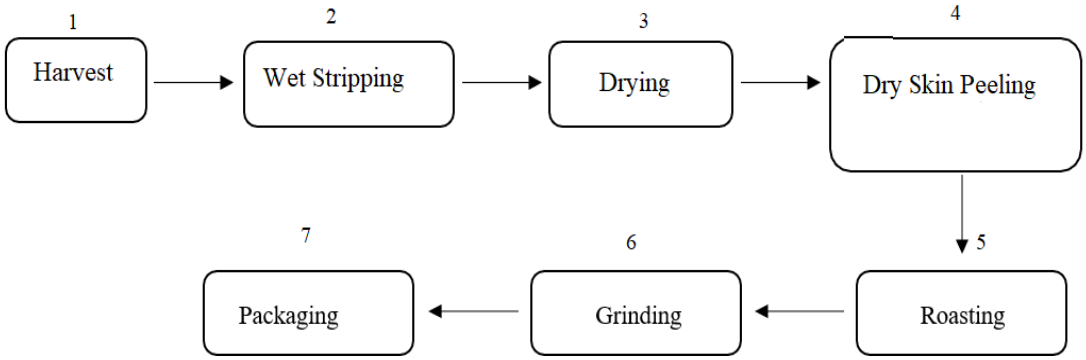

Figure 2. Post-harvest process of coffee beans to the packaging

3 Result and Discussion

Based on the agreement with the partners, the main problems that will be solved through this activity/program include two aspects, namely production and management aspects. Issues related to production aspects include 1. Partners do not have adequate equipment to support an effective and efficient production process due to capital. This problem gets priority to provide convenience to partners in the production process. 2. Partners are not yet skilled in producing quality coffee products from coffee beans, especially taste. This is due to the lack of opportunities to try and practice continuously. Therefore, this issue is prioritized to provide partners with abilities, skills, and confidence to produce quality coffee products. 3. Partners have not been able to package their products attractively. Partners do not yet know attractive product packaging techniques and can provide characteristics that can convince potential buyers. This problem is getting attention because it can affect the success of product marketing. Therefore, the solutions offered to solve the issues faced by partners must be by the priorities of the problems met. Based on the analysis of the previous situation, the solution provided is to carry out the following activities:

1. We are assisting with production equipment in the form of a coffee peeler with 100 kg/hour capacity to coffee farmers.

2. Provide brief training on the operation and maintenance of the coffee peeler machine [7].

3. Training and counseling on good marketing and packaging techniques to increase purchasing power and selling value of products after packaging.

Coffee Peeler Machine Manufacturing

The first step in making this coffee peeler machine is to determine the coffee peeling capacity of 100 kg/hour. After doing the design calculations and maximizing the coffee peeling capacity, a motor with a power of 5.5 hp was used. This machine is expected to work optimally to assist the activities of coffee farmer partners in meeting the needs of quality and competitive coffee beans in the market. Figure 3 shows a coffee peeler machine that has been designed and built.

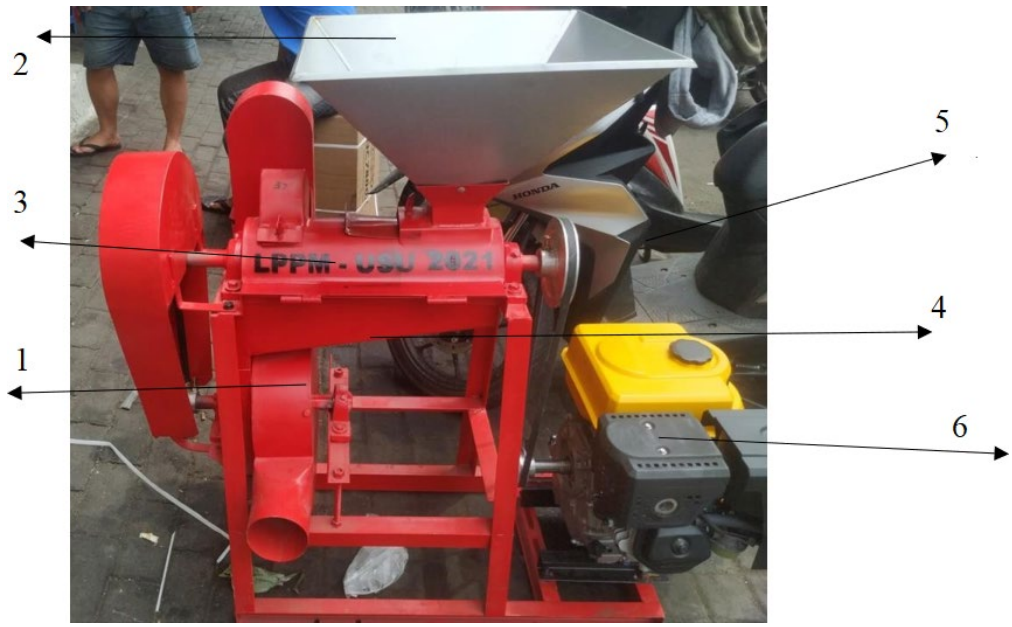

Figure 3. Built-in coffee peeler machine

The parts of a coffee peeler machine: (1) frame, (2) hopper, (3) crusher roller, (4) separation roller, (5) large pulley, and (6) motor pulley.

Please note that the working principle of this coffee peeler machine is quite simple. The device uses a transmission system in pulleys, belts, sprockets, and chains [8]. The coffee peeler machine will work when the driving motor is turned on and rotated to the pulley. The rotary motion of the driving motor is transmitted from the drive pulley to the stripper pulley, which is attached to the shaft using a belt to rotate the stripper roll. When the paring roll turns, the coffee beans are ready to be put into the hopper; then, the coffee beans are directed and parsed by the input roll to organize the incoming coffee beans. Roll input uses rotary motion transmitted from the peeler

shaft by sprockets and chains. The output of the coffee peeler machine will consist of coffee husks and coffee beans through different dispensing channels.

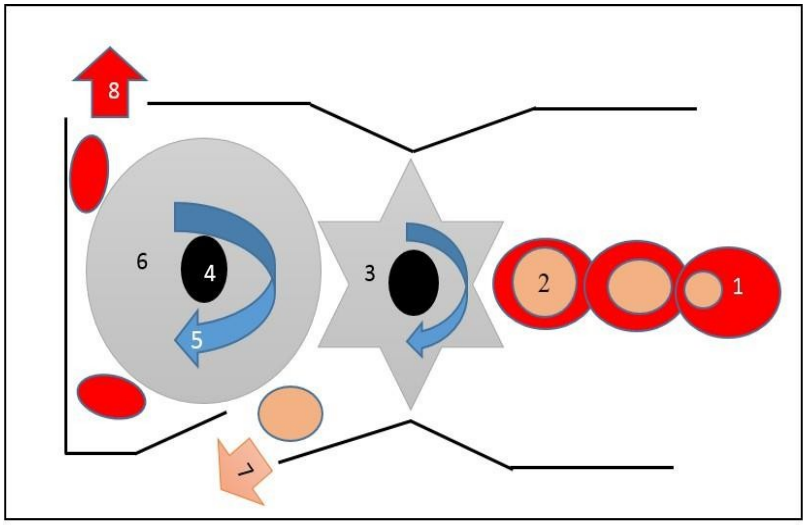

Figure 4. The working principle of coffee peeler machine [9][10]

Image captions: (1) coffee pods, (2) coffee beans, (3) grinding roller (crusher), (4) shaft, (5) roller rotation direction, (6) separating roller, (7) coffee bean output, (8) coffee husk output.

Figure 5. Delivery of a coffee peeler with a capacity of 100 kg/hour to partners

Production Cost Reduction Calculation

The data obtained from the field survey results show that the total number of coffee tree trunks from partners is around 4200 stems. Based on information from partners, 0.5 kilograms of coffee beans are obtained for one coffee tree. Therefore, the coffee farmer partners get the number of coffee beans in the range of 2100 kg for each harvest. Please note that for one harvest, it takes two weeks. Generally, for each harvest, the processing of coffee skin takes three working days. So far, most of the partners use coffee peeling services at the cost of Rp. 2000 per kilogram of coffee beans. So, to strip the skin of coffee beans as much as 2100 kg requires a cost of Rp. 4,200,000. From the test data in the field, it was found that using a coffee skin peeler with a capacity of 100 kg/hour only required one liter of gasoline to peel 400 kg of coffee beans. So for stripping 2100 kg of coffee beans using a 100 kg/hour capacity machine that uses gasoline as fuel at Rp. 6450 per liter, it only costs around Rp. 34000. This, of course, greatly reduces production costs significantly. It is hoped that the coffee peeler machine that is made can work optimally with regular maintenance. The reduction in coffee peeling production costs will increase the income of coffee farmers' partners in the village of Gunung Tua Mandailing Natal.

4 Conclusion

Community service activities have been carried out in the village of Gunung Tua Mandailing Natal by the LPPM team from the Universitas Sumatera Utara. The service activity carried out was to provide one unit of coffee peeler machine to increase post-harvest yields and reduce production costs. Based on the implementation results in the field, using a coffee bean peeler machine with a capacity of 100 kg/hour, a significant reduction in production costs was obtained, especially for peeling the skin of coffee beans. With a brief training on machine maintenance, it

is hoped that the machine-made can work optimally. The reduction in coffee peeling production costs will increase partners' income in the village of Gunung Tua Mandailing Natal.

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