

IMPLEMENTATION OF CLEAN PRODUCTION IN MICROBUSINESS LOCATED IN WEST JAKARTA

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ABSTRACT

This study explores the implementation of cleaner production (CP) principles in microbusinesses in West Jakarta through a community training program led by the University of Mercu Buana in collaboration with BRIN and PNM. The initiative aimed to address operational inefficiencies and environmental challenges faced by micro, small, and medium enterprises (MSMEs), particularly in urban areas. The training engaged 25 local entrepreneurs—primarily women—in food, trade, and craft sectors, many with limited education and resources. Participants were introduced to CP strategies such as waste reduction, energy efficiency, and resource optimization, tailored for small-scale businesses. The interactive sessions emphasized sustainable profitability, lifecycle thinking, and practices like composting and greywater reuse. Feedback and follow-up mentoring revealed strong interest in adopting CP and identified key challenges including limited funding, digital skills, and raw material access. The program successfully built awareness and practical knowledge, showing that participatory, localized approaches—paired with mentorship—can promote both environmental and business resilience. Expanding technical demonstrations, peer learning, and supportive policies will be essential to sustaining and scaling CP adoption in MSMEs.

Keywords: Cleaner Production, Micro Enterprises, Sustainability, Waste Reduction, Community Engagement.

1. INTRODUCTION

Situation Analysis. Enterprises of all sizes—including Micro, Small, and Medium Enterprises (MSMEs)—operate in increasingly competitive markets that demand the consistent delivery of high-quality, cost-effective, timely, and environmentally responsible products and services. Sustaining customer trust and ensuring repeat business hinge on an MSME’s ability to meet these expectations reliably and efficiently. Cleaner production presents a systematic and proactive approach to environmental management. It aims to enhance operational efficiency while minimizing environmental harm by optimizing resource use and reducing waste at its source, rather than depending solely on end-of-pipe solutions. Although cleaner production practices have been widely adopted by large enterprises, MSMEs often lag in this area due to the lack of formalized, integrated systems.

Many MSMEs do implement elements aligned with cleaner production—such as operational procedures, defined business objectives, and staff training—but these efforts are usually fragmented and uncoordinated. The primary challenge lies in enabling MSMEs to develop customized management systems that support the gradual and sustainable adoption of cleaner production principles. These systems must reflect the unique conditions and growth paths of each enterprise, while ultimately supporting a transition toward a sustainability-driven business model.

Partner Issues. Micro, Small, and Medium Enterprises (MSMEs) are pivotal to Indonesia's economic development, contributing around 60% to the national GDP and employing over 90% of the workforce (Ministry of Cooperatives and SMEs, 2024). Despite their significance in various sectors—including manufacturing, food and beverage, textiles, and creative industries—MSMEs continue to struggle with low efficiency and unsustainable resource use. Many rely on outdated production systems, resulting in excessive raw material waste, high energy consumption from inefficient machinery, and inadequate water management—especially in industries like textile dyeing. Environmental pollution due to poor waste disposal practices, including untreated discharge of solid and liquid waste, remains a major concern. Opportunities for circular economy practices, such as converting sawdust to briquettes or food waste to compost, are often missed (Ghisellini et al., 2016; Singh et al., 2019; Hoekstra et al., 2011).

A lack of awareness and access to cleaner production concepts further exacerbates these challenges. Many MSME owners perceive sustainability initiatives as burdensome expenses rather than long-term investments (Pujari, 2006). Training programs are scarce, and technological innovations like water recycling systems and energy-efficient equipment are seen as cost-prohibitive (Klewitz & Hansen, 2014). Moreover, government incentives have yet to be fully utilized to drive adoption of sustainable practices (Seuring & Müller, 2008). Regulatory compliance poses additional hurdles, as many MSMEs lack knowledge of environmental regulations or struggle with bureaucratic complexities (Hartini & Ciptomulyono, 2015). Meanwhile, growing consumer demand for eco-friendly products is reshaping markets, compelling MSMEs to innovate or risk reduced competitiveness (Bai et al., 2015; Bocken et al., 2014).

Recommendations and Problem Statement. Adopting cleaner production practices among MSMEs is essential to address persistent inefficiencies and environmental concerns. Strategic actions should prioritize structured education and training to enhance awareness and practical skills, while financial incentives and grant programs must be established to facilitate access to cleaner technologies. Collaboration among MSMEs, academic institutions, and private stakeholders is crucial for promoting innovation and knowledge sharing. Strengthening policy frameworks is also necessary to provide clear regulatory guidance and motivate sustainable practices through supportive measures. Despite these opportunities, challenges remain—namely, limited understanding of cleaner production among MSME managers, insufficient hands-on experience with sustainable strategies, and a lack of awareness regarding the environmental benefits of cleaner production. These issues highlight the urgent need for an integrated approach to promoting cleaner production in the MSME sector.

Activity Objectives

- Enhance understanding of clean production to improve efficiency and reduce operational costs.
- Promote awareness of clean production's role in ensuring timely and effective product delivery.
- Minimize waste and resource overuse (water, electricity) to lessen environmental impact.
- Support the transition to sustainable business practices through clean production adoption.

2. METHOD

The community service program which coordination between University of Mercubuana, BRIN (National Research and Innovation Agency and PT PNM (Madani National Capital Company) took place on May 3, 2025, at Kelurahan Keagungan, West Jakarta, from 08:00 to 16:00 WIB. The participants were microenterprise owners under Mekaar, managed by PNM—local entrepreneurs needing improved skills and understanding in integrated marketing. Training was delivered in a classroom setting through direct interaction between facilitators and participants. The session included four segments: (a) **Opening** – an introduction to the training objectives and its importance; (b) **Material Delivery** – covering cleaner production and its relevance to sustainable business operations; (c) **Q&A Session** – an open discussion to deepen understanding; and (d) **Closing** – summarizing key takeaways.

This program forms part of the university's community service initiatives in collaboration with sub-district agencies and MSME partners. Activities followed three main stages: (1) **Preparation and Planning** – coordination meetings with local stakeholders to assess training needs; (2) **Implementation** – interactive sessions held in a venue provided by the sub-district, opened by the team leader, lecturer, and host, and recorded for documentation; (3) **Reporting** – dissemination of outcomes via online media, LPPM YouTube, and formal reporting to Mercu Buana University as part of the Tri Dharma of Higher Education.

3. RESULTS AND DISCUSSION

Overview and Context.

A community service activity was successfully held on May 3, 2025, in Keagungan Subdistrict, Tamansari District, West Jakarta, focusing on enhancing MSME capacity through the adoption of cleaner production (CP) principles. The event was part of a broader initiative to promote sustainable practices among micro and small enterprises, particularly those affiliated with Permodalan Nasional Madani (PNM). The training highlighted the urgency of addressing environmental damage in Jakarta, where small businesses significantly contribute to river and land pollution. Data from Dinas Lingkungan Hidup Provinsi DKI Jakarta (2023) indicate over 68,000 tons of unmanaged waste annually, much of it originating from micro-scale businesses. This waste burden contributes to environmental degradation and public health threats. Traditional waste management methods, such as the end-of-pipe approach, have proven insufficient in Jakarta, necessitating a shift toward upstream solutions like cleaner production.

CP emphasizes waste reduction at the source, promoting resource efficiency through strategies like reuse, recycling, and recovery. According to UNEP (2006), cleaner production is a preventive environmental strategy that enhances process efficiency and reduces risks to people and the environment. Practical actions discussed included minimizing food waste, using efficient equipment, repurposing greywater, and converting waste materials into usable products like compost or alternative fuels. These approaches align with circular economy principles and have been successfully adopted by small businesses worldwide.

Training Implementation and Participant Engagement. The training followed a structured agenda: an opening session, core material delivery, interactive Q&A, and a closing summary. The face-to-face format allowed for dynamic interaction, discussion, and shared learning. Participants, mainly MSME owners and representatives from PNM, engaged actively throughout. As supported by Huda and Susanto (2021), interactive delivery enhances retention and practical application for small business operators.

Five core modules were presented:

- **Profitability through Sustainability** – Framing cleaner production as a strategic business advantage (Pujari, 2006).
- **Concept Clarification** – Defining CP and its scope for MSMEs.
- **Systemic CP Frameworks** – Introducing lifecycle thinking, continuous improvement, and process integration.
- **Practical Strategies** – Focused on source reduction, reuse, recycling, and energy efficiency.
- **Case Examples** – Highlighting successful CP applications in Indonesian MSMEs.

These modules equipped participants with actionable insights and fostered confidence to initiate change in their businesses. Testimonies from participants highlighted the novelty and applicability of the materials, particularly in improving resource use and minimizing waste.



Figure 1. Presentation on Cleaner Production and Post Training

Outcomes, Impact, and Reflections

Participants completed the full session and received certificates, reflecting their commitment to sustainable practices. Post-session feedback indicated strong interest in applying cleaner production principles. Notably, participants valued guidance on operational improvements such as waste management, energy savings, and product quality consistency. Informal mentoring via WhatsApp and phone follow-ups helped reinforce learning and encourage practical application—an approach shown effective by blended learning research (Huda & Susanto, 2021).

The program made a significant contribution to promoting CP as a viable management framework for MSMEs. Before the training, most participants had limited exposure to sustainability concepts. Through tailored content and interactive delivery, the training helped contextualize CP principles for their specific operations. Participants acknowledged existing informal practices (e.g., SOPs, waste segregation), which could now be aligned within structured CP frameworks, consistent with Klewitz & Hansen (2014), who noted that small firms require guided support to implement sustainability effectively.

This activity serves as a model for future outreach programs. It demonstrates that when paired with mentorship and participatory learning, cleaner production can be integrated into MSMEs organically. Future efforts may expand to include technical demonstrations, peer learning, and stronger institutional support from government and private sectors. With broader adoption, CP can drive economic and environmental gains at the grassroots level.

Participant profile and Business Challenges. A total of 25 micro and small business (MSME) participants took part in the training session. Demographic data revealed that 80% were female entrepreneurs, primarily aged 31–40. Most had completed senior high school, with a few holding diplomas or undergraduate degrees. The majority ran individually owned businesses that had been operating for 1–5 years, typically with only 1–2 employees, consistent with the micro-scale nature of urban enterprises in Indonesia. Business types were predominantly in food production and trade, followed by crafts and services. Most participants reported incomes in the lowest category. These characteristics reflect broader national trends, where women-led urban microenterprises often function with limited

formal education and minimal capital or labor support (Tambunan, 2019). Despite these constraints, participants exhibited a strong willingness to learn and showed high engagement with cleaner production concepts, suggesting readiness for future sustainability training initiatives.

Participants reported their primary challenges as follows: 68% cited limited access to funding, 32% faced business development constraints, 28% lacked digital or ICT skills, and 12% struggled with raw material availability. Several respondents faced multiple challenges simultaneously—such as Respondent 10, who noted issues with funding, business capacity, and digital literacy—highlighting the layered difficulties many MSMEs encounter. These findings indicate the need for integrated support systems that address financial, operational, and digital development collectively.

Evaluation, impact and testimonials. Participant evaluations showed strong satisfaction across the training's relevance, clarity, and applicability. Most scored content relevance and ease of understanding at satisfied or very satisfied, with only one participant giving a low rating, possibly due to language or presentation differences. Application potential was rated highly, with participants confident in adopting cleaner production methods. While time and location logistics were positively reviewed, some suggested improvements for future accessibility. Overall, participants responded favorably to the training's quality and expressed interest in future sessions focusing on sustainability practices.

The feedback underscores that the training addressed real business challenges and improved environmental understanding. Participants appreciated actionable strategies they could immediately consider for implementation. The presence of informal follow-up mentoring also reinforced knowledge and practical application. Two participants offered testimonials highlighting their appreciation for new perspectives gained during the training. One shared how the session helped them understand the dual benefits of reducing environmental harm while maintaining profitability. Another noted the importance of selecting environmentally friendly materials—an aspect previously overlooked in their operations. These reflections illustrate the training's tangible impact and its potential to shape more responsible business practices among MSMEs.

4. CONCLUSION

This training successfully demonstrated that cleaner production principles can be introduced and adopted by MSMEs, even among low-income, small-scale enterprises with limited prior exposure to sustainability. The structured, interactive approach effectively bridged knowledge gaps and engaged participants, many of whom already practiced isolated sustainability efforts. However, the absence of a cohesive strategy highlights the need for continued capacity building.

Participants responded positively, showing strong interest in future training and benefiting from informal post-session mentoring. Key challenges—such as limited access to finance, digital skills, and raw materials—underscore the importance of integrated support systems. Overall, this initiative confirms the potential of community-based, participatory approaches to embed cleaner production into MSMEs. Future programs should expand through technical demonstrations, peer learning, and policy support to deepen impact and strengthen business resilience.

ACKNOWLEDGMENT

The authors acknowledge the support of the UMB for facilitating this program. Appreciation is extended to BRIN and PNM for their collaboration and assistance in participant engagement. We also thank the officials of Kelurahan Keagungan, West Jakarta, for logistical support, and the MSME participants for their active involvement. Finally, we recognize the contributions of facilitators, volunteers, and organizers whose efforts ensured the program's success.

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