

The Improvement of Product Quality and Increase in Production Quantity through the Implementation of Apec_3 (Ecoprint Steaming Tool) at the Ecoprint Msme 'Citra Collection' in Tegal City

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Abstract

Citra Collection MSME is a business engaged in the production of ecoprint fabric. This MSME was established in 2017 by Retno Wulansari. It produces clothes, bags, shoes, and wedding or seminar accessories using fabrics and leather that have been ecoprinted. The demand for ecoprint fabric products is very good, and sales volume has increased. However, some consumers are particular about the ecoprint results, particularly the quality issues, such as wrinkles and color fading. The company also faces difficulties in increasing its boiling capacity due to the limited design of its equipment. So far, the company has been using a meatball pot (manci bakso) for the ecoprint boiling process. Seeing these issues, this community service aims to help improve the quality of ecoprint products and enhance the production process. The method used in this community service is the Participatory Action Research (PAR) method. The PAR method involves the business or MSME from the start, with the hope of delivering targeted and effective results. By implementing APEc_3, the company is able to increase production capacity. This tool can process 30 pieces of fabric in one boiling session. The use of a roll made from stainless steel material helps eliminate wrinkles and prevent color fading, which has always been a problem with the 'manci bakso' equipment.

Keywords: *MSMEs, Ecoprint, APEc_3*

1. Introduction

Ecoprint is a promising development in the fashion world that is worth exploring and has the potential to become a new business [1]. 'Citra Collection' MSME in Tegal City, owned by Retno Wulansari, is located on Jalan Jalak Timur 9, Tegal City, and is a pioneer of ecoprint in Tegal City. The production of 'Citra Collection' includes men's and women's clothing, bags, shoes, and wedding accessories. The raw materials used are fabric and leather [2]. Referring to the Work Instruction (IK) for Ecoprint Production (IK.01) from Citra Collection, the process sequence begins with: a) Scouring Process – cleaning the fabric from any residual factory chemicals; b) Mordanting Process – soaking the fabric in a solution of alum for 1 hour. This process includes adding 2 liters of water, 2 bottle caps of vinegar, alum, baking soda, and tannin powder, mixing them well, soaking the fabric, scrubbing it, and then drying it under the sun; c) Printing Process (arranging flowers and leaves) – spread the fabric, which is half wet, and place flowers and leaves according to

the desired design until the fabric is covered, then cover with a blanket fabric, place a plastic sheet on top, and roll it up; d) Steaming Process – place the fabric in a meatball pot (manci bakso) and let it steam for 2 to 2.5 hours; e) Releasing Flowers and Leaves – after two hours, remove the flowers and leaves and dry the fabric. The process is complete. Below is an example of the products made at the company.



Figure 1. Ecoprint Process Result using Manci Baso Tool

The image of the product resulting from the boiling process at Citra Collection MSME above shows color fading, unclear leaf prints, and wrinkles on the fabric in areas that were folded during steaming. This condition has also been a complaint from their customers. This issue was then identified by the service team as a problem. The goal of this community service activity is to improve the color imprint and eliminate the color fading on the fabric.

2. Method

The method used in this community service project is the Participatory Action Research (PAR) method [4]. In our view, this method is the most appropriate for addressing the issues at hand. The PAR method focuses on collaborative problem-solving, involving the community in the research and action process. Its main objectives are to facilitate learning in addressing problems, meet the practical needs of the community, and foster social change. By engaging directly with the community, this method ensures that the solutions are not only effective but also tailored to the local context and needs. From the PAR method, a flowchart was developed to guide the implementation process.

The problems faced by the Citra Collection MSME were identified through detailed observations of the ecoprint fabric results, as well as feedback from the owner and several customers. The main issues highlighted were: first, that the leaf prints on the fabric were not sharp enough and lacked the desired clarity; and second, that the base color (from the blanket) on the fabric was fading, causing an uneven and undesirable appearance. Additionally, there were wrinkles in the fabric, especially in the areas where it was folded during the steaming process, which had also been a point of concern for the customers. These issues significantly affected the overall quality of the products and were discussed extensively by the community service team.

The identified problems were then used as the basis for further discussion within the team, which led to the formulation of a clear action plan and timeline for implementing the community service activities. A detailed schedule was created and shared with the MSME owner, ensuring that it did not interfere with the production process. This collaboration helped establish a time that was convenient for the owner and would allow the team to carry out their tasks without disrupting regular operations. Furthermore, the team divided responsibilities according to each member's expertise and role, ensuring that all aspects of the community service were well-managed. During the actual implementation phase, the team worked together on-site to ensure that all activities were carried out efficiently and effectively, focusing on addressing the issues faced by the MSME.

3. Result and Discussions

1. Results

The issues faced by the Citra Collection MSME are visible in the image above, where there are signs of color fading, unclear leaf prints, and wrinkles on the fabric, especially in the areas that were folded during the steaming process. These issues were addressed through careful analysis and corrective action by the community service team.

a. Problem of color fading and unclear leaf prints

One of the issues identified was the fading of color and unclear leaf prints on the fabric. After conducting an analysis, it was suspected that one of the causes was the improper composition of the mordant used during the dyeing process in the steaming phase. However, after experimenting with different compositions of the mordant, it was found that adjusting the mordant composition alone did not resolve the issue. This led the team to explore other potential causes and solutions.

b. Problem of wrinkles on the fabric from folding during steaming

Another problem identified was the presence of wrinkles in the fabric, particularly in the areas where the fabric had been folded during the steaming process. To address this issue, the team proposed the replacement of the boiling equipment used for the ecoprint process. The steps taken by the team included:

- 1.) Observing the steaming process of ecoprint with fabric as the raw material.

The team conducted a detailed observation of the ecoprint steaming process with fabric, and it was found that the process was identical to the steaming process used for ecoprint leather. Notably, the issue of wrinkles in leather during steaming had been successfully



resolved by using APEc_2 equipment (Tofik, 2023). This gave the team an insight that a similar approach might help address the issue in fabric as well.

2.) Identifying key differences in the steaming process between fabric and leather materials.

There was a significant difference in the steaming process for fabric compared to leather. During the steaming of fabric, the material needed to be flipped every 30 minutes to prevent overheating, ensuring that the temperature did not exceed 70°C. This process requires equipment with a turning mechanism and precise temperature control to avoid damaging the fabric and to prevent the formation of wrinkles. The requirement for precise temperature management and turning was critical in addressing the issue effectively (Tofik, 2023).



Figure 2. APEc_2 Specially for Leather Raw Materials

3.) Designing the Ecoprint Boiling Tool for Fabric Raw Materials – We named it APEc_3 (Ecoprint Steaming Tool Generation 3) for fabric raw materials. The tool was designed with consideration for the width of the fabric to ensure that no folds occur during the steaming process. The specifications of the tool are as follows, with a maximum capacity of 30 pieces of fabric per boiling process:

- a.) Tool Length (manci): 1,250 mm (this length accommodates the maximum fabric width of 1,200 mm).
- b.) Manci Width: 550 mm.
- c.) Manci Height: 500 mm.
- d.) Stove Design: The stove uses a "mawar" type burner to maintain a constant temperature of 100°C during the steaming process, ensuring that the fabric is exposed to the optimal temperature for dyeing and printing.



Here is the complete design of APEc_3 along with its stove.

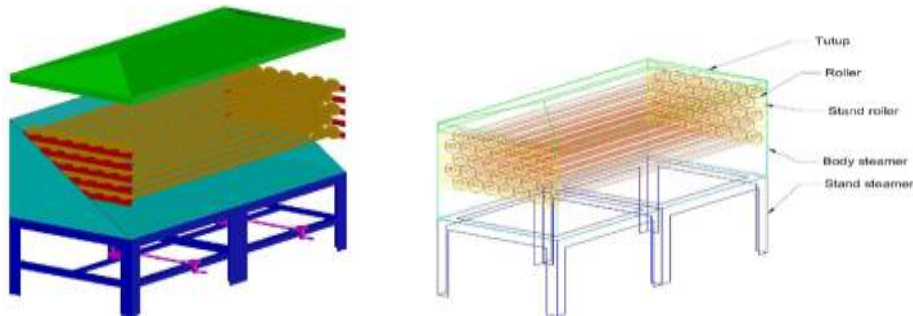


Figure 3. APEc_3 Design

4.) Construction of APEc_3

After the design received approval from the owner, Mrs. Retno Wulandari, the team proceeded with the construction of the APEc_3 tool. This stage involved carefully following the specifications outlined in the design to ensure that the tool would function effectively and meet the needs of the fabric ecoprinting process. The construction process took into account factors such as the size and material specifications to ensure durability, efficiency, and ease of use. Below is an image of the completed APEc_3 tool.



Figure 4. APEc_3 Product

The APEc_3 tool has been carefully engineered to improve the ecoprint process for fabric, addressing issues such as wrinkles and uneven prints that occurred with previous equipment. The design focuses on ensuring that the fabric is evenly exposed to heat during the steaming process, which helps produce high-quality prints without damaging the material. The inclusion of a specialized stove with temperature control further enhances the efficiency of the tool and ensures that the ecoprinting process runs smoothly and consistently.

5.) Handing Over and Operation of APEc_3

After the APEc_3 tool design successfully passed the testing phase, the UPS Tegal community service team proceeded with handing over the APEc_3 tool to the Citra Collection MSME. In

addition to the tool handover, the team also conducted a demonstration on how to properly operate the APEc_3. The demonstration was observed by the owner of the company, Mrs. Retno, as well as all the workers involved in the ecoprinting process. This allowed the team to show how the tool works and ensure that all workers were able to practice using it effectively. The demonstration was an essential step in familiarizing the team with the tool's operation and ensuring its proper integration into the daily operations of the business. Below is the documentation of the handover and demonstration of the APEc_3 tool.



Figure 5. The Process of Attaching Leaves to the Fabric



Figure 6. The Process of Rolling Fabric with a Roll as Part of the APEc_3 Tool



Figure 7. The Process of Steaming Fabric with the APEc_3 Tool Compared to the Manci

6.) Results of Using the APEc_3 Tool

Below is the documentation of the ecoprint fabric production results using the APEc_3 tool.



Figure 8. Ecoprint Fabric Result with the APEc_3 Tool



Figure 9. Ecoprint Fabric Result with the APEc_3 Tool after the Fixation or Color Locking Process

2. Discussions

a. Implementation of Community Service (PkM)

The implementation of this community service (PkM) project was carried out effectively, following the established flowchart for PkM, which began with identifying the problems, followed by the planning phase, execution, and finally the creation of the expected outcomes of the PkM. Every phase was carefully planned and executed, ensuring that the process was aligned with the goals of improving the ecoprinting technique at Citra Collection MSME. The implementation also involved close collaboration between the project team and the MSME owner, Mrs. Retno Wulandari, ensuring that the tools and methods employed would best suit the needs of the company. Throughout the project, feedback from the workers and stakeholders was taken into consideration to adapt the tools and processes, further ensuring that the final solution addressed the real-world issues faced by the business.

In addition to the direct implementation, there was a strong emphasis on building the capacity of the employees at Citra Collection to handle and operate the new tool. The demonstration and training on how to use the APEc_3 tool were crucial steps in ensuring that the workers could seamlessly integrate the new technology into their daily workflow, ultimately contributing to the long-term sustainability of the improvements made.

b. Results of PkM Implementation

The implementation of the PkM project resulted in the following key outcomes: The creation of a new ecoprint steaming tool, named APEc_3 (Ecoprint Steaming Tool Generation 3). This tool represents an innovation that directly addresses the specific problems encountered during the ecoprinting process, such as wrinkles, unclear leaf prints, and color fading. The new design of APEc_3 was tailored to the particular needs of fabric processing, which is more delicate than leather. The larger steaming capacity of the tool allows for more efficient production without compromising the quality of the prints. The design ensures that the fabric remains flat during the steaming process, preventing folds and ensuring that the ecoprint process is completed with optimal results. By upgrading the steaming equipment, the Citra Collection MSME now has a more reliable and effective tool that allows for higher-quality products and increased production



capacity.

Improved ecoprint fabric results using the APEc_3 tool. The fabric produced using the new APEc_3 tool showed significant improvements in quality. The leaf prints were more distinct and vivid, making the designs stand out clearly, with no color fading or cracks that had been a recurring issue with the previous boiling equipment. Additionally, the tool eliminated the wrinkles that were commonly formed when the fabric was folded during the steaming process, ensuring a smoother finish and more professional-looking products. This not only improved the aesthetic quality of the ecoprint fabric but also increased the overall appeal of the products to consumers, which is essential for maintaining competitiveness in the market.

Beyond just the immediate improvements in product quality, the introduction of the APEc_3 tool has a long-term impact on the business. The ability to produce higher-quality ecoprint fabric means that Citra Collection can expand its customer base, offering products that meet higher standards and cater to more discerning clients. The enhanced production capacity also means that the company can potentially increase its output, thus meeting growing demand without sacrificing quality. Furthermore, the successful implementation of this project demonstrates the potential for innovation within small and medium-sized enterprises (SMEs) in the creative industries, encouraging other businesses to adopt similar improvements and adopt more efficient practices.

Ultimately, the PkM project has not only improved the quality of the ecoprint products but has also empowered the workers by equipping them with new skills and knowledge. It is expected that the MSME will continue to benefit from the use of the APEc_3 tool for years to come, leading to greater productivity, profitability, and customer satisfaction.

4. Conclusion

From the discussion on the implementation of this community service project, it can be concluded that the execution followed the planned flowchart, with significant achievements. The APEc_3 tool was successfully handed over to the MSME owner, Mrs. Retno, along with a training session on how to operate the tool. The first production run was also conducted, allowing the workers to see the immediate improvements in the ecoprinting process and the results of using the new tool. This hands-on experience was important for ensuring the smooth integration of the tool into the daily operations of the business. The use of the APEc_3 tool successfully addressed the main issues the MSME had been facing, such as color fading, unclear leaf prints, and fabric wrinkles during the

steaming process. By improving these aspects, the tool has enhanced the overall quality of the ecoprint fabric, helping the business produce more consistent and visually appealing products. This, in turn, has contributed to better customer satisfaction and will likely improve the company's market position. Additionally, the project team provided extra training on the use of social media platforms for product promotion and sales. This training was essential for helping the MSME expand its customer base and reach new markets through online channels. By equipping the workers with these digital marketing skills, the MSME is better positioned to grow its sales and increase brand visibility in a competitive market.

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