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UTILIZATION OF AI IN MARKETING CREATIVE PRODUCTS MADE FROM WOOD WASTE IN THE CRAFTSMEN COMMUNITY OF NGEMPLAK DISTRICT, BOYOLALI REGENCY

Oleh
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Abstract: *This study explores the application of Artificial Intelligence (AI) to enhance the aesthetic quality and design innovation of creative products made from wood waste in Ngemplak District, Boyolali Regency, Indonesia. Local craftsmen in this area often face challenges in improving product appearance due to limited access to design tools and technological resources. By integrating AI-based design systems, such as generative design algorithms, image enhancement models, and style transfer techniques, artisans can develop more appealing, modern, and market-responsive product designs while maintaining the authenticity of local craftsmanship. The use of AI not only supports creativity and efficiency in the product development process but also contributes to sustainability by increasing the added value of upcycled wood materials. This study highlights how AI-driven visual enhancement can bridge traditional craftsmanship with digital innovation, promoting competitiveness and sustainable growth in rural creative industries.*

INTRODUCTION

The integration of Artificial Intelligence (AI) into marketing strategies represents a major paradigm shift in the way businesses conceptualize, execute, and evaluate their promotional activities. AI provides transformative tools that enhance operational efficiency, enable personalized customer interactions, and optimize campaign performance across multiple platforms (Das and Saikia, 2025; Patil et al., 2024; Rozhko and Pletnova, 2024). This transformation is particularly relevant for the creative industries—one of the world's fastest-growing economic sectors—where AI's disruptive capabilities are driving innovation in both product development and strategic implementation. AI can automate repetitive marketing tasks, process vast amounts of data for evidence-based decision-making, and even interpret human emotions and behavioral patterns, thereby improving marketing research, strategy formulation (including segmentation, targeting, and positioning), and tactical execution. Through advanced analytics and predictive modeling, AI helps businesses enhance product relevance by identifying emerging market trends, optimizing product design, and tailoring

offerings to align with consumer preferences. Moreover, AI-powered digital marketing tools are increasingly utilized to collect, process, and analyze audience data in real time. These technologies provide deep insights into market dynamics, consumer sentiment, and engagement patterns, allowing marketers to refine their strategies and create more impactful, data-driven campaigns. Collectively, these developments illustrate how AI not only revolutionizes marketing efficiency but also redefines the relationship between creativity, technology, and consumer experience in the digital era (Baluk and Boychuk, 2024; Brocato and Davis, 2025; Kumar, 2025).

This confluence presents a unique opportunity for communities engaged in creative industries, such as the craftsmen in Ngemplak District, Boyolali Regency, Indonesia. In this region, wood waste—often a byproduct of furniture production and other wood-processing activities—represents an underutilized resource with substantial potential for upcycling into high-value creative products (Akhsan et al., 2024; Rifdian et al., 2022; Kurdhi et al., 2024). By transforming wood scraps into eco-friendly products such as decorative crafts, furniture components, or biomass briquettes, local communities can simultaneously reduce environmental waste and strengthen their economic resilience. Ngemplak District, part of Boyolali Regency in Central Java Province, is characterized by a combination of rural and developing urban areas (Maryono and Seruyaningtyas, 2019). While traditional crafts and local resources are abundant, issues such as a limited product range, conventional management practices, and inadequate marketing methods often hinder the economic empowerment of local craftsmen (Hendra et al., 2024; Yulianto et al., 2022).

Moreover, the younger generation tends to migrate to urban centers due to limited employment opportunities, leading to a gradual erosion of traditional craftsmanship and entrepreneurial continuity. For example, the community in Dibal Village, Ngemplak District, has historically lacked knowledge regarding the effective use of technology for marketing their micro, small, and medium enterprise (MSME) products (Yulianto et al., 2022). Similarly, efforts to develop processed vegetable products in Sindon Village, Ngemplak, have highlighted challenges in marketing development (Muhtadi et al., 2016). These cases reflect broader structural issues, including the digital divide, low innovation adoption, and the absence of business incubation facilities to support creative entrepreneurs. This context underscores the need for advanced strategies to enhance productivity, creativity, and competitiveness among these local enterprises. Integrating digital marketing, design innovation, and sustainable material utilization could serve as key levers for transformation. Collaborative programs involving universities, local governments, and industry partners can play a pivotal role in fostering digital literacy, value-added production, and global market access for rural MSMEs.

The global craftsmanship market is currently undergoing a significant transformation, driven by increasing consumer demand for unique, handcrafted, and sustainable products (Suntrayuth, 2017). However, many local craft communities, despite possessing distinctive skills and relying on abundant local materials, often face challenges in accessing broader—particularly international—markets due to issues related to product identity, quality consistency, and limited marketing capabilities. These barriers not only constrain income diversification but also limit opportunities for innovation and cultural branding within rural creative economies. The challenge also extends to the optimal management of waste materials, such as wood waste, which, if not properly utilized, can contribute to

environmental pollution and resource inefficiency (Pane et al., 2023). Developing sustainable approaches to upcycling such materials could therefore address both ecological and economic concerns. In Boyolali, several community-based initiatives have already demonstrated success in repurposing various forms of waste, such as transforming plastic waste into economically valuable products and converting used cooking oil into candles, indicating strong local receptiveness and adaptability toward sustainable practices (Ishartomo et al., 2020; Putri et al., 2023). Building on this momentum, the integration of creative design, green technology, and digital marketing could serve as a catalyst for expanding the market reach of local artisans. By promoting innovation-driven and environmentally conscious production systems, Boyolali's craft sector has the potential to position itself as a model for sustainable rural entrepreneurship and circular economy development in Indonesia.

The integration of AI into marketing strategies for creative products made from wood waste in Ngemplak District aligns with broader objectives of economic empowerment and sustainable development (Ibrahim et al., 2013; Suraji et al., 2024). By leveraging AI for enhanced market research, strategic planning (segmentation, targeting, and positioning), and optimized marketing actions, local craftsmen can not only increase their sales and income but also contribute to environmental sustainability by reducing wood waste (Huang and Rust, 2020). AI systems can support multiple levels of marketing intelligence: *mechanical AI* can automate repetitive marketing functions and facilitate data collection; *thinking AI* can process and analyze data for strategic decision-making, such as market analysis and customer targeting; and *feeling AI* can interpret interactions and human emotions to enhance customer understanding and product positioning.

Therefore, this paper aims to explore the application of Artificial Intelligence (AI) in enhancing the visual quality and design innovation of creative products made from wood waste within the craftsman community of Ngemplak District, Boyolali Regency. It seeks to identify how AI can assist local artisans in improving product aesthetics, optimizing design processes, and creating visually appealing, market-responsive, and sustainable products, thereby supporting both creative excellence and environmental sustainability.

METHOD

The implementation of the wood waste utilization program involves several stages: preparation and situation analysis, outreach and education, training and demonstration, mentoring and business development, as well as evaluation and sustainability. These stages ensure that wood waste is regarded as a valuable resource rather than mere waste. Through a structured and participatory approach, the community can develop both technical skills and an entrepreneurial mindset to maximize the economic and environmental potential of wood waste. The process also encourages behavioral transformation, promoting environmental awareness and circular economy practices at the local level.

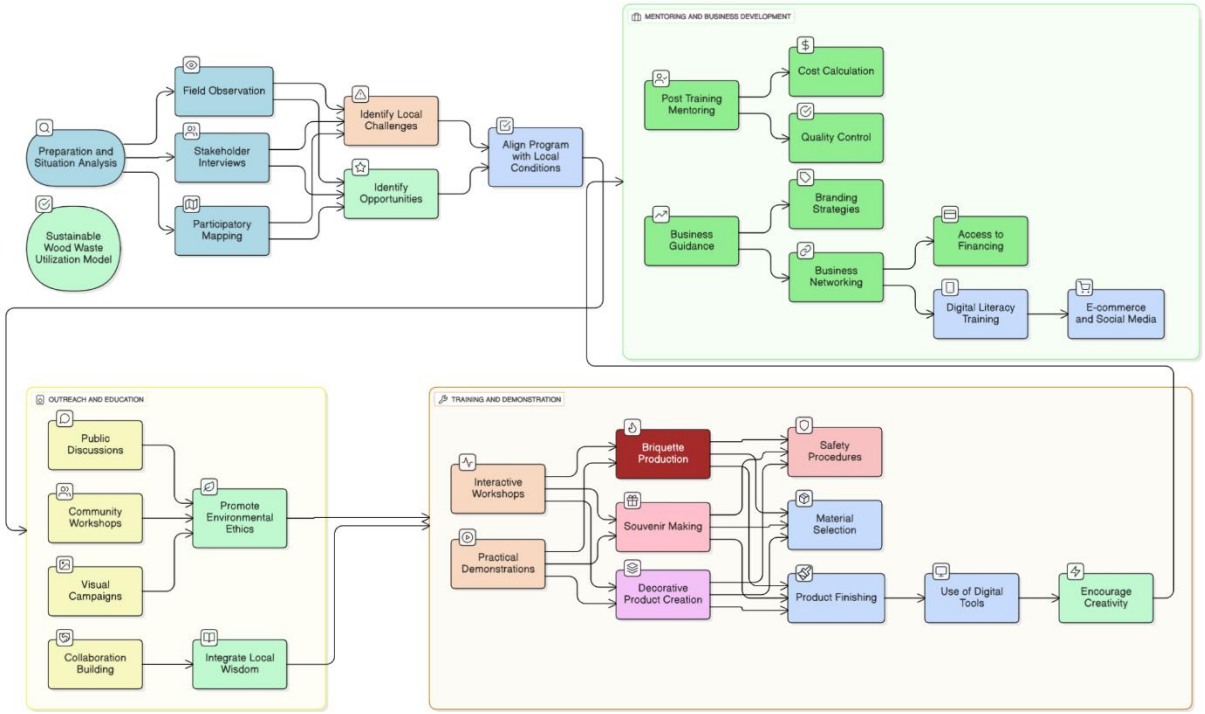

Figure 1. Wood Waste Utilization Program Implementation Flow

a. Preparation and Situation Analysis

This initial stage employs a participatory approach to understand the social, economic, and technical conditions of the target community. It involves field observation, stakeholder interviews, and participatory mapping to identify the types, quantities, and current handling practices of wood waste. This stage helps uncover local challenges such as limited access to processing technology, capital constraints, and weak market linkages, while also identifying potential opportunities such as available craftsmanship skills and community-based enterprises. Understanding the local context is essential for tailoring the program to specific needs and resources. In Pandeyan Village, Boyolali Regency, training and education on wood waste utilization were provided to furniture industry groups. Likewise, education was conducted on converting wood waste into briquettes as an alternative energy source. These activities emphasize the importance of aligning program design with local conditions to ensure relevance and sustainability.

b. Outreach and Education (Participatory Outreach)

This stage aims to build collective awareness that wood waste is a valuable resource rather than a disposable material. Awareness activities include public discussions, community workshops, and visual campaigns to reshape community perceptions of waste. Educational programs encourage participants to view wood residues as potential raw materials for new, marketable products. Effective waste management strategies often begin with changes in perception and the development of environmental ethics within the community. Outreach campaigns also foster collaboration among households, MSMEs, and local organizations, establishing a shared commitment to sustainable production. By integrating local wisdom with modern environmental principles, this stage creates a cultural foundation for long-term behavioral change.

c. Training and Demonstration

This core stage involves direct skill transfer through interactive workshops and practical demonstrations. Participants learn various processing techniques, such as converting sawdust into briquettes, producing wooden souvenirs, or combining wood fragments with resin for decorative products. The training incorporates safety procedures, material selection, and product finishing techniques to improve durability and visual appeal. Demonstrations are designed to encourage creativity and experimentation, allowing participants to explore innovative product designs using locally available tools and materials. This experiential learning approach builds participants' confidence and strengthens their problem-solving abilities. The inclusion of AI-assisted design tools or simple digital visualization software can further enhance product aesthetics and align outputs with market trends.

d. Mentoring and Business Development

Program success continues through post-training mentoring and ongoing business development support. Mentors assist participants in applying their new skills to real business contexts, guiding them in cost calculation, quality control, and branding strategies. This stage focuses on transforming technical competence into sustainable entrepreneurship. Mentorship also connects artisans with business networks, online marketplaces, and government programs that provide access to financing or production facilities. Furthermore, digital literacy training equips participants to utilize e-commerce platforms and social media marketing to expand their customer reach. These activities strengthen local economic ecosystems and promote inclusive, sustainable growth within rural creative industries.

e. Evaluation and Sustainability

The final stage focuses on evaluating the program's outcomes and formulating strategies for long-term sustainability. Evaluation is carried out through surveys, focus group discussions, and production data analysis to measure improvements in income, product quality, and community engagement. The sustainability plan considers ecological, economic, and social aspects, ensuring that activities continue beyond the project period. Continuous monitoring enables adaptive management, allowing the program to evolve in response to changing market and environmental conditions. Successful models can then be replicated or scaled up to other villages, contributing to broader regional development and supporting the achievement of Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth) and SDG 12 (Responsible Consumption and Production).

RESULTS AND DISCUSSION

The community service program conducted in Ngemplak District (Gambar 1), Boyolali Regency, was specifically designed to strengthen the digital capacity of local artisans through the integration of Artificial Intelligence (AI) in marketing activities. The initiative aimed to help wood waste craftsmen enhance their visibility in digital markets, increase business efficiency, and adopt sustainable, technology-driven approaches to creative production. The program was successfully implemented and produced significant measurable and qualitative outcomes. It involved 20 participants, all members of the Paguyuban Kajeng Suwito artisans' association, representing small and micro-scale furniture industries. According to post-activity evaluations, 90% of participants reported being very satisfied with the materials, methods, and facilitation, while the remaining 10% expressed satisfaction. Notably, none of

the respondents reported dissatisfaction, indicating a high level of acceptance and perceived relevance of the training content.

Figure 2. Condition of Wood Artisans in Ngemplak District, Boyolali Regency

The program focused on empowering local wood craftsmen through technology-based innovation and creative product development. Collaboration between the university team and the artisans aimed to introduce Artificial Intelligence (AI) applications to support digital marketing and improve product quality. The activity also included practical training sessions on processing wood waste using modern tools, allowing participants to gain hands-on experience in craftsmanship and technology integration. The program fostered enthusiasm, teamwork, and active learning among the participants, reflecting the shared commitment to

sustainable community development. Through this initiative, UNS successfully strengthened the connection between academic knowledge and local empowerment, demonstrating how science and technology can contribute to the growth of creative and environmentally responsible entrepreneurship.

Figure 3. Community Service Activities

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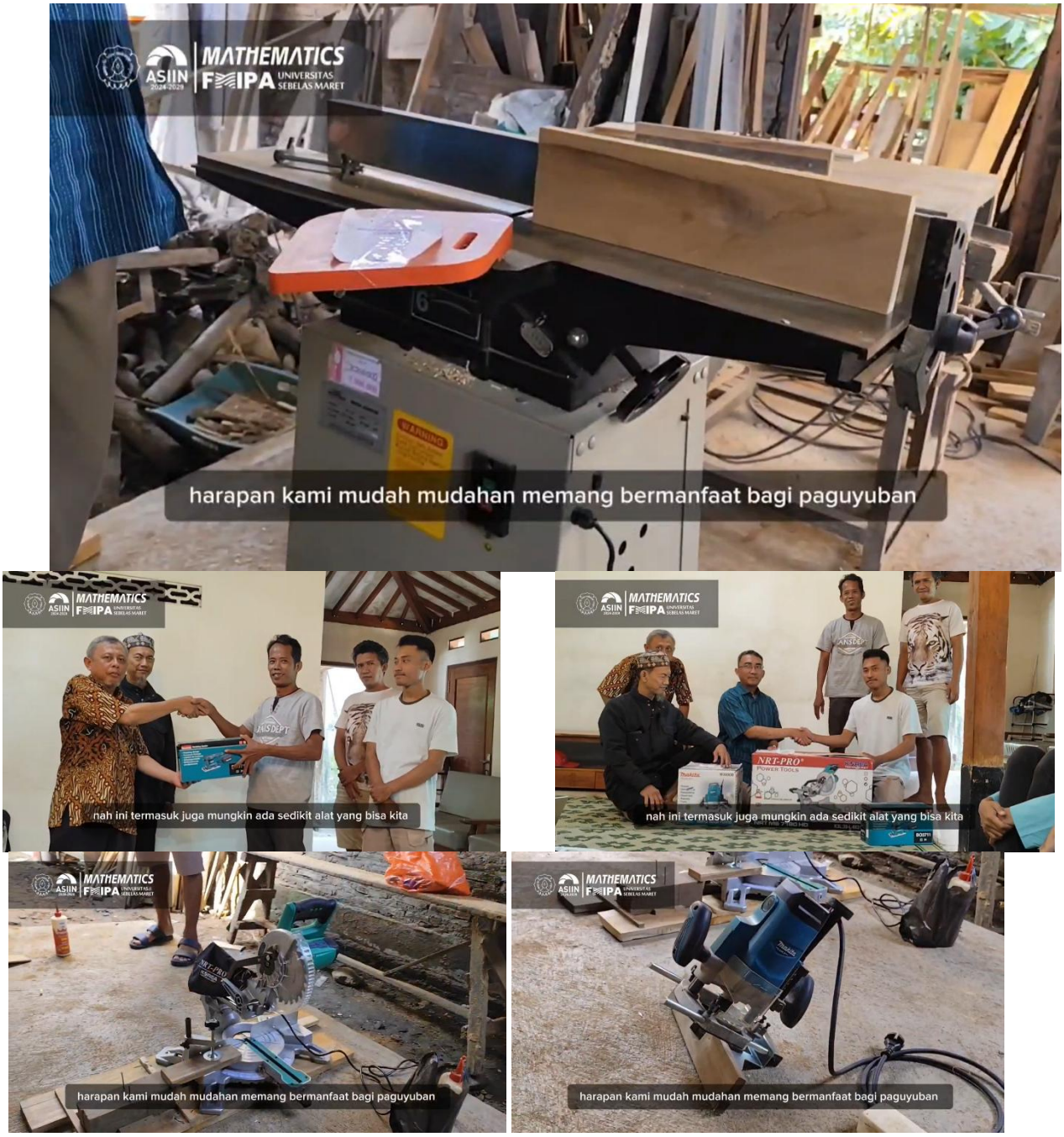

Figure 4. Woodworking tools were donated to support craftsmen's production

As part of the community service program, several production tools were also donated to the partner craftsmen in Ngemplak District to support their woodworking activities and enhance productivity (Figure 4). The donated equipment included a Wood Jointer, Router Machine, and a set of router bits for precision shaping and finishing, as well as a Mitre Saw for accurate cutting of wood materials. In addition, the artisans received engraving solder tools to support creative detailing and decorative design processes. To ensure continuous production, essential materials such as teak wood and Presto adhesive were provided, enabling the craftsmen to practice and develop product prototypes. A Sander Machine was

also included to improve surface finishing and product quality. The provision of these tools not only strengthened the production capacity of the local craftsmen but also encouraged the adoption of modern woodworking techniques to enhance efficiency, creativity, and sustainability in their small-scale industries.

In terms of participation, the program demonstrated consistent engagement, with full attendance across all training sessions. The comparison between pre-test and post-test assessments revealed a substantial increase in participants' understanding of digital marketing concepts and AI utilization, with an average score improvement of 35 points. In practical terms, 15 participants successfully completed the creation of no-code websites that incorporated simple chatbot features for automated customer interaction, representing a direct application of AI in microbusiness contexts. The introduction of AI-based tools also increased participants' confidence in digital entrepreneurship, as they could visualize how automation and online systems reduce workload and improve communication with potential customers. From a qualitative perspective, the training fostered active engagement and curiosity among participants. Discussions were highly interactive, with participants exchanging ideas on how AI could support not only marketing but also design optimization, inventory management, and product differentiation. Several artisans proposed follow-up collaborations to integrate AI-driven design or content generation for promotional materials, suggesting that the training successfully stimulated innovation and forward-thinking behavior. The participants also acknowledged that the program introduced them to a new digital ecosystem previously beyond their reach, broadening their perspective on the role of technology in creative industries.

Figure 5 shows the process of utilizing CapCut AI to enhance the visual quality and presentation of creative wood-based products. Using the AI-powered features in CapCut, such as AI image generation, AI stylization, and automatic lighting adjustment, the team was able to produce realistic and aesthetically appealing visuals that highlight the craftsmanship and texture of the wood products. The editing interface displays how AI tools were applied to generate multiple variations of product images, refine lighting, and create cinematic tones suitable for marketing and promotional materials. This approach demonstrates how artificial intelligence can be effectively used to support artisans in creating professional-quality digital content, improving product branding, and enhancing the overall storytelling of locally made creative products. Moreover, the process also enables users to experiment with different visual themes and compositions quickly, saving time in content creation. The integration of AI-driven editing tools not only simplifies the design process but also provides consistent visual standards for digital campaigns. As a result, the use of CapCut AI serves as an accessible and practical solution for small-scale artisans to elevate their online presence and strengthen the competitiveness of their creative industries.

The AI-generated visualization results created with CapCut effectively enhanced the aesthetic presentation of wood-based creative products, making them more appealing and professional for digital promotion (Figure 6).. By utilizing CapCut's AI features, such as image enhancement, background refinement, lighting adjustment, and style generation, the visual quality of each product was significantly improved to highlight its texture, color, and craftsmanship. These AI-assisted edits allowed artisans to transform ordinary product photos into captivating promotional visuals suitable for online marketing platforms and social media. The process not only simplified digital content creation but also empowered

local craftsmen to present their products competitively in broader markets. Through this approach, AI technology served as a bridge between traditional craftsmanship and modern digital marketing, supporting creative innovation and sustainable entrepreneurship in rural industries.

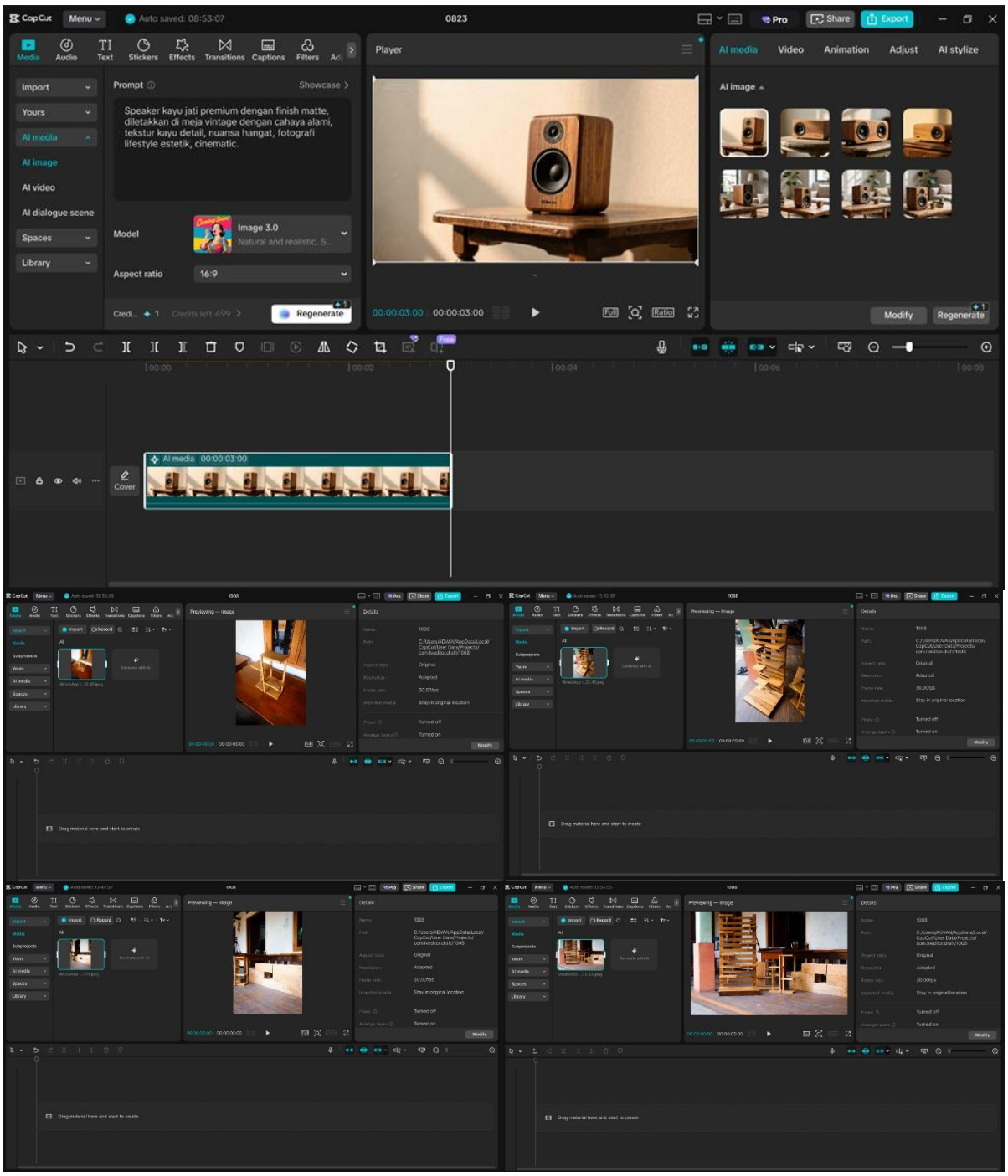

Figure 5. CapCut AI used to enhance and stylize wood product visuals.

Figure 6. AI-enhanced visuals of wood-based products created using CapCut

The training experience demonstrated that participants' willingness to adopt new technology is strongly influenced by their perception of its ease of use and benefits in daily operations. Direct exposure to AI-based applications through website creation increased both confidence and motivation to continue exploring digital tools in their marketing strategies. The results also showed that hands-on learning, peer collaboration, and contextual guidance are critical in encouraging technology adoption among rural artisans. Furthermore, the training successfully translated complex AI concepts into tangible, easy-to-use applications, bridging the digital literacy gap between rural artisans and urban entrepreneurs. The adoption of website-based AI tools reflected an inclusive and adaptive innovation process, in which technological advancement was aligned with local needs and resources. This inclusive approach not only facilitated economic empowerment but also contributed to sustainable community development by opening new access to digital economic opportunities.

A further indicator of program success was the shift in participants' attitudes toward technology. Initially, many artisans expressed uncertainty or even reluctance toward adopting AI due to its perceived complexity. However, after hands-on practice, participants demonstrated growing enthusiasm and technological confidence, reflected in their ability to design auto-response systems and utilize chatbot functions for real-time customer service. This behavioral transformation signified a critical step in fostering digital inclusion and lifelong learning within rural creative economies. In a broader context, this program illustrated how AI-based interventions can be localized and humanized to align with community learning capacities. The participatory approach—combining technical training, mentoring, and peer learning—ensured that knowledge transfer was inclusive and culturally sensitive. It also highlighted the potential of academic–community partnerships in promoting grassroots innovation and sustainable economic models. Future initiatives are expected to focus on developing a digital hub or innovation center in Pandeyan Village, where artisans can collaboratively enhance their digital products, share marketing data, and explore further applications of AI in product design and supply chain management.

In conclusion, the community service program in Pandeyan Village not only enhanced technical skills and digital literacy but also transformed participants' mindsets toward innovation, sustainability, and entrepreneurship. The initiative demonstrated that even small-scale artisans can effectively adopt AI technologies when provided with contextualized training, mentorship, and institutional support. This activity represents a scalable model for community empowerment, bridging the gap between traditional craftsmanship and modern technology while fostering inclusive, sustainable, and competitive rural economies.

CONCLUSION

The community service program implemented in Pandeyan Village, Ngemplak District, Boyolali Regency, has successfully demonstrated how the integration of Artificial Intelligence (AI) and digital technology can empower rural artisans and strengthen sustainable creative industries. Through a combination of participatory training, mentoring, and technological assistance, local wood craftsmen—members of the Paguyuban Kajeng Suwito—gained new skills in utilizing AI-based tools for digital marketing, product visualization, and design enhancement. The introduction of practical applications, such as CapCut AI for visual improvement and chatbot features for customer interaction, allowed participants to

experience first-hand how technology can increase product attractiveness, streamline promotional processes, and expand market access.

In addition to training, the donation of modern woodworking tools and materials significantly improved production efficiency and encouraged innovation in processing wood waste into high-value creative products. The participants' enthusiasm, active engagement, and measurable progress—reflected in higher post-training assessment scores and successful digital prototype creation—illustrate the program's tangible impact on local capacity building. Beyond skill improvement, this initiative fostered a mindset shift among artisans toward digital entrepreneurship and environmental sustainability, aligning with national goals for rural empowerment and the Sustainable Development Goals (SDGs), particularly Decent Work and Economic Growth (SDG 8) and Industry, Innovation, and Infrastructure (SDG 9).

Overall, the program not only strengthened the partnership between Universitas Sebelas Maret (UNS) and the local community but also created a replicable model for integrating AI-based innovation into small-scale industries. By combining traditional craftsmanship with modern technology, the initiative paved the way for inclusive, creative, and sustainable economic development—proving that digital transformation can begin from local villages and contribute meaningfully to broader national and global sustainability agendas.

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