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Community-Based Entrepreneurship Learning through Pyrography Training for Forest Product Technology Students

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Abstract

Students in the Forest Product Technology programme often possess theoretical knowledge of wood but lack practical competencies in creative product development and forest-based enterprise management. This community engagement initiative addressed that gap through a structured pyrography training programme conducted in partnership with WoodCraft SMEs in Loa Janan, Samarinda, whilst simultaneously strengthening the capacity of partner SMEs through product innovation and the expansion of academic networks. Using a Community-Based Learning (CBL) approach grounded in Knowledge-Based Community Development, the programme positioned students as agents of innovation, academics as facilitators, and the SME as a practical mentor. A total of 25 students from the 2021–2023 cohorts participated in practitioner presentations, production process observations, and hands-on pyrography practice. Outcomes demonstrated measurable improvements in students' understanding of pyrography techniques, local timber characteristics, and basic business management. Active participation throughout the sessions indicated a substantial strengthening of entrepreneurial competencies. For WoodCraft Samarinda, the programme generated increased business exposure and expanded academic networks. This initiative represents a replicable model of university–SME collaboration for building a sustainable, local-resource-based entrepreneurial ecosystem in the context of forestry higher education.

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Introduction

Students specialising in Forest Product Technology at the Faculty of Forestry and Tropical Environment, Mulawarman University, possess a basic understanding of timber and forest products; however, the majority have not yet gained direct experience in developing creative products with economic value or in managing small businesses based on forest products. An informal survey administered to 35 students from the 2021–2023 cohorts indicated that over 78% felt insufficiently equipped in the areas of product design, production cost calculation, digital marketing, and packaging—competencies that are integral to operating a creative forest-product enterprise. Furthermore, in-depth interviews with supervising lecturers confirmed that existing curricula in the Forest Product Technology programme place greater emphasis on technical and scientific dimensions, with limited structured exposure to entrepreneurial practice. Students tend to view forest products solely from a technical or technological perspective, whilst aspects such as product design, packaging, digital marketing, and cost calculations—including production costs—have not yet been internalised as practical skills. On the other hand, the need to strengthen

entrepreneurial soft skills, design creativity, and business literacy is highly relevant to the demands of the 'Campus Autonomy' initiative and the Key Performance Indicators (KPIs) that encourage students to be self-reliant and competitive in the workplace (Huda et al., 2024).

The development of entrepreneurial competencies among forestry students requires more than classroom instruction; it demands experiential exposure to real-world business environments. Theoretically, this aligns with Experiential Learning Theory, which posits that meaningful learning occurs through a cyclical process of concrete experience, reflective observation, abstract conceptualisation, and active experimentation (Kolb et al., 2014). Several previous community engagement studies have similarly demonstrated that direct industry interaction effectively enhances student entrepreneurial intention, for example, Jumawan and Ali (2020) documented improved craft business competency following hands-on training with wood waste processing enterprises in Sulawesi, and Huda et al. (2024) confirmed significant gains in professional soft skills through structured industry visits. However, few studies have specifically integrated pyrography as the medium for entrepreneurship education in a forestry context. Meanwhile, in today's era of globalisation, the demand for timber and wood products is rising in line with population growth and is certain to continue increasing in the future (Daviyana et al., 2013; Jumawan & Ali, 2020; Ningrum & Yuniawati, 2023; Setianingsih & Yeni, 2024). Samarinda, as a timber industry city, has great potential for the development of wood-based craft enterprises. The timber industry is an economic sector concerned with the processing of timber into various products, ranging from building materials and furniture to paper products. This industry involves various activities, including logging, sawmilling, further processing, and the trade of timber and its derivatives (Tirkaamiana et al., 2025). Pyrography (the art of wood-burning) is the art of painting on wood or other materials by burning marks or patterns using a tool heated in a controlled manner (Ali, 2025). This art form is one of the techniques that can transform wood into decorative products of high economic value (Walitalo, 2023). Pyrography, as the art of burning wood, offers a powerful combination of the characteristics of tropical timber, design creativity, and market opportunities for personalised products (custom gifts, institutional mementoes, and forestry souvenirs), making it relevant to strengthening the identity of the Faculty of Tropical Forestry and the Environment. Through a partnership with the WoodCraft SME, this community engagement programme serves as a platform for transferring specific skills, business management training, and the economic empowerment of students to develop small-scale enterprises based on non-timber forest products and the utilisation of wood waste.

The selection of the WoodCraft SME in Loa Janan was based on the relevance of its field (woodcraft/pyrography), its geographical proximity to the campus, and the partner's willingness to provide practical training, work placements and direct mentoring for students. This situation makes this community engagement activity an appropriate response to the need to enhance students' entrepreneurial capacity whilst strengthening the competitiveness and sustainability of partner woodcraft SMEs. Therefore, this initiative aims to foster entrepreneurial interest among students of the Forest Products Technology programme through intensive learning about pyrography businesses run by local SMEs, viewed through the lens of materials science and value-added diversification, whilst empowering partner SMEs through product innovation and capacity building.

Implementation Method

This community service activity was held on 9 December 2025 at the WoodCraft Handicrafts micro, small and medium-sized enterprise (SMEs), located in Loa Janan, Samarinda, East Kalimantan. This activity utilised a community-based learning approach with collaborative and knowledge-based community development strategies. This approach involved students as agents of innovation based on theories of forestry and materials science, academics as research supervisors and facilitators, and MSMEs as practical mentors and experimental partners. The implementation stages of this PKM activity were as follows:

1. Internal preparatory meeting
   At this step, the implementation team held an internal meeting to draw up a technical plan, allocate tasks to each member, and identify the partners' requirements in greater detail.
2. Coordination and agreement with partners
   At this step, coordination takes place with the Owner of Woodcraft Samarinda to finalise the activity schedule, the presentation materials to be delivered, and the tour itinerary of the production process at the workshop. This coordination process is carried out directly by the Implementation Team and the Owner of Woodcraft Samarinda at the Woodcraft Samarinda production facility to agree on the technical details of the implementation.
3. Field visit implementation
   The implementation of the activities followed the pre-arranged schedule, which served as the primary guide for the entire series of events from start to finish. The activities began with the students' departure from the campus, including participant registration, a brief briefing on the purpose of the visit, and an explanation of the rules and regulations whilst at the partner's premises.
4. Activity evaluation
   At this step, an evaluation is carried out by the organising team once the entire series of activities has concluded, as part of an effort to assess the overall effectiveness of the programme.

Results and Discussion

A. Implementation of Community Service Activities

This community service activity was specifically organised for students specialising in Forest Product Technology at the Faculty of Forestry and Tropical Environment, Mulawarmam University, from the 2021, 2022 and 2023 cohorts. A total of 25 registered participants took part in this visit, which was carried out in accordance with the prepared schedule. The event began with an opening address by the Deputy Dean for Student Affairs, Alumni, and Cooperation at the Faculty of Forestry and Tropical Environment, Mulawarman University, who emphasised the importance of fostering an entrepreneurial spirit among students, followed by a presentation from a representative of the SME partner, who outlined a brief profile of the business. Following the opening session, the students attended a presentation by the owner of the WoodCraft Samarinda SME, who discussed the journey of establishing the business, the development of the woodcraft business, and the stages of the pyrography product-making process. The participants' enthusiasm was evident, particularly when the speaker explained practical experiences and strategies for survival in the creative SME sector, accompanied by a simple demonstration of pyrography

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techniques and how to use carving tools, allowing participants to observe the application of technical skills in the production process first-hand (Figures 1 and 2).

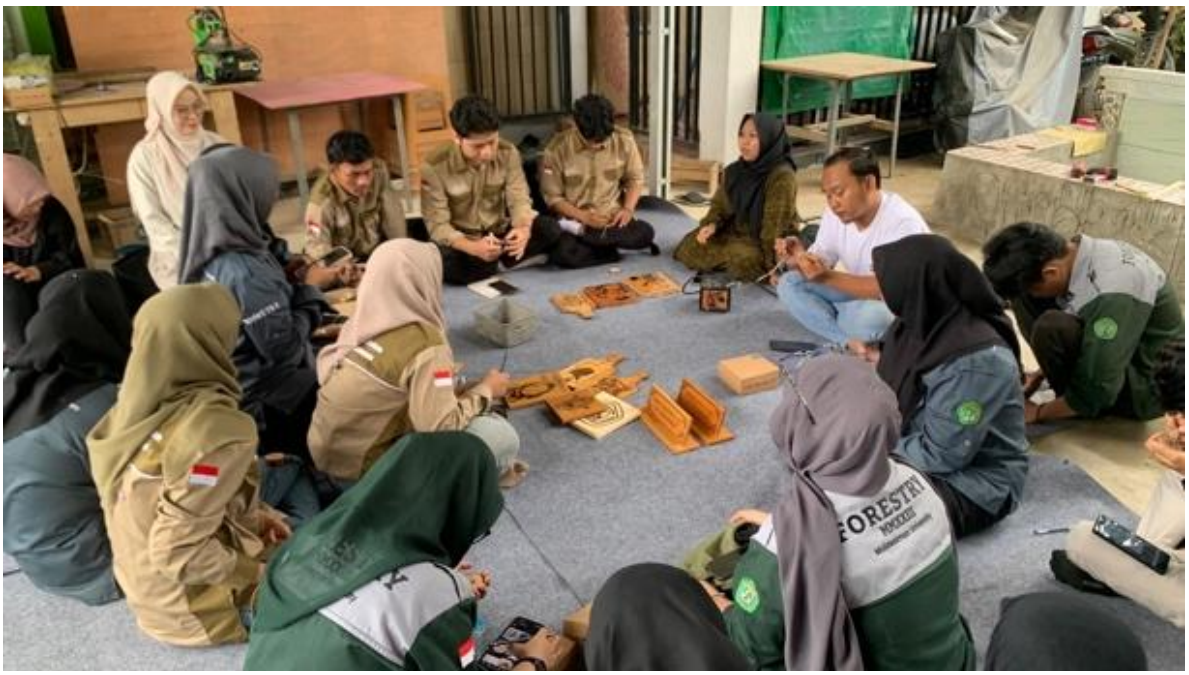

Figure 1. The speaker (Owner of Woodcraft) demonstrates how to create pyrography

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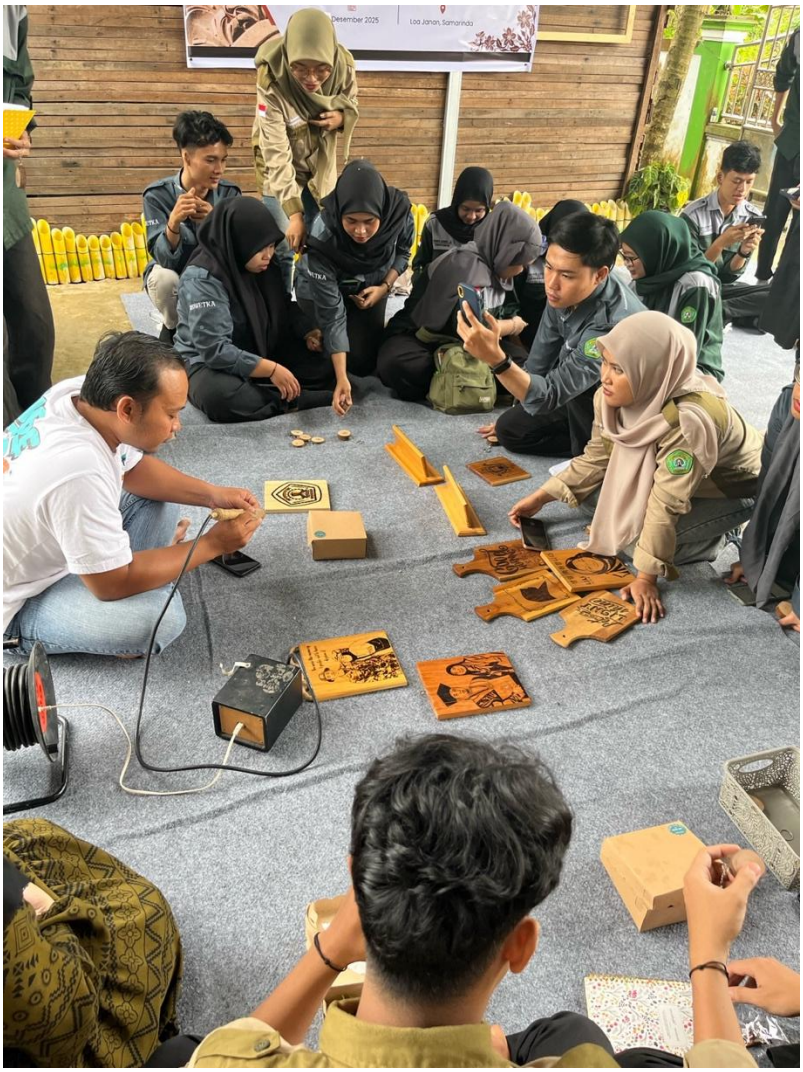

Figure 2. The speaker demonstrates how to use the carving tool

In the following session, students were given the opportunity to gain hands-on experience by attempting to carve wood using pyrography tools according to designs they had created themselves (Figure 3). This direct involvement boosted the participants' enthusiasm as they were able to experience the creative process first-hand, from operating the tools to producing unique products with commercial potential (Figure 4). Through this practical activity, students gained an applied understanding of how a creative product based on forest products is processed, given aesthetic added value, and prepared for market entry. The series of activities concluded with a question-and-answer session, the sharing of impressions and messages by student representatives, the presentation of a plaque to the SME partner, and the Implementation Team also received a memento from the partner as a token of appreciation and to strengthen the collaboration (Figure 5), followed by a group photo (Figure 6). Overall, the event proceeded in an orderly, communicative, and interactive manner, reflecting the achievement of the learning objectives and the establishment of constructive collaboration between the students and the partner SMEs.

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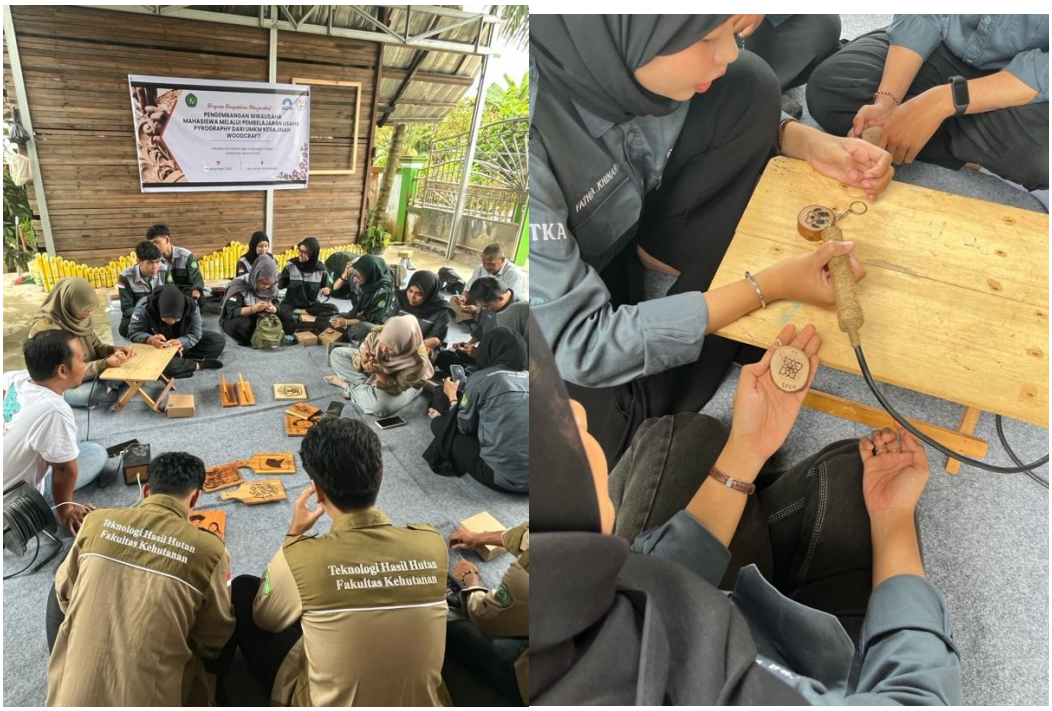
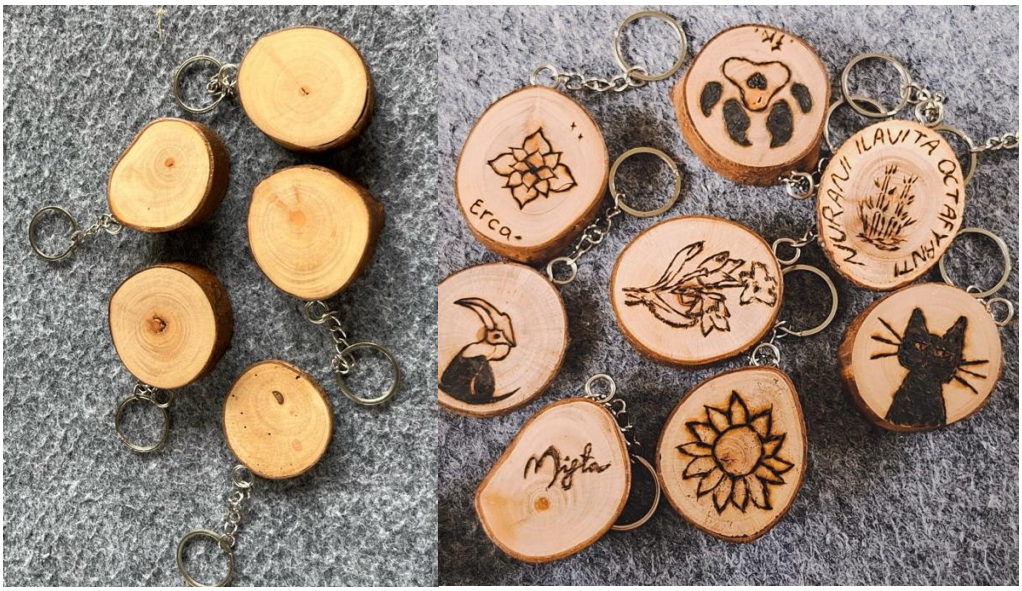


Figure 3. Students creating pyrography works in a practical session



(a) (b)

Figure 4. Students' pyrography work: (a) before engraving, (b) after engraving

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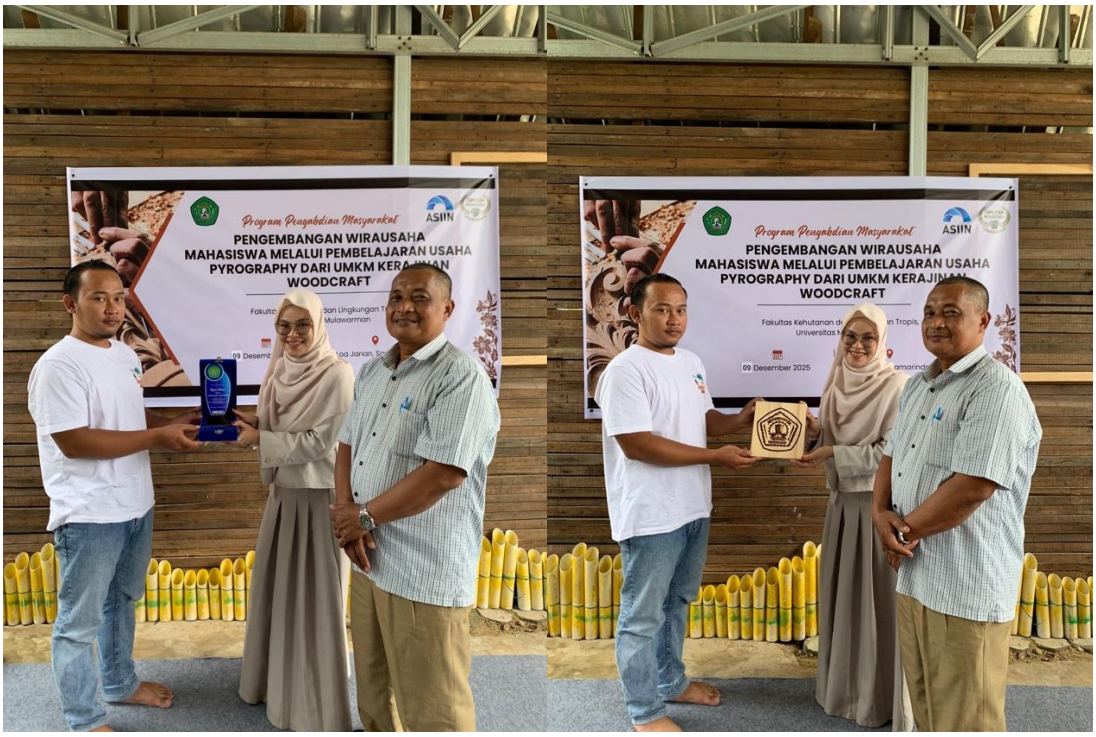

(a) (b)

Figure 5. (a) Presentation of souvenirs to partners and (b) receipt of souvenirs from partners

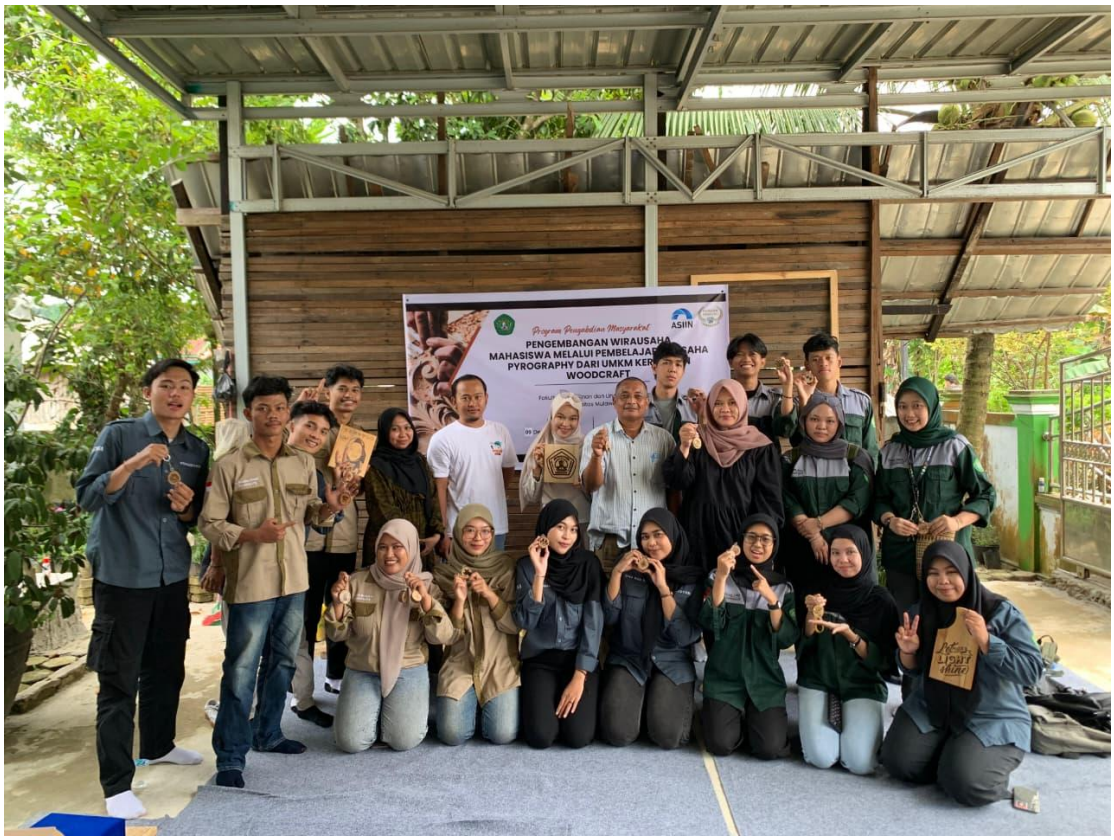

Figure 6. Group photo with partners, participants, and the organising team

B. Evaluation and Outcomes of Community Service Activities

Based on observations and verbal feedback, the students showed great enthusiasm throughout the event, particularly during the discussion sessions and the practical pyrography workshop. The SMEs stated that the visit had a positive impact, particularly in terms of increasing the exposure and awareness of their businesses amongst the student body. Overall, the activity was deemed to have run smoothly, was relevant to the students' learning needs—particularly those of students specialising in Forest Product Technology—and provided tangible benefits for the SMEs; consequently, the programme is considered worthy of replication and further development in future community service activities.

The outcomes of this community engagement programme encompass three interconnected dimensions: individual competency development, tangible product creation, and collaborative ecosystem formation. In terms of individual competency, participants demonstrated measurable progress across the four stages of Kolb's experiential learning cycle: they engaged with concrete pyrography experience, reflected on the technical and aesthetic dimensions of wood selection, conceptualised the application of timber properties knowledge to creative product design, and actively experimented with pyrography tools to produce their own works. This multi-stage learning process distinguishes the programme from conventional lecture-based entrepreneurship education, and aligns with the findings of Farnsworth (2010), who emphasised that community-based learning settings generate deeper identity formation and skill internalisation than classroom instruction alone. In terms of tangible outcomes, each participant produced at least one pyrography work during the practical session, demonstrating the direct application of theoretical knowledge of wood surface characteristics to a marketable product. The quality and diversity of student outputs confirmed that short-duration, immersive pyrography training is sufficient to achieve a foundational level of craft competency. The activity outcomes were fully aligned with the programme's dual objectives: fostering students' entrepreneurial spirit grounded in forest product technology, and strengthening the capacity of WoodCraft Samarinda as a local SME partner. At the ecosystem level, this activity not only resulted in improved individual competencies and tangible products but also fostered a collaborative ecosystem between the university and business operators. The potential for sustainability of this collaboration is supported by the SME partner's expressed willingness to serve as a long-term industry mentor for future student cohorts, as well as the identified opportunities for follow-up programmes involving student-led product development under practitioner guidance.

Conclusion

This community engagement initiative has proven successful in achieving its primary objective. Of the 25 participating students, verbal feedback and observational records indicate that all participants were able to operate pyrography tools independently by the end of the practical session and articulate at least three key characteristics of local timber species relevant to pyrography work. The active participation of students in lectures, discussions, field observations and hands-on pyrography sessions demonstrates that this programme effectively bridges the gap between theoretical knowledge of forest product technology and its practical application in the development of creative enterprises. For the WoodCraft Craft SMEs, this activity provided added value through increased business

exposure, the opening up of product development opportunities, and the expansion of networks with the academic community, which supports the prospects for business sustainability. At the institutional level, this programme represents an effective model of collaboration between higher education institutions and SMEs in building a local resource-based entrepreneurial ecosystem oriented towards sustainability and empowerment. To enhance the effectiveness of future initiatives, similar programmes should be designed with greater duration and frequency, so that students can develop their technical and managerial competencies in a more progressive and consolidating manner. Sustained post-activity support, in the form of entrepreneurship mentoring or business incubation programmes, should likewise be made available to students who wish to pursue pyrography as a commercial venture, enabling nascent entrepreneurial potential to be guided and facilitated in a systematic and accountable way. The partnership with WoodCraft Samarinda should be formalised and expanded to encompass structured internship placements, applied research collaborations, and digital marketing assistance, so that the benefits accrued by both parties are measurable, reciprocal, and sustainable over the long term.

Acknowledgment

The authors would like to thank the Deputy Dean for Student Affairs, Alumni and Collaboration at the Faculty of Forestry and Tropical Environment, Mulawarman University, for facilitating this community service initiative, as well as our partner, the Woodcraft Samarinda SME, for their willingness to share their knowledge and experience in carrying out the activities.

Author Contribution Statement

AZ: Contributed as executive chairperson, responsible for coordinating the entire programme of activities, liaising with the Woodcraft Samarinda SME partner, and drawing up the schedule for the activities; ER: Contributed as a member of the executive team, responsible for coordinating the participation of Forest Product Technology students in the activities, and preparing all necessary equipment during the event; ADF: Contributed as a member of the executive team, responsible for preparing the technical aspects of the activities, assisting with the scheduling, and organising the transport of participants to the Woodcraft SME location.

Ai Disclosure Statement

The author notes that, during the writing of this article, Google Scholar was utilised to locate journal references pertinent to the theme of community service, while Grammarly was employed to enhance the linguistic structure and writing style. The application of these two tools was strictly for technical support, and the author assumes full responsibility for the accuracy of the content, its originality, and the academic integrity of this manuscript.

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