Utilization of Machines to Produce Craft Raw Materials from Doyo Leaf Fiber

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Abstract. The limitation of raw materials for doyo leaf fiber crafts is that the fiber produced is still stiff so it is mostly used for crafts in the form of decoration only. Researchers made a machine to produce doyo leaf fiber with a finer texture to help local craftsmen improve the quality of their products. This research aims to test the use of machines by local craftsmen to produce raw materials from doyo leaf fiber. This research uses a comparative description method between the process of producing raw materials from doyo leaf fiber using a machine and manually. This research found empirical evidence that doyo leaf fiber processed by machine produces products with softer quality than when processed manually. The strength of the fibers produced by the machine is the same as if processed manually. The results of this study are useful for improving the quality and diversity of products produced by local craftsmen using doyo fiber as raw material. While doyo leaf fiber has been mostly used to make decorations, processing it using a machine produces fine fiber so it can be used for fashion products.

1 Introduction

The use of technology helps improve and accelerate the growth of a country, industry and society in various aspects. Not only large industries use machines to speed up and improve the quality and quantity of their products, small industries or businesses can also be affected by producing better products in terms of quality and quantity. The development of machines that help the production process in an industry is very massive and has been proven to be able to increase the quality and quantity of products produced [1].

The use of machines to assist production in large-scale industry is certainly different from that used by micro, small and medium enterprises. Large companies/industry use sophisticated machines while micro, small and medium businesses use much simpler machines and the price to obtain the machines is also not too expensive. This is due to limited capital available and human resources who can operate and maintain the machine.

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Common problems often encountered by micro, small and medium enterprises include capital, marketing and the use of the latest technology [2-4] which need to be provided with solutions in order to encourage the development of micro, small and medium enterprises. Maintaining the existence of micro, small and medium enterprises is important because this sector contributes to the local and national economy [5].

The relationship between government, micro, small and medium enterprises, as well as other stakeholders such as investors, suppliers or private parties, allows the emergence of strategic resources that support business sustainability [6].

The micro-scale craft industry is a form of industrial sector that is generally still limited in terms of capital and the ability to adopt the latest technology in order to produce products. Meanwhile, we know that the craft industry can promote local wisdom, distinctive local culture, which has the potential to enter the world market if managed well. One of the crafts that highlights local culture is the typical craft of the East Kalimantan Dayak tribe, namely the doyo weaving craft. The raw material for this craft is obtained from the doyo plant (Curliglia Latifolia) which is a type of strong fibrous pandan that grows wild in the interior of Kalimantan. Doyo weaving has been designated as a National Intangible Cultural Heritage by the Ministry of Education and Culture in 2013. The process of making doyo weaving starts from taking fresh doyo leaves, then washing them and removing the fibers by rinsing them while combing them in the river, or called dilorot, then dried in the sun until dry. Once dry, the process of curing/softening and spinning into yarn continues [7].

This softening and spinning process takes the longest of all the processes, to make one ball of yarn it takes 2 days. After it becomes thread, the thread is dyed so that it can produce patterned woven cloth through the process of weaving it into cloth using a weaving tool. To make one woven cloth measuring 60 cm x 200 cm, a minimum of three rolls of woven thread are needed. For this reason, the process of providing raw materials for crafts can be made shorter in order to better meet raw material needs.

The machines currently available are spinning machines and fabric weaving machines, while there is no doyo leaf fiber softening machines yet. The available spinning and weaving machines are still not suitable for the characteristics of doyo leaf fiber. Therefore, it is necessary to design and make a special softening machine and spinning machine for doyo leaf fiber which also has safety and comfort when used [8-10]. In this section, the author will focus on the results of softening doyo leaf fiber using a doyo leaf fiber softening machine. It is hoped that the results processed by this machine will also highlight the local cultural wisdom typical of the East Kalimantan Dayak tribe so that they can compete on the national and international stage. Contribution to the industrial world helps doyo weaving craftsmen in the process of spinning doyo leaf fiber which will be spun into woven thread, so that the time needed to make doyo weaving crafts will be more effective.

2 Method

This research uses comparative descriptive analysis to compare the results of doyo leaf fiber manually and those produced by machine. The comparison includes the length of the processing process and also the strength of the fibers produced. Interviews with
craftsmen were carried out for the process of collecting and testing data in the form of raw materials for doyo weaving crafts in the form of doyo leaf fiber. The craftsmen selected are experts in their fields and have many years of experience.

The machines used by craftsmen are the result of product development through a design process. One of the product design methods used is the design method developed by Vinod Goel [11]. This method consists of three main stages, namely initial design, design development, and final design and prototype. The initial draft or design includes problem formulation, objectives, data collection and literature data analysis. Design development is the beginning of the process of creating machine product designs according to needs. The final design and prototype are the final results of machine development activities which can become product prototypes.

3 Result and discussion

The process of producing raw materials for doyo weaving crafts is manually carried out starting from taking fresh doyo leaves, washing the leaves, taking the fiber, rinsing them while combing them in river water (dilorot), then drying them in the sun until dry. The entire softening to spinning process takes 2 days.

Doyo leaf fiber softener machine product into yarn this weaving is intended to solve problems to reduce weaving production process time in softening production line doyo leaf fiber becomes ready-to-use woven thread. Apart from that, there is This machine is also an innovation and technology transfer for help the work of existing doyo weaving craftsmen to become more efficient by switching from manual work processes to production processes by using a machine.

Because the preparation process takes a long time, a machine to soften the doyo fiber so that it is ready to become raw material for crafts was created to make the process more efficient (Fig. 1).

Fig. 1 Perspective View of Machine
a. ¼ HP motor  
b. 2.5-inch pulley  
c. 12V 100Ah battery  
d. Sprockets 36T, 15T, 40T  
e. Gearbox Reducer: WPA 1:10  
f. 2000-watt inverter  

Material specifications are as follows:  
a. Softening Roll = Rubber (Softening Roll uses rubber material to soften the results get maximum results and no slippage occurs during the softening process)  
b. Frame = Angle Iron 33 x 33 x 3 mm, 40 x 40 x 4 mm  
c. Delivery Roller = Iron Strip & Wire Mesh (Wire mesh material is used as introduction fiber which is also useful as a separator of doyo leaf fiber and dirt resulting from softening)  

The working principle of the doyo leaf fiber softening process is almost similar to simple patent No. S00202108003 which relates to a machine used to form square iron pipes to produce a curved shape, and patent number P00201506117 is a basic dyeing machine for batik cloth for coloring cloth in which there are two parts of the roll rotating simultaneously, located at the top and the other at the bottom in a container coloring. The difference is that this doyo leaf fiber softener requires two rolls that are parallel and have a certain density to function to press and soften the dry doyo leaf fiber. Apart from that, this Doyo leaf fiber softener has a manual and automatic system that is integrated in one tool to make it easier and save energy when used. The design of the machine is quite simple so that it can be used easily by craftsmen. Apart from that, machine maintenance is also easy and does not require expensive costs. This is an important thing to consider so that operational costs and machine maintenance do not burden doyo weaving craftsmen. Apart from that, an evaluation was carried out on the results of weaving raw materials obtained if done manually using a machine.  

<table>
<thead>
<tr>
<th>Process</th>
<th>Quantity (gram)</th>
<th>Time (hour)</th>
<th>Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manually</td>
<td>300</td>
<td>16</td>
<td>Good but not soft enough</td>
</tr>
<tr>
<td>Automatic</td>
<td>550</td>
<td>16</td>
<td>Good and soft</td>
</tr>
</tbody>
</table>

Based on the results of a comparison of raw materials for doyo weaving crafts from the manual process and machine output results (Table 1), it shows that the time to produce ready-to-use doyo leaf fiber is shorter using a doyo leaf fiber softening machine than if done manually. The quality of the products produced using machines is much softer compared to the results of manual processes. Apart from that, the strength of doyo leaf fiber produced using manual processes and using machines is the same. This is based on the results of testing raw materials by doyo weaving craftsmen. With softer results, raw materials can be used to develop a wider variety of products.
The results of products using this machine are very well received by doyo weaving craftsmen, because they can develop products into more various forms of crafts. The softness of the raw materials produced by the machine makes it possible to diversify products into the fashion sector using existing raw materials. These findings can enrich and expand the marketing of Kalimantan’s typical doyo weaving crafts to national and international levels (Fig. 2).

4 Conclusion

The results of research on the use of machines to produce raw materials for doyo fiber crafts show that the time used to produce doyo fiber is much shorter than if it were produced manually. The strength of doyo leaf fiber products produced manually and those produced by machine are the same. However, regarding the quality of raw materials, it is softer produced using a machine than if processed manually.

With softer raw materials, faster processing times are expected to increase the number of craft raw materials for doyo weaving. Apart from that, the softer raw material products can be used for other types of crafts such as clothing and are not limited to decorative products only. This will contribute to product diversification and increased marketing of typical Kalimantan handicraft products made from doyo leaf fiber as the raw material.

References


