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Research article

Using a 30-cm Mortar Molding Machine to Increase the Productivity of Pottery Craftmen in Mayong Lor Village, Jepara, Central Java

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Abstract.
As part of the community service program between Muria Kudus University and pottery craftsmen in Mayong Lor Village, Jepara, Central Java, a 30-cm mortar molding machine was provided to the craftsmen with an aim to increase the production of 30-cm diameter mortar – a leading local product in Mayong Village area – as well as a means of educating craftsmen on their product development. This article discusses the 30-cm diameter mortar production process before and after the use of the molding machine and describes the prototype of the 30-cm molding machine. The authors conclude that the 30-cm diameter mortar molding machine can help craftsmen to ease the mortar production. The production of mortar per day increases after using the molding machine.

Keywords: mortar molding machine, pottery craftsmen, productivity

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1. Introduction

Making pottery in Indonesia is a tradition that passes from generation to generation since thousands of years ago [1]. Even in the past, most craftsmen in the pottery center made pottery as a part time job, in which the products then used as kitchen tools, eating and drinking utensils, home decorations and others. This is also happened in Mayong Village. Geographically, Mayong Village is located in Mayong District, Jepara Regency, Central Java. Its area is bordered by 9 (nine) villages in Mayong District and Nalumsari District (including Paren, Pringtulis, Kuanyar, and Blimbingrejo Village). The geographical location of Mayong Lor Village is in fact closer to Kudus Regency than to downtown Jepara, it is still 23 km away to the west [2].

Mayong Lor Village has fertile reddish yellow soil conditions with the texture of clay and with an inclination of 0 to 2˚. This soil is then used by the residents as a source of raw materials for making pottery. Most of the population make their living from the

industrial sector related to handicrafts such as pottery, tiles, bricks, jugs, piggy banks, accessories, traditional toys, and so on.

The particular leading product in Mayong Lor Village is a mortar of 30 cm in diameter. So far, the production of 30 cm diameter mortar is made traditionally. It is molded with bar not with machine. This results in a less-productive process. The production in one day is also limited because it depends on human labor. If this condition continues, the market needs may not be fulfilled.

Figure 1: The Making of 30 cm Diameter Mortar Using Bare Hand.

In fact, Mayong Lor Village has skilled human resources and they are willing to develop. The clay made for making mortar is also quite good in quality. If this potential is not maintained and nurtured appropriately and sustainably, it will inflict a financial loss.

Gunawarman [3] in his writing explained that generally molding techniques are used in the general industry and the aluminum craft industry. This is similar to the opinion of Zulnazri and Dewi [4] regarding the use of fiber and polypropylene recycling. On the other hand, Suartini and Presentman [5] explained about the molding technique on Banyuning pottery which uses wooden molding materials with positive print references and negative print references.

From the observations and interviews with pottery craftsmen, it is found that in the past, craftsmen taught pottery making techniques to their children in which parents would usually accompany and train directly and intensely through the process. However, along with the science and technology development as well as the very rapid globalization, many of the successors are unwilling to keep themselves on their business.

They prefer to work in factories around Mayong Lor Village. This is contrast to pottery products which are still highly demanded by consumers. Thus, based on the needs analysis, the pottery craftsmen in Mayong -especially for the 30 cm diameter mortar makers-, require the utilization of appropriate technology such as molding machines which enable them to easily produce unlimited mortar copies in short time. With this machine, it is hoped that craftsmen will also be able to increase both the quality and quantity in the production.

The research problems in this article were formulated into: (1) How is the prototype design of the 30 cm diameter mortar molding machine? (2) What is the solid frame structure for a 30 cm diameter mortar molding machine? and (3) Is there any significant increase in the production of 30 cm diameter mortar in one day, before and after using the machine? Thus, the objectives of this study were to (1) determine the prototype design of a 30 cm diameter mortar molding machine; (2) knowing a solid frame structure for a 30 cm diameter mortar molding machine; (3) find out whether there is an increase in the production of 30 cm diameter mortar in one day after using the machine.

The results of this study are expected to be a pilot project for the development of the pottery business, especially in Mayong Lor Village. The contribution of this research are as follows

1. Cultural Aspect

   Able to preserve cultural heritage from generation to generation in making pottery in Mayong Lor Village

2. Social Aspect

   To increase community appreciation of their traditional culture and local wisdom as well as to increase partnerships between universities and local government.

3. Economic Aspect

   To increase the 30 cm diameter mortar production quantity.

4. Human Resources Aspect

As a means of educating craftsmen on the development of the production process for 30 cm diameter mortar

2. Methods

A machine construction design must have an effective and efficient system so that it can result in maximum quality production. The machine design approach is focused on

needs analysis so that the craftsmen can easily operate the molding machine to produce the 30 cm diameter mortar. The molding machine was made in order to replace the human labor in producing pottery. The existence of this machine is also expected to be able to improve the quality of the mortar product itself. Thus, it is necessary to have target-oriented planning in the design method. The use of this method is expected to be useful in the pottery business in Mayong Lor Village, Jepara, Central Java, Indonesia. Target-oriented planning aims to seek for proper steps for the production, as well as to effectively improve product's quality and time-efficient. This is because the machine was made to be sustainably used to produce the 30 cm diameter mortar. Below is the flow chart of the action plan.

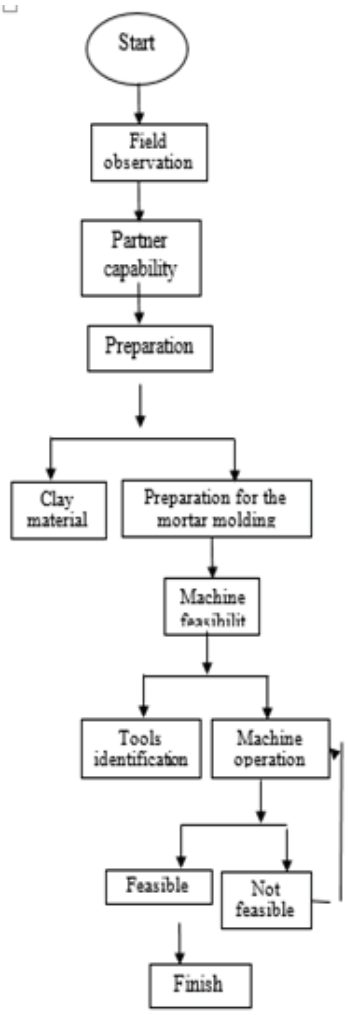

Figure 2: The flow chart of the action plan Results.

The implementation process starts from observation and field review. From these activities, it was found that the simple and manual hand-made manufacture leads to the sub-optimal production because it takes longer time. Therefore, an appropriate

technology tool is needed in the form of molding machines to increase the production so it can be more efficient both in quality and quantity.

The results of the making process of a pottery molding machine with a diameter of 30 cm are as follows.

1. Determine the prototype design for the 30 cm diameter mortar molding machine.

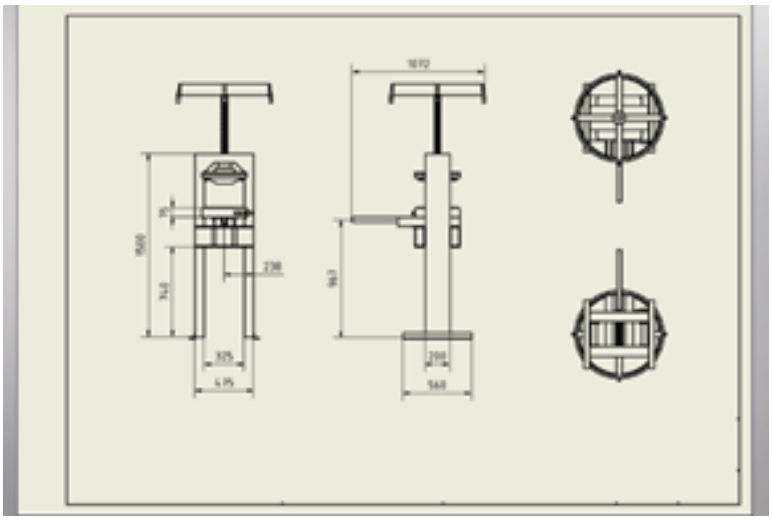

Figure 3: 2D Prototype Picture of A Mortar Molding Machine with A Diameter of 30 cm.

The following is a 2D prototype picture of a mortar molding machine with a diameter of 30 cm with a 1: 20 scale and in millimetre.

Below is the 3D prototype picture of a mortar molding machine with a diameter of 30 cm with a 1: 15 scale and in millimetre

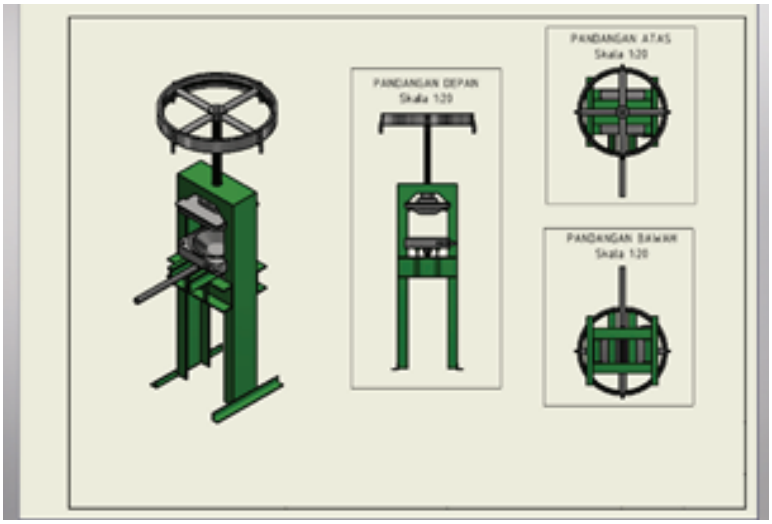

Figure 4: 3D Prototype Picture of A Mortar Molding Machine with A Diameter of 30 cm.

2. Determine the specification of 30 cm mortar molding machine

The specification of 30 cm mortar molding machine are as follows:

Model : mortar molding machine with a diameter of 30 cm

Type : manual

Weight : 1000 kg

Frame : mild steel

3. The Production of Mortar Molding Machine with a Diameter of 30 cm

The mortar molding machine with a diameter of 30 cm is a machine used to make mortar with a diameter of 30 cm. This machine does not need electricity because it uses manpower. The operation of this machine is very easy, and its maintenance is not so difficult. The documentation for the manufacture of the machine is as follows

Figure 5: The Documentation of The Mortar Molding Machine.

4. The testing on a 30 cm diameter mortar molding machine

The following is a picture of a 30 cm diameter mortar molding machine

The operation for the mortar molding machine is very easy, here are the steps:

Figure 6: A 30 cm Diameter Mortar Molding Machine.

1. Prepare a 30 cm diameter mortar mold. Then install it into the machine.
2. After that, place the clay into the mold.
3. Turn the wheel lever on top of the machine so that the mold pressing component goes down until it presses the clay into the mold.
4. After the raw material has been printed, turn the wheel lever up so that the mold pressing component moves up.
5. Then pull the mold lever away from the machine
6. Rotate the mold down so that the printed result comes out of the mold.
7. If you have finished using the machine, clean it and give lubricant on the drive so that the engine quality is maintained.

The following is the documentation of machine testing.

The following diagram shows the significant difference before and after using the machine. It can be seen that after using the machine, the productivity per day is increasing significantly

Figure 7: The Documentation for Machine Testing.

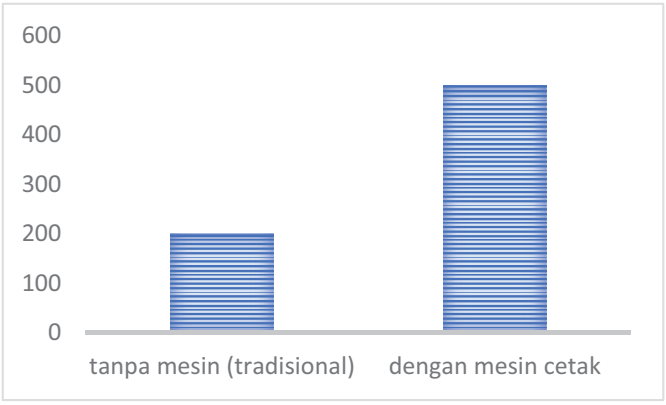

Figure 8: The Increasing Productivity of Mortar Per Day.

Based on the picture above, the percentage of the productivity increase per day is:

$$Productivity = \frac{500}{200}\ x\ 100\% = 250\%$$

Thus, the percentage of the productivity increase per day after using a mortar molding machine is 250%. This productivity is only considered in terms of production time, meanwhile the operator factor and production costs have not been studied.

The advantages of the 30 cm diameter mortar molding machine are as follows.

1. Easy to operate
2. Energy saving
3. Easy and cheap maintenance
4. Small damage rate

Meanwhile, the disadvantages of the 30 cm diameter mortar molding machine are as follows:

1. Still uses manpower to operate the machine.
2. The machine is heavy enough to be moved around

3. Conclusion

Based on the results that have been achieved from the entire manufacturing process and testing of the machine, it can be concluded that the 30 cm diameter mortar molding machine can ease the craftsmen to produce mortar. The production of mortar per day is increasing after using the machine. The use of appropriate technology for the mortar production process can be used for further and more in-depth research for the researchers and also as educational material for the community.

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