Rice Thresher Machines in Handling System Alley Blow Rice in Post-Harvest

Junil Adri\textsuperscript{1(*)}, Bulkia Rahim\textsuperscript{1}, Refdina\textsuperscript{1}, Nelvi Erizon\textsuperscript{1}

\textsuperscript{1}Universitas Negeri Padang, Indonesia
*corresponding author: juniladri@ft.unp.ac.id

Abstract. The problem faced by Indonesia in 2017-2018 is the lack of food production which resulted in Indonesia having to import rice from neighboring countries. The low food productivity, especially rice, is due to the large number of shifts from paddy fields to oil palm and others. To boost interest and productivity in the field of rice farming, it is necessary to have innovation and special attention from all parties towards rice farming. In this service activity, the service team innovated the rice thresher machine. This innovation is in the form of adding aisles on the threshing machine. The function of this blowing tunnel is to streamline the threshing process that is able to effectively separate filled and empty rice. The method used in this service is survey and demonstration. The survey method is used to see farmers’ problems in real terms. While the demonstration method is used to introduce technology and innovation to farmers in the process of threshing rice. Problems faced by farmers in the threshing process are a burden both in terms of cost and labor. To overcome this problem, the dedication team made a thresher machine that would be used by the target population in the Sungai Duo area of Sitiung District, Dharmasraya Regency. This activity was enthusiastically welcomed by farmers, especially farmer groups in the Sungai Duo area. Innovation in the threshing process is new and badly needed. With this activity it is hoped that the community will be helped in the process of threshing rice. The rice thresher machine with the blown aisle system is handed over to the kenagarian equipment which will then be managed for community use.

1. Introduction
Rice is a staple food for most of Indonesia’s population. Citing Susenas data which shows that 98% of Indonesia’s population consumes rice as its main foodstuff. Meanwhile the government policy on rice has a very big influence on economic and political stability in Indonesia. Rice is one of the most important elements that determine the rate of inflation, in turn, the level of normal economic stability. Therefore, the Indonesian government is trying to ensure that national rice supplies are always adequate and prices are controlled. In order to achieve this goal the government established various rice policies in various fields such as price policy. Procurement of production facilities and infrastructure, investment in research and counseling in the agricultural sector and institutional engineering.

The role of the resilient agricultural sector as expected in the development process includes at least four aspects: First, its ability to provide food for the people. Second, provide employment opportunities for the community. Third, save and collect foreign exchange and the fourth, as a basis that provides support for other sectors [1]. According to the neoclassical economic theory of consumer behavior, each individual consumer is faced with a market price determined from various commodities, with consumers who only have a known and steady cash income [2].
Problems in 2018 Indonesia lacks the availability of food stocks. The solution provided by the government is to import rice from neighboring countries. Jokowi-JK administration's nawacita has not been realized in the agricultural sector. Decreasing food availability is a measure of this. This crisis is caused by many factors, including the non-comparable rate of population growth compared to the availability of agricultural land, the existence of the exchange of land functions and changes in the form of food agriculture into plantation agriculture, and others. One area that still has a lot of rice farming is the Dharmasraya district.

Dharmasraya is a district located on the border of West Sumatra province which is 240 KM from the center of the provincial capital. Dharmasraya Regency is an agricultural agronomy area. Flat and fertile pliers make this region has great potential in the development of agriculture. At present there are three developing agricultural sectors in the Dharmasraya district, including oil palm, rubber and rice. For rice farming, water needs have been met by irrigation, because almost all of the Dharmasraya area has been irrigated. So that every year the community can do rice planting three times a year.

From the field survey, problems or problems that exist in farmers today are post-harvest problems. Information from Ranah Talang farmer group and Sinar Harapan farmer group, farmers lacking tools for grain thresher. Besides that, the rental price of the grain thresher thresher tends to be expensive. This sometimes becomes anxious for farmers in the harvest process. There are already several individual thresher machines, but that number is not enough to meet the needs of farmers, especially Ranah Talang farmer groups and Sinar Harapan farmer groups.

Grain thresher machine which has an individual used type of Dragon that is still less effective, there is still a lot of wasted grain. The energy needed is also quite a lot in collecting grain that has been broken down. So that the complications of this problem in addition to the number of machines are not sufficient, the existing machines are also less effective and efficient in helping the farmers' harvesting process.

The solution that might be offered through community service is the creation of a threshing machine that is added to an operating tunnel system that is effectively construction and operationally efficient for farmers. The design will be simpler, lighter so it's easy to move around. It is hoped that through this dedication, the farming community in Dharmasraya Regency, especially farmers within the scope of the Ranah Talang farmer group and the Sinar Harapan Farmer Group, can more easily handle rice during post-harvest.

1.1. Post-harvest Rice

Post-harvest is a series of activities including harvesting, threshing, drying, transporting, grinding, storing and marketing. Good post-harvest handling can reduce significant yield losses. The aim of post-harvest handling is to reduce yield losses, improve rice quality, expand employment opportunities, and increase added value. The main problem in post-harvest activities is to reduce yield losses, this is due to the lack of awareness of farmers to conduct good post-harvest activities. These activities include threshing, drying, transporting crops, storing, milling, packaging, and selling or marketing [3].

Figure 1. Post-harvest
1.2. Post-harvest handling of rice

Besides during seed quality and cultivation, post-harvest handling also has a big influence in determining the quality of rice. Post-harvest handling aims to reduce yield losses, improve quality, improve shelf life and use of agricultural commodities, increase added value and expand employment opportunities. The stages of the post-harvest handling process by the farmers began with the determination of the age of harvest until packaging for sale. Following are the steps that must be carried out by farmers in post-harvest rice before the rice is ready to be stored or ground to be made rice.

1.2.1. Rice accumulation and collection

This is the initial stage of postharvest activities. If the accumulation and collection is not done correctly will have an impact on high yield losses. In order not to cause high yield losses, rice accumulation and collection is recommended to use a mat. In this way, yield losses can be reduced to 0.94-2.36%.

![Figure 2. Rice Collection and Stacking Process](image)

1.2.2. Threshing of rice

This threshing can be done with motorized thresher or with human labor. When using a machine, threshing is done by touching the rice panicle to a rotating gear serration. While threshing with human labor is done by beating rice stalks, rice panicles can be trampled so that the grain falls out. To anticipate that the grain is not wasted during threshing, the threshing place must be given a base from woven bamboo or thick plastic sheets (tarpaulin).

![Figure 3. Manual threshing process](image)

1.3. Technology in threshing rice

Technological advances in threshing rice are recommended using thresher pedals and power thresher. The threshing of the rice pedal model requires only one person per tool by relying on human power as a driving machine. Power thresher technology uses a more sophisticated tool when compared to the way the pedal thresher, so that the capacity is greater that is equal to 500-1200 kg / hour so that work is quickly completed. The yield loss is also very low, the grain produced is clean and of high quality. Lack of this method, the tools used are heavy and the price is very expensive so that it is often not affordable by farmers.
Power thresher is a technology in agriculture that is useful for removing rice that has been harvested before [4]. Many farmers use power thresher technology because by using this technology, farmers can save labor costs, better grain yields, lower costs, accelerate postharvest processes and can reduce yield loss in threshing. At the threshing stage, yield loss can reach 5% [4]. Loss of results that occur during threshing by using a "gebot" tool, pedal thresher, and power thresher are equivalent to 266.24 kg / ha, 258.95 kg / ha, and 59.75 kg / ha [5].

2. Method
The application of science and technology is carried out by providing demonstration and direct application in the field on how to carry out the threshing process with threshing of the blow tunnel system, farmers will also be given an explanation of the safety standards that farmers must know in operating the blowing machine threshing system. The threshing system blowing machine material that is offered in the service activities is chosen lightweight material. This material selection is intended for lighter engine weight so it is easy to move around. The driving motor used is a 9 HP gasoline motor. The mechanism of separating filled rice and empty rice is designed using aisles and is blown with a fan mounted on the drive motor.

The method of applying science and technology used in this activity is to analyze problems and design a rice thresher machine. This method is adapted to the schematic problem-solving framework. Problems arise due to various factors, the target audience is the farmer group. In accordance with the objectives to be achieved in this activity is to produce farmers who are skilled and responsive to appropriate technology and at the same time have motivation, the method applied is to provide direct training to farmers to operate the threshing system threshold threshing machinery.

3. Result
3.1 Making process

3.1.1 Design Thresher Blasting aisle system
The manufacturing process was carried out at the Fabrication workshop of the Department of Mechanical Engineering, Faculty of Engineering, Universitas Negeri Padang. The implementation of the activity begins with drawing a machine design. This design aims to make machines that are more effective compared to machines on the market. In the design, the dedication team added a blowing tunnel that made this machine capable of separating filled and empty rice that passed through the alley.

Figure 4. Frame Design

Figure 5. Threshing Wheel Design
3.1.2 Making the Frame

After the design drawing is complete, the manufacturing process is carried out. The process of making the frame begins with the marking process on the iron to be used. In order to manufacture threshing machine hall blowing system is used brackets 40 x 40 mm. The frame on this machine is made of 900 x 600 mm size. in the framework the drilling process will also be used for the bearing mount. The following form of the framework is made.

![Frame Making Process](image)

3.1.3 Process of Making Thresher Wheels

Thresher wheels are made with a diameter of 20 cm and a length of 90 cm. Threshing wheel base is made with 4 mm rounded iron plate. For score buffer and thresher bolt holder is made with a 1-inch iron strip. The bolts used are M 10 bolts with a total of 90 pieces. The thresher wheel is also equipped with a straw throw fan. Here is the shape of the thresher wheel made.

![Threshing Wheel](image)
3.1.4 **Manufacturing Process of Thresher Upper Components**

Components of the top of the threshing system alley blow in the form of the engine cover made of steel plate 1 mm. This machine cover is made with a semicircle shape. On the inside is made a groove fins to direct the straw that has been threshed at the exhaust fan. On the edges of the upper components reinforced by the installation of 20 mm iron strip. To connect this upper lid with the body thereiser used bullet hinges and equipped with a locking lever so that it is practical to open and close. Here is the shape of the top of the thereiser made.

![Figure 9. Upper Threshold Components Thumping system passageway](image)

3.1.5 **Blowing Hallway Manufacture**

This passageway is a hallway where rice grains fall. On the drive motor, in addition to being placed in the pulley, a blowing fan is also placed. Which is where the fan will blow the wind into the passageway and will make the falling rice into the hallway blow. Strong wind gusts are a separating factor between filled and empty rice. Empty rice will be blown farther than filled rice. This tunnel is welded directly to the frame of the thereiser. The following is the shape of the aisle.

![Figure 10. Blowout Hallway on Thresher Engine](image)

3.1.6 **Finishing Process**

This finishing process is the grinding process of all components and the painting process. The colors used are orange and black. Here is a photo of the physics process.
3.1.7 Assembly Process
The assembly process is the process of combining all the components and installation of the engine in the threshold body of the blow tunnel system. Next is a photo of the assembly process of the threshing system threshold blowing machine.

4. Discussion
Based on the predetermined method, the implementation of this community service activity starts from the manufacture of innovation tools, handover and demonstration of the rice thresher threshing system. Handover of threshing system blowing machine with nagari devices with farmer groups as the target audience in the Sungai Duo district of Situng District, Dharmasraya District. In this activity the community is very enthusiastic and happy to get help of agricultural equipment that can ease their work. Here is a symbolic handover process to the village government and farmer groups in Kenagarian River Duo.

After the handover is complete, it is continued with the demonstration of the operation of the tool with several people who will operate the machine. This demonstration will explain the SOP and the risks.
that can occur using this machine. The following is an illustration of the implementation of the demonstration.

**Figure 15.** Demonstration process thresher machine Operating System blown Aisle

5. Conclusions
The conclusion is 1) The hallway system threshing engine uses a 9 HP drive motor to achieve maximum performance, 2) Threshing machine system equipped with a hallway hallway blow blower to separate rice and rice contain empty, dan 3) The threshing system of the passageway system helps peters farmers in handling rice in the post-harvest process. The effectiveness of the threshing system through the passageway can be seen from the threshing threshing that is able to separate the empty rice and filled rice properly.

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Acknowledgments
The author would like to thank all those who have been involved in community service activities, especially to the LP2M of Universitas Negeri Padang and the Sungai Duo religious leaders who have facilitated the implementation of this activity.