Increased productivity of batik wood mask craftsmen through appropriate technology equipment

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Abstract. The target partner of this activity is the wooden batik mask craftsmen in the village of Batur, Putat, Patuk Gunung Kidul. The purpose of this activity is to improve product quality, increase production capacity and increase partner income turnover. The method used in this activity is to help complete production equipment and provide various guidance and training. The appropriate technology equipment provided to partners is a seated planner machine, a hand planner machine and a didgeridoo drilling machine. Guidance and training activities consist of online marketing technical assistance, occupational health and safety implementation training and machine maintenance training. The result of this activity is that partner productivity can be increased, such as the quality of the wood becomes smoother and has the same thickness, the partner's production capacity increased by 33% and the partner's turnover increased by 12.5%.

1. Introduction

The target of this activity is wooden batik mask craftsmen who are members of the small and medium-sized business Vinda Batik Craft. The target location is in the village of Batur Putat Patuk Gunung Kidul. This mask craft uses wood as the main raw material. The woods that are often used are puli, acacia, rosewood, teak and albasia wood. Supply of raw materials from around the Gunung Kidul and Bantul areas. The main product produced by the partners is the wooden batik mask. But partners also produce other handicraft products to order. Other products include puppet statues, miniature animals, trays, fruit holders, tissue holders, various boxes, wooden batik numbers and letters, and various other souvenirs. The selling price of these products varies from Rp. 25,000 to Rp. 300,000.

Production equipment owned by partners is still simple, so the quality of raw materials is not good. In the process of splitting wood, the wood is still coarse and the thickness is not the same, so it still requires further work, this obviously takes a longer time. In addition, the operation of production equipment does not follow correct operating standards, as a result of which the equipment often breaks down. If there is damage to the equipment owned, the work will automatically stop, because you have to wait for the repair of the equipment. This resulted in increased production time and costs. Besides that, work safety is also neglected. One of the effects of work on wood is dust or sawdust. Workers should use adequate work safety equipment while working, including wearing masks, glasses and gloves. But what happens now is that workers work without personal protective equipment, and it has become a habit.

In addition to the simple production equipment, partners today really need a machine design that can be used to make long holes in wood. Partner received an order to manufacture an aboriginal wind instrument, the didgeridoo. However, the constrained partners do not have adequate equipment, namely a drilling machine that can be used for drilling lengthwise up to 120 cm. The facilities consist of a
production room, a living room as well as a showroom, a storage room and a batik coloring room. The facilities owned are very simple. The production room is also very simple with an unsystematic arrangement of equipment layout, so rearrangement is needed.

As is well known, currently the world is being hit by the Covid-19 outbreak. The impact of this epidemic is felt for all, including the craftsmen. The most significant impact is the decline in marketing of handicraft products by up to 85%. Due to decreasing marketing, automatically the production capacity and income of partners will also decrease. Before Covid-19, the production capacity was around 1200 units / month, 50% of partner product marketing was the export market reaching America, Europe, Spain, Taiwan, Canada, Jamaica and Singapore. And for the domestic market, including Yogyakarta, Jakarta, Bandung, Surabaya, Bali and Sumatra. But with the Covid-19 outbreak, everything has changed. Production almost stopped.

So far, marketing techniques have been carried out by participating in exhibitions, middlemen, through cooperatives, through the websites of Bantul and Gunung Kidul Regencies. Partners do not have online marketing capabilities independently. In fact, to overcome the impact of the pandemic outbreak 19, one of them is by marketing products online. So that partners really need assistance with this capability.

Based on the explanation above, it turns out that the partners are still experiencing several problems. These problems are the need to add production equipment to improve the quality and quantity of products, the production room needs to be renovated and rearranged, does not have machine maintenance capabilities, needs to understand the importance of implementing work safety and does not have online marketing capabilities. These problems require a solution to overcome them. The solution offered is the addition of production equipment consisting of a planer machine, a hand planer machine, a didgeridoo drilling machine. In addition, training on production equipment maintenance techniques, tool set assistance for maintenance, training on the implementation of work safety principles, work safety equipment assistance, online marketing technical assistance, rehabilitation and arrangement of production room layouts and the manufacture of billboards are also necessary.

A planer or wood shaved machine is a machine used to trim wood surfaces, resulting in a flatter and smoother surface [1]. By using this machine is able to produce a surface that is flat and smooth and has the same thickness. This process can also be done very quickly, thus reducing production time. This machine consists of several parts, namely electrical components, carbon brush, armature and stator, connecting pulley, drawstring eye and drawstring eye adjustment knob. The didgeridoo drilling machine is a development of a drilling machine where the position and capacity of the drilling are adjusted to the needs, namely to make a hole with 120 cm long. This machine is specially designed to make longitudinal holes in the didgeridoo wind instrument. The didgeridoo is a wind instrument owned by the aborigines of Australia [2]. Didgeridoo is usually cylindrical or conical, and is about 1 to 2 meters long, mostly 1.2 meters in size. It is seldom shorter or longer than this. In general, the longer the instrument, the lower the key.

Apart from these production equipment, the ability that is needed by partners is machine maintenance techniques. In general, the word maintenance will not be separated from the work of repairing, dismantling, or checking the machine carefully and thoroughly (Maintenance, Repair, and Overhaul - MRO) [3]. In general, the term maintenance has the following meanings: keep, maintain and protect. Continuous routine work carried out to maintain facilities (plans, buildings, structures, land facilities, utility systems, or other real property) in such a condition that they can continue to be used, with the original design capacity and for the efficiency of the company for its intended purpose. Various activities, such as: testing, measurement, replacement, adjustment and repair aimed at maintaining or returning the function of components / units in or to a particular system where the unit can perform the functions required by the company All actions taken to protect company assets from various disturbances in order the system can always work optimally. Its activities include inspection, testing, servicing, classification for servicing, and reclamation repairs.

The next ability is understanding the importance of implementing the principles of work safety in every job. The basic philosophy of occupational safety and health (OHS) is to protect the safety and
health of workers in carrying out their work, through efforts to control all forms of potential hazards that exist in the workplace environment [4]. OHS consists of two elements, namely safety and health. Work safety is defined as efforts aimed at protecting workers; keep others safe; protect equipment, workplaces and production materials; preserving the environment and accelerating the production process. Some things that must be considered in safety are control of accident loss and the ability to identify and eliminate unacceptable risks. Health is defined as the degree of physiological and psychological well-being of the individual. In general, the definition of health is efforts aimed at obtaining the highest possible health by preventing and eradicating diseases suffered by workers, preventing work fatigue, and creating a healthy work environment.

Another skill that partners really need is online marketing techniques. The decline in marketing of handicraft products due to the impact of the Covid-19 pandemic requires a breakthrough to overcome it. One alternative solution to this problem is implementing online marketing techniques or often referred to as digital marketing. With digital marketing, producers are able to increase their online brand presence, attract audience attention, drive sales, and turn them into profitable consumers [5]. In addition, the advantages of using digital marketing include: (1) more efficiency, small and medium businesses can save more money by doing digital marketing compared to regular marketing; (2) real time 2-way communication; (3) the results can be monitored very easily; (4) flexible, can be accessed with multi-devices, anywhere and anytime; (5) able to increase return on investment (ROI) significantly.

2. Method
This activity consists of two main activities, namely technology transfer and knowledge transfer. The methods used are as follows:

A. Technology transfer activities
   1. Procurement of machines and other equipment
      This procurement method is pursued by purchasing machines and equipment that are already on the market. Some of these machines and equipment are planer machines, hand planner machines, maintenance tool sets, and OHS tools.
   2. Manufacture of machinery and equipment
      This method is used for the manufacture of machines and equipment that require certain specifications according to the conditions and needs of partners. Some of the equipment is the didgeridoo drilling machine and nameplate billboards. The steps in the machine and equipment manufacturing process are:
      a. determination of function and capacity requirements;
      b. design process;
      c. procurement of materials;
      d. processing process;
      e. assembly process;
      f. function test and performance test;
      g. finishing process.

B. Transfer of knowledge activities
   What is meant by transfer of knowledge activities is training and mentoring activities. This activity is pursued by the method of lectures, discussions, simulations, hands-on practice and evaluation, so that the material presented will be easier for partners to understand, then mentoring is carried out. The steps for implementing training and mentoring are as follows: (a) determining a schedule with partners; (b) preparation of supporting materials; (c) determination of material; (d) appointment of instructors; (e) conducting training and mentoring; (f) evaluation.

3. Results and Discussion
The result that has been achieved from the technology transfer activity is the handover of 1 unit of bench planer machine, 1 unit of hand planner machine, 1 unit of didgeridoo drilling machine, as well as rehab and production room arrangement. The bench planer machine that has been handed over to the partner
(figure 1) has specifications for the Oscar MB 104 16” brand which has 2200 Watt electric power with a 3 horse power (HP) motor power. This automatic planer machine functions to smooth the surface of wood automatically. It is able to smooth wood with a maximum width of 400 mm with a thickness maximum 200 mm. Easy use and the setting process will be faster. The detail specification is summarized in table 1.

**Table 1. Bench planer machine specification**

| Variable                     | Specification |
|------------------------------|---------------|
| Voltage                      | 220V/50Hz     |
| Electrical power             | 2200 Watt     |
| Cutting depth                | 4 mm          |
| Maximum wood thickness       | 200 mm        |
| Maximum wood width           | 400 mm        |
| Speed without load           | 5270 rpm      |
| Feeding rate                 | 10.2 m/minute |
| Dimension                    | 670 x 650 x 849 mm |

![Figure 1. Bench planer machine handed over to community service partner](image)

The next result is that one hand planer machine has been handed over (figure 2). This machine serves to shave wood to get a smooth wood. It is called a hand planer because this machine is smaller than a bench planer, and the fundamental difference is that with this planer is moved by hand, while the position of the wood is still. This machine uses 500 watts of electric power with the Maktec MT192 brand, capable of producing a no-load speed of 16000 rpm. With a depth of 1 mm and a width of 82 mm. The MT192 planer machine makes it easy for us to quickly shrink wood surfaces. The detail specification is summarized in table 2.
### Table 2. Hand planer machine specification

| Variable              | Specification |
|-----------------------|---------------|
| Voltage               | 220V/50Hz     |
| Electrical power      | 500 Watt      |
| Cutting depth         | 1 mm          |
| Width                 | 82 mm         |
| Speed without load    | 16000 rpm     |

*Figure 2. Hand planer machine handed over to community service partner*

Apart from the above equipment, the equipment most needed by partners is the didgeridoo drilling machine (figure 3). This machine is a development of a drilling machine and is devoted to drilling raw materials for making didgeridoo musical instruments. The capacity of this machine is capable of making holes with a maximum diameter of 25 mm with a maximum length of 120 mm, with a horizontal cutting axis. This machine is driven by using an electric motor 1 HP, with a simple construction so it is very suitable to be applied in small industries.

*Figure 3. Didgeridoo drilling machine*
Furthermore, what will be carried out is rehabilitation activities and production space arrangement. The newly designed production room measures 8 x 11 m. Previously, the partner’s production room was a room measuring 4 x 11 m, the roof was made of asbestos with wood and bamboo poles, and the machinery and production equipment were not properly arranged. After rehabilitation, the production room was constructed using a hollow steel roof construction of 40 x 40 x 2 mm which was welded and the roof was made using a galvalume roof. For poles it is made with a combination of cast concrete and hollow iron 40 x 40 x 2 mm and for walls it is made using brick material. Then the floor is made using cement plaster. After the rehabilitation and arrangement process has been completed, the atmosphere of the production room is more comfortable, cleaner, so as to provide comfort to workers in carrying out the production process (figure 4). To support partner location information, billboards with 2 x 1 m size and 6 m high poles were also made. Billboards frames are made using 40 x 40 x 2 mm angle iron with metal inert gas (MIG) welding joints. The pole is made using a steel pipe with a diameter of 3 inches and a length of 6 m. The name board writing is made by printing using the best quality outdoor special banner material.

Figure 4. Production room building and nameplate

Transfer of knowledge activities include machine maintenance training, training on the application of work safety principles, and online marketing assistance. Machine maintenance training consists of technical assistance for machine maintenance and equipment assistance (tool set) for maintenance. Good maintenance activities consist of three types, namely preventive maintenance, breakdown maintenance, and corrective maintenance [6].

a. Breakdown Maintenance
Breakdown maintenance is maintenance that is carried out when there is damage to a machine or work equipment so that the machine cannot operate normally or a complete cessation of operations in sudden conditions. This maintenance breakdown must be avoided because there will be losses due to the stopping of the production machine which results in not achieving quality or production output.

b. Preventive Maintenance
Preventive maintenance is a type of maintenance performed to prevent damage to the machine during operation. An example of preventive maintenance is scheduling for inspection and cleaning or changing spare parts regularly and periodically. Preventive maintenance consists of two types, namely:

1. Periodic Maintenance
Periodic maintenance includes scheduled periodic maintenance in cleaning machines, inspecting machines, oiling machines and also changing spare parts that are scheduled to
prevent sudden engine damage which can disrupt the smooth running of production. Periodic maintenance is usually carried out on a daily, weekly, monthly or yearly basis.

2. Predictive Maintenance

Predictive maintenance is maintenance performed to anticipate failure before total damage occurs. Predictive maintenance will predict when certain components of the machine will be damaged by analysing the behaviour of the machine/ work equipment. In contrast to periodic maintenance which is carried out based on time (time based), predictive maintenance focuses more on the condition of the machine (condition based).

c. Corrective Maintenance

Corrective maintenance is maintenance that is carried out by identifying the cause of the damage and then repairing it so that the production machine or equipment can operate normally again. Corrective maintenance is usually carried out on machines or production equipment that are operating abnormally (the machine can still operate but is not optimal).

Figure 5. Implementation of machine maintenance training and assistance

The next mentoring activity is training and mentoring in the application of the principles of occupational health and safety (OHS). This activity is carried out in order to provide understanding and increase partner awareness of the application of OHS in every production process that is carried out. The application of OHS is very important in the manpower and human resources system. The OHS program will help to maintain the physical condition of employees, the tools and machines used, and the products that are worked on. Basically, the main goal of OHS is to secure a system of activities starting from process input to output, and in the end the implementation of the OHS program can also improve welfare [7]. In this activity, it was also accompanied by the assistance of OHS equipment tailored to woodwork, namely gloves, industrial masks, glasses, and light fire extinguishers.

Figure 6. Implementation of OHS training and mentoring
In order to boost partner marketing, assistance activities were carried out on the use of online media as a product marketing medium. In this activity, the material provided was an online marketing strategy (digital marketing) through an existing marketplace, namely Tokopedia. The benefits of using digital marketing are that it can relate directly to potential customers, have the opportunity to generate high sales, save on marketing costs, expand marketing networks, and help generate high income [8].

Appropriate technology equipment support activities have been able to improve both the quality and quantity of handicraft products produced by partners. With adequate technological equipment, the quality of the raw material will be better, the result is smoother cleavage and the resulting thickness is uniform [9]. The time used for the wood grinding process is faster. In terms of quantity, the partner's production capacity increased, before having a seated planner machine, wood thinning and grinding with a size of 120 x 15 x 3 cm could be done about 30 units/ hour, but after using this sitting planner machine it became faster, around 40 units/ hour or an increase of about 33%. During this Covid-19 pandemic, partner turnover decreased drastically to around 15 million / month. However, after there was some assistance through this activity program, especially online marketing techniques, marketing increased so that the income turnover per August 2020 increased to around 16,875,000, or an increase of around 12.5%.

4. Research Limitation
The implementation of this activity coincides with the Covid-19 pandemic outbreak, so the principle of social distancing must be considered. This has an impact on the number of targeted activities that must also be limited. Because in community coaching and mentoring, in this case small craftsmen, it cannot be carried out online because it requires intensive assistance.

5. Conclusion
Based on the results of the activities that have been achieved, the following conclusions can be drawn:
   a. The quality of the wood raw material becomes smoother and has the same thickness.
   b. Partner production capacity increased by 33%.
   c. Turnover of partners increased by 12.5%.

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