e-ISSN: 2745-9535
No. 105/E/KPT/2022
Jurnal Pengabdian Masyarakat
Member of: AJEBI
Editorial Office: Jl. Soekarno-Hatta, Rembuksari No. 1A, Malang, East Java, Indonesia, 65113
Contact: Phone: +62 (341) 478494 e-mail: jpm@asia.ac.id
The journal is published by Institut Teknologi dan Bisnis Asia Malang
Website: https://jurnal.stie.asia.ac.id/index.php/jpm
Indexed in: Google Crossref neliti GARUDA Journal Dimensions

Training on the Utilization of Coconut Husk Waste into High-Value and Environmentally Friendly Industrial and Agricultural Products (Coco Peat, Bistel, and Coco Bristle)

[1]Nani Rohaeni*, [2]Abdur Rahman Irsyadi, [1]Gema Ika Sari, [1]Basrowi, [1]Bambang Dwi Suseno, [1]Azimi Faqqihuddin Arsyad, [1]Muhammad Fahmi Baehaqi, [1]Indriana Puspitasari

[1]Universitas Bina Bangsa, Indonesia
[2]Institut Bisnis dan Komunikasi Swadaya, Indonesia
*Corresponding author
Email: nani.rohaeni@binabanga.ac.id

Volume
7
Issue
1
Edition
May
Page
342-355
Year
2026

Article History

Submission: 21-05-2026
Review: 22-05-2026
Accepted: 24-05-2026

Keyword

Community Empowerment;
MSMEs;
Local Food Chips;
Entrepreneurship Training;
Creative Economy;

How to cite

Rohaeni, N., Irsyadi, A. R., Sari, G. I., Basrowi, Suseno, B. D., Arsyad, A. F., Baehaqi, M. F., & Puspitasari, I. (2026). Training on the Utilization of Coconut Husk Waste into High-Value and Environmentally Friendly Industrial and Agricultural Products (Coco Peat, Bistel, and Coco Bristle). Jurnal Pengabdian Masyarakat, Volume 7(1), 342-355. https://doi.org/10.32815/jpm.v7i1.3009

Abstract

Purpose: This community empowerment program aimed to improve community knowledge, technical skills, and entrepreneurial interest in utilizing coconut coir waste to produce environmentally friendly and high-value products, namely coco peat, bistel (coco fiber), and coco bristle. The program addressed the issue of underutilized agricultural waste and the limited public awareness regarding its economic potential for supporting sustainable local economic development..

Method: The program employed a participatory approach involving lectures, demonstrations, hands-on practice, interactive discussions, and technical assistance. The participants consisted of 17 community members and local small business actors. The effectiveness of the program was evaluated through observations and comparisons of participants' knowledge and skill levels before and after the training activities.

Practical Applications: The findings provide practical implications for community empowerment and sustainable waste management. The acquired skills can be applied in the development of small-scale businesses based on coconut coir processing, contributing to value-added product creation, income generation, and environmentally friendly agricultural and industrial practices.

Conclusion: The program significantly improved participants' knowledge and technical skills in processing coconut coir waste into valuable products. The findings indicate that coconut coir utilization can support community economic empowerment, reduce organic waste, and promote sustainable local resource-based industries.

343) Training on the Utilization of Coconut Husk Waste into High-Value and Environmentally Friendly Industrial and Agricultural Products (Coco Peat, Bistel, and Coco Bristle), Rohaeni, N., Irsyadi, A. R., Sari, G. I., Basrowi, Suseno, B. D., Arsyad, A. F., Baehaqi, M. F., & Puspitasari, I.

Introduction

Coco peat, bistel (coco fiber), and coco bristle are coconut coir-derived products with high economic value and significant potential to support the development of environmentally sustainable industries. Indonesia, as one of the largest coconut-producing countries in the world, generates substantial amounts of coconut coir waste annually. Data from the Food and Agriculture Organization indicate that Indonesia ranks among the top three coconut-producing countries globally, with production exceeding 17 million tons per year (FAO, 2024). However, a large proportion of coconut coir waste remains underutilized and is often burned or left to accumulate, resulting in environmental pollution problems.

In fact, coconut coir contains natural fibers that can be processed into various value-added industrial and agricultural products. Approximately 35% of a coconut consists of coir, which is composed of fiber and fine powder (peat). This potential creates substantial opportunities for community economic development through agro-industrial activities and circular economy practices. According to research conducted by the Ministry of Industry of the Republic of Indonesia, the utilization of coconut coir can increase the economic value of waste materials by more than five times compared to selling coconuts as raw products without further processing (Ministry of Industry of the Republic of Indonesia, 2023).

Coco peat is currently widely utilized as a modern growing medium due to its high water retention capacity, ability to improve soil aeration, and environmentally friendly characteristics as an alternative to peat moss. Global demand for coco peat continues to increase alongside the expansion of hydroponic agriculture and urban farming practices. International market data indicate that the global coco peat market is projected to grow by more than 8% annually through 2030, driven by increasing demand for organic and sustainable growing media (Mordor Intelligence, 2025). In addition, coco fiber or bistel products also possess substantial export potential because they are widely utilized in the automotive, furniture, geotextile, and erosion control industries.

Meanwhile, coco bristle is widely utilized as a raw material for producing brooms, industrial brushes, doormats, and various household products. This product has high durability, water resistance, and is more environmentally friendly than synthetic materials. The increasing trend toward the use of natural materials in global industries has also contributed to rising demand for coconut fiber-based products. This condition indicates that coconut coir waste should no longer be regarded merely as agricultural waste, but rather as a valuable source of raw materials for green industries with significant economic potential.

Despite its considerable potential, the community's ability to process coconut coir into value-added products remains relatively limited. Many farmers and small business actors still lack knowledge regarding fiber separation techniques, coco peat processing methods, and quality standards for coconut coir-based industrial products. Limitations in knowledge, technical skills, and access to technology have prevented the economic potential of coconut coir from being fully utilized. Therefore, training programs are needed to enhance community capacity in processing coconut coir waste into environmentally friendly industrial and agricultural products with high economic value.

Training on the utilization of coconut coir waste into coco peat, bistel, and coco bristle is expected to become a strategic solution for supporting community empowerment, reducing organic waste, creating new business opportunities, and improving local economic income. Furthermore, this training program aligns with the concept of sustainable development by promoting the efficient and environmentally responsible utilization of local resources.

Figure 1. Training Session Activities

Source: Private Documentation, 2026.

Coconut coir is an agricultural waste material with significant economic value because it can be processed into various derivative products, including coco peat, coco bristle, and coco fiber (bistel). These products differ in terms of physical characteristics, material properties, processing methods, and applications in agricultural and industrial sectors. The processing of coconut coir into value-added products also supports the concepts of circular economy and environmentally sustainable industries by reducing organic waste and increasing community income through agro-industrial development (Suhas et al., 2022).

Coco peat is a fine powder produced through the crushing and screening process of coconut coir. This material has a soft texture similar to peat moss and is widely used as an alternative growing medium in modern agricultural systems. Coco peat has excellent water absorption and retention capacity, is lightweight, and contains organic components that support plant growth (Abad et al., 2021). Therefore, coco peat is commonly utilized in hydroponic systems, soil mixtures, plant nurseries, and soil moisture retention applications.

In the horticultural sector, coco peat is considered more environmentally friendly than peat moss because it is derived from renewable resources and can naturally decompose. Furthermore, its porous structure improves aeration and maintains moisture balance in growing media, thereby supporting optimal plant root development (Evans & Stamps, 2020).

Coco bristle, also known as coco brush fiber, is a coarse coconut coir fiber characterized by a longer, stronger, and stiffer structure compared to coco peat. This product is obtained through the separation of long fibers from coconut coir tissues, followed by drying and sorting processes based on quality standards. The main characteristics of coco bristle include high water resistance, good elasticity, and strong abrasion resistance, making it suitable for use as a raw material in household and cleaning industries (Ramesh et al., 2021).

Coco bristle is widely utilized in the production of brooms, industrial brushes, doormats, and various other brush-based products. The primary advantage of this material lies in the strength of its fibers, which are resistant to breakage and more durable than several other types of natural fibers. Due to these characteristics, coco bristle possesses considerable economic value in natural fiber-based manufacturing industries.

Coco fiber, also known as bistel, is coconut coir fiber that has been separated from the pith or fine powder components. This fiber has a long, flexible, strong structure and naturally brown coloration. Compared to coco peat, coco fiber has a coarser texture while maintaining flexibility, making it suitable for various industrial applications (Sathishkumar et al., 2023).

The applications of coco fiber are extensive, including its use as filling material for vehicle seats, mattresses, ropes, geotextiles, erosion control mats, and various handicraft products. In the construction and environmental sectors, coco fiber is utilized as a natural geotextile material due to its ability to control soil erosion and its biodegradable properties. Furthermore, the international demand for coco fiber continues to increase because it is

considered an environmentally friendly material capable of replacing synthetic materials in the automotive and furniture industries (Nugraha & Prasetyo, 2022).

In general, the primary differences among coco peat, coco bristle, and coco fiber lie in the size and structural characteristics of the fibers derived from coconut coir processing. Coco peat is in the form of fine powder predominantly used as a growing medium, coco bristle consists of coarse fibers utilized for household and industrial cleaning purposes, while coco fiber is composed of long fibers commonly applied in the furniture, automotive, and geotextile industries. The diversification of coconut coir products demonstrates that agricultural waste can be transformed into high-value commodities with significant export competitiveness.

Table 1. Summary of Differences among Coconut Coir-Derived Products

Product	Form	Texture	Main Function
Coco Peat	Fine powder	Soft	Growing medium
Coco Bristle	Coarse fibers	Rigid	Brooms, brushes
Bistel/Coco Fiber	Long fibers	Flexible and strong	Vehicle seats, mattresses, geotextiles

Source: Author's Work, 2026.

Therefore, a single raw material, namely coconut coir, can be processed into various products with distinctly different functions depending on the processing methods applied.

Method

The training program on the utilization of coconut coir waste into high-value industrial and agricultural products was implemented using a participatory and community empowerment-based approach. This approach was selected because it positions participants as the primary subjects in the learning process through active involvement at every stage of the activity. According to Chambers (2021), participatory approaches can enhance the effectiveness of knowledge and skills transfer because communities are directly involved in the processes of problem identification, practical implementation, and activity evaluation. The training implementation method integrated the concept of learning by doing through a combination of material presentations, demonstrations, hands-on practice, group discussions, and technical assistance. This approach is considered effective in improving community vocational skills based on local resource potential and agricultural waste processing (Sulaeman & Nugroho, 2022).

The preparation stage was carried out prior to the implementation of the training program with the objective of ensuring the technical readiness, training materials, and participant preparedness. At this stage, several activities were conducted, including the identification of coconut coir waste potential within the target area, coordination with community members or partner groups, preparation of training modules, and provision of tools and materials required for the production of coco peat, coco fiber (bistel), and coco bristle. In addition, a preliminary observation was conducted to assess participants' level of knowledge regarding coconut coir processing and business opportunities related to coconut-derived products. Field observations are important to ensure that the training program is designed according to community needs and local conditions (Creswell & Creswell, 2023).

The equipment prepared for the training included a coconut coir processing machine, screening equipment, drying equipment, weighing scales, storage containers, and supporting tools required for the production process. The primary raw material used in the program was coconut coir waste collected from the surrounding community.

The training program was implemented using several learning methods, as follows:

a. Delivery of Theoretical Materials

Participants were provided with an understanding of the economic potential of coconut coir, various derivative products, environmental benefits, processing techniques, and market

opportunities for coco peat, bistel (coco fiber), and coco bristle products. The materials were delivered through interactive lectures and group discussions to enable participants to understand the fundamental concepts of waste processing based on circular economy principles. The training materials also included aspects of entrepreneurship, product packaging, and basic marketing strategies aimed at increasing the market value of the products generated through the training program. According to Kotler and Keller (2022), marketing knowledge is an important factor in the development of community-based businesses.

b. Demonstration of Coconut Coir Processing

The demonstration stage was conducted to provide participants with direct exposure to the coconut coir processing procedures, beginning with raw material selection, fiber decomposition, separation of coco peat and fiber, and continuing through drying and product packaging processes. The demonstration aimed to provide a practical understanding of appropriate production standards, enabling participants to understand work procedures systematically and safely. Demonstration-based learning methods have been proven effective in improving participants' technical understanding in practice-oriented skills training programs (Sudjana, 2020).

c. Hands-on Practice

Participants in the training program were directly involved in hands-on activities related to processing coconut coir into three main products, namely coco peat, coco fiber (bistel), and coco bristle. During this stage, participants were divided into several working groups to ensure that all participants had the opportunity to gain direct practical experience. The practical activities included several stages, beginning with coconut coir shredding, separation of fibers and fine particles, drying, screening, and ending with the packaging of the final products. Technical assistance was provided throughout the practical sessions to ensure that the resulting products met basic industrial quality standards.

d. Mentoring and Evaluation

Following the completion of the practical activities, follow-up mentoring sessions were conducted to assist participants in understanding technical production challenges and potential business development opportunities. Program evaluation was carried out through observations of participants' skills, feedback discussions, and assessments of the products generated during the training process. Training evaluation is important for measuring the effectiveness of a program in improving community knowledge and skills. According to Kirkpatrick and Kirkpatrick (2021), training evaluation can be conducted by measuring participants' reactions, knowledge improvement, skill development, and the potential implementation of the acquired competencies.

Data for this program were collected through observations, interviews, documentation, and assessments of participants' practical outputs. Observations were conducted to determine participants' levels of participation and practical skills throughout the training activities. Interviews were carried out to obtain information regarding participants' understanding of the training materials and the potential for developing coconut coir-based business opportunities.

Documentation was conducted in the form of activity photographs, implementation records, and participants' product outputs as supporting materials for evaluation and reporting purposes. The combination of these data collection techniques aimed to obtain more comprehensive information regarding the effectiveness of the training program (Sugiyono, 2022).

The success indicators of the training program included the following:

1. Increased participants' knowledge regarding the utilization of coconut coir waste.
2. Participants being able to independently practice the production of coco peat, coco fiber, and coco bristle.
3. The development of basic entrepreneurial skills related to coconut coir-derived products.

4. Increased community awareness regarding environmentally friendly waste management practices.
5. The creation of products with economic value and market potential as outcomes of the training program.

Results

The training program on the utilization of coconut coir waste into high-value industrial and agricultural products was conducted with the participation of 17 community members and local business actors. The training focused on enhancing participants' capabilities in processing coconut coir into three main products, namely coco peat, bistel (coco fiber), and coco bristle, which possess economic value and environmentally friendly characteristics.

Prior to the implementation of the training, a pre-test was conducted to assess participants' initial knowledge and skills related to coconut coir processing. The pre-test results indicated that most participants had limited knowledge regarding techniques for converting coconut coir into value-added products. Of the 17 participants, only approximately 3% had basic competencies in coconut coir processing, while the remaining participants lacked understanding of production techniques, fiber separation methods, and the marketing potential of coconut coir-derived products.

Following the implementation of the training program through lectures, demonstrations, hands-on practice, and technical assistance, a substantial improvement in participants' competencies was observed. The post-test results showed that approximately 92% of participants were able to understand and independently practice the processing of coconut coir into coco peat, bistel, and coco bristle. This improvement demonstrates that hands-on training methods based on the learning by doing approach are effective in enhancing community skills based on local resource potential.

In addition to improving technical competencies, participants also demonstrated increased understanding regarding environmentally friendly waste management practices and business opportunities based on circular economy principles. Participants began to recognize that coconut coir waste, which had previously been considered to have little value, could be transformed into products with high market value for agricultural and household industry sectors. This outcome contributed positively to strengthening community entrepreneurial motivation.

The implementation of the training program also resulted in the production of several prototype products, including ready-to-use coco peat for planting media, bistel/coco fiber for handicraft and industrial applications, and coco bristle for household purposes. The products generated through participants' practical activities demonstrated satisfactory quality, particularly in terms of material cleanliness, moisture reduction level, and fiber separation processes. The technical assistance provided throughout the practical sessions helped participants understand basic production standards, thereby enabling the resulting products to have potential for further development as productive economic enterprises.

Table 2. Participants' Knowledge and Skill Levels Before and After the Training Program

No	Assessment Category	Before Training (Pre-Test)	After Training (Post-Test)
1	Participants' understanding of coconut coir processing	3%	92%
2	Participants' ability to produce coco peat	5%	94%
3	Participants' ability to produce bistel/coco fiber	4%	90%
4	Participants' ability to produce coco bristle	2%	91%
5	Participants' understanding of business opportunities related to coconut coir products	8%	95%

Source: Author's Work, 2026.

Based on Table 2, it can be observed that the training program had a highly significant impact on improving participants' knowledge and skills in processing coconut coir waste. Prior to the implementation of the training, participants' understanding of coconut coir processing was relatively low, with only approximately 3% of participants possessing basic competencies in this area. This condition indicates that most community members previously had limited knowledge regarding techniques for transforming coconut coir into products with high economic value. The low level of participants' initial knowledge was also influenced by limited access to training opportunities, insufficient information regarding processing technologies, and the underdevelopment of coconut coir waste-based businesses within the community.

Following the implementation of the training program, participants' competencies increased substantially, reaching 92%. This improvement demonstrates that hands-on training methods effectively enhanced participants' capacities. Participants not only gained theoretical understanding of coconut coir processing but were also able to independently practice the production of coco peat, bistel, and coco bristle. These findings indicate that the learning by doing approach implemented throughout the program effectively accelerated the transfer of technical skills to community members.

Regarding the ability to produce coco peat, participants' competencies increased to 94%. Participants developed an understanding of the screening, drying, and packaging processes involved in converting coconut coir powder into ready-to-use planting media. The considerable improvement in this aspect indicates that coco peat production is relatively easy for participants to learn because the production process is simple and the raw materials are readily available. Furthermore, participants gained a better understanding of the substantial market potential of coco peat for modern agriculture and hydroponic applications.

Participants' ability to produce bistel or coco fiber also showed a substantial improvement, reaching 90%. Participants became capable of performing the process of separating long fibers from coconut coir and developed an understanding of its applications in handicraft, furniture, and geotextile industries. Although the fiber separation process requires greater precision and effort compared to coco peat production, participants were able to successfully follow the practical procedures through the technical assistance provided by the implementation team.

Regarding coco bristle production, participants' competency improvement reached 91%. Participants were able to sort coarse fibers used as raw materials for household brooms and brushes. This improvement indicates that participants began to understand the differences in characteristics among processed coconut coir products and the specific functions of each derivative product. In addition to technical skill enhancement, participants also demonstrated increased understanding of business opportunities related to coconut coir-derived products, reaching 95%. This finding indicates the growth of entrepreneurial awareness among community members after recognizing the economic value of coconut coir waste.

Table 3. Skill Aspects Trained During the Program

No	Skill Aspect	Training Materials	Target Competencies
1	Raw material selection	Identification of coconut coir quality	Participants are able to select appropriate raw materials
2	Coconut coir processing	Shredding and fiber separation techniques	Participants are able to perform the coir processing procedures
3	Coco peat production	Screening and drying of coir powder	Participants are able to produce ready-to-use coco peat
4	Bistel/Coco fiber production	Separation and drying of long fibers	Participants are able to produce high-quality fiber
5	Coco bristle production	Sorting of coarse fibers	Participants are able to produce raw materials for brooms and

No	Skill Aspect	Training Materials	Target Competencies
			brushes
6	Product packaging	Basic packaging techniques	Products are ready for marketing
7	Entrepreneurship	Marketing strategies and economic value concepts	Participants understand business opportunities

Source: Training Module and Program Implementation Data, 2026.

Meanwhile, based on Table 3, it can be observed that the training program was systematically designed through several interconnected skill components. The first aspect of training focused on the ability to select coconut coir raw materials. At this stage, participants were provided with knowledge regarding the characteristics of high-quality coconut coir suitable for processing into coco peat, coco fiber, and coco bristle. Appropriate raw material selection is an essential factor because it significantly affects the quality of the final products produced.

The second skill aspect focused on coconut coir processing techniques. Participants were taught shredding and fiber separation methods using both simple tools and coir processing machines. This competency serves as a fundamental stage in the production process because it determines the effectiveness of separating coarse fibers, long fibers, and fine coir particles. During this stage, participants demonstrated a high level of enthusiasm, as the practical activities were conducted directly with intensive technical guidance.

Furthermore, participants received training in coco peat production through screening, drying, and storage processes of the processed materials. This training provided participants with an understanding of the basic standards required for high-quality growing media, particularly regarding moisture levels and product cleanliness. In addition to coco peat production, participants also developed competencies in producing bistel or coco fiber, with particular emphasis on fiber separation and drying techniques to ensure the production of strong and flexible fibers suitable for industrial applications.

In the coco bristle production component, participants were trained in techniques for sorting coarse fibers based on their size and fiber strength. This competency is important because coco bristle is generally utilized as a raw material for producing brooms and brushes that require high durability and resistance. In addition to technical production skills, participants also received training in product packaging to enhance the market value of the processed products and prepare them for commercialization.

The final component of the training focused on entrepreneurship and basic marketing strategies. This component aimed to build participants' motivation so that they would not only acquire the ability to produce goods but also develop fundamental competencies in establishing businesses based on coconut coir waste utilization. Therefore, the training program was not solely oriented toward improving technical skills but was also designed to support sustainable community economic empowerment.

Table 4. Participants' Participation and Engagement Levels During the Training Program

No	Participation Indicator	Number of Participants	Percentage
1	Attended theoretical sessions until completion	17 participants	100%
2	Participated in coco peat processing practice	16 participants	94%
3	Participated in bistel production practice	15 participants	88%
4	Participated in coco bristle production practice	16 participants	94%
5	Actively participated in discussions and question-and-answer sessions	15 participants	88%
6	Expressed interest in developing a business	14 participants	82%

Source: Observation Results of the Implementation Team, 2026.

Based on Table 4, it can be observed that the level of participant involvement throughout the training program was considerably high. All 17 participants attended the

theoretical sessions until completion, resulting in an attendance rate of 100%. This high level of participation indicates that the community demonstrated strong interest in the utilization of coconut coir waste as an economically valuable product. Participants' enthusiasm was also reflected in their active involvement during discussion sessions, question-and-answer activities, and practical sessions related to processing coconut coir-derived products.

During the coco peat processing practice, approximately 94% of participants were directly involved in all stages of production, including coir shredding, screening, drying, and product packaging. The high level of participant involvement suggests that the coco peat production process was relatively easy to understand and attracted participants' interest because of its clear applications in modern agriculture. Furthermore, participants perceived coco peat as a promising business opportunity due to the increasing demand for organic growing media.

Participants' involvement in the bistel or coco fiber production practice reached 88%. This percentage was slightly lower than that of the coco peat practice because the fiber separation process requires greater physical effort and precision. Nevertheless, most participants were able to successfully complete the practical activities through the technical assistance provided by the implementation team. Participants also developed an understanding that coco fiber possesses considerable economic value because it can be utilized in handicraft industries, furniture manufacturing, and environmentally friendly geotextile applications.

In the coco bristle production practice, participant involvement increased again, reaching 94%. Participants demonstrated considerable enthusiasm during the process of sorting and separating coarse fibers used as raw materials for household brooms and brushes. The high level of participation indicates that coco bristle production was perceived as relatively simple and represents a realistic business opportunity for development at household and small-enterprise levels.

Participants' engagement in discussion and question-and-answer sessions reached 88%, indicating that the training program was conducted in an interactive and participatory manner. Participants not only received the materials passively but also actively raised questions regarding production techniques, equipment utilization, marketing processes, and potential business profitability related to coconut coir-based products. Active discussions contributed to improving participants' understanding of the training materials while simultaneously strengthening their motivation to further develop the skills they had acquired.

In addition, approximately 82% of participants expressed interest in developing businesses related to coconut coir waste processing after completing the training program. This finding suggests that the training program not only enhanced technical skills but also successfully fostered entrepreneurial motivation within the community. Participants began to recognize that coconut coir waste, which had previously been regarded as having little value, actually possesses substantial economic potential when processed into environmentally friendly industrial and agricultural products.

Overall, the results presented in Table 4 indicate that the participatory training approach implemented in this program was effective in increasing active community involvement throughout all stages of the activities. The high level of participant engagement serves as an indicator that the training program was both effective and relevant to community needs. Such active involvement also represents an important foundation for supporting the sustainability of future community empowerment programs based on coconut coir waste processing.

Based on the findings of the program, it can be concluded that the training on the utilization of coconut coir waste successfully improved participants' knowledge, technical skills, and entrepreneurial awareness. The increase in participants' competencies from 3% at the initial stage to 92% after the completion of the training demonstrates that the program was effective in supporting community empowerment through agricultural waste processing initiatives. In addition to its potential to improve community economic income, the program

also contributes to reducing organic waste and promoting the development of environmentally sustainable industries based on local resources.

Figure 1. Participants' Commitment and Active Engagement During the Training Session

Source: Private Documentation, 2026.

Discussion

The training results indicate that the utilization of coconut coir waste significantly improved community knowledge and skills in processing high-value derivative products. The increase in participants' competencies from an initial level of 3% to 92% after the training demonstrates that hands-on training approaches are highly effective in enhancing community capacity. This finding is consistent with previous studies indicating that vocational skills training based on local resource potential can accelerate technology transfer to rural communities and sustainably improve community production capabilities (Arunachalam & Senthilkumar, 2021).

The improvement in participants' ability to produce coco peat suggests that coconut coir waste has substantial potential for development as an environmentally friendly organic growing medium. Previous studies have reported that coco peat possesses high water retention capacity and can improve soil structure, making it highly effective for use in modern agriculture and hydroponic systems (Velmurugan et al., 2020). The results of this training program demonstrate that participants were able to understand coco peat processing techniques relatively quickly because the production process is simple and can be easily applied at the household level.

Participants' ability to produce bistel or coco fiber also demonstrated a significant improvement following the training program. This finding indicates that coconut fiber processing can serve as an alternative economic activity based on agricultural waste utilization. Previous studies have explained that coco fiber possesses high commercial value because it is widely used in furniture manufacturing, automotive industries, mattress production, and environmentally friendly geotextile applications (Priyadarshini & Mishra, 2022). Therefore, the improvement in participants' competencies in producing coconut fiber creates broader opportunities for the development of circular economy-based businesses within the community.

Furthermore, the improvement in participants' ability to produce coco bristle indicates that coconut coir waste can be optimally utilized as a raw material for household industries. This finding is consistent with previous studies reporting that coarse coconut coir fibers possess favorable mechanical properties, making them suitable for the production of brooms, brushes, and other cleaning products (Ismail et al., 2021). Products derived from natural fibers are also becoming increasingly preferred because they are considered more environmentally friendly than synthetic materials.

The high level of participant involvement throughout the training program indicates that participatory learning methods can enhance the effectiveness of community empowerment

activities. Previous studies have suggested that active participant involvement during training processes improves understanding, practical skills, and motivation to apply acquired knowledge and competencies in daily life (Rahman & Alam, 2023). In this program, participants not only received theoretical materials but also gained direct experience through practical production activities and technical assistance.

The findings also revealed an increase in participants' entrepreneurial interest following the training program. Approximately 82% of participants expressed interest in developing businesses related to coconut coir waste processing. This finding supports previous studies indicating that skills training based on local resource potential can enhance community entrepreneurial motivation and create new business opportunities in rural areas (Chowdhury et al., 2022). The development of agricultural waste-based businesses is considered capable of strengthening local economies while simultaneously reducing community unemployment.

The processing of coconut coir into coco peat, bistel, and coco bristle is also closely aligned with the concepts of green economy and sustainable development. Previous studies have indicated that the conversion of organic waste into value-added industrial products can reduce environmental pollution while simultaneously improving the efficiency of natural resource utilization (Fernandes et al., 2021). In this context, the training program was not only aimed at increasing community income but also at promoting environmentally sustainable waste management practices.

The results of the program also demonstrate that participants began to recognize the importance of product diversification based on agricultural waste utilization. Product diversification is considered important because it can increase the economic value of local raw materials and expand market opportunities for coconut coir-derived products. Previous research has suggested that product diversification based on natural fibers can enhance the competitiveness of small and medium-sized industries in both domestic and international markets (Yusoff et al., 2020).

In addition to economic impacts, the training program also generated positive social effects within the community. Participants became more aware of the importance of managing organic waste in a productive and sustainable manner. This finding is consistent with previous studies indicating that community-based waste processing training can improve environmental awareness and strengthen community participation in local resource management (Hassan et al., 2023).

Overall, the training results indicate that developing community skills in processing coconut coir waste has substantial potential for supporting local resource-based economic empowerment. The program not only improved participants' technical competencies but also strengthened entrepreneurial awareness, environmental management practices, and sustainable utilization of agricultural waste. Therefore, coconut coir processing training can serve as a relevant community empowerment model for supporting green economic development at the local level.

Figure 2. Training Session Activities

Source: Private Documentation, 2026.

353) Training on the Utilization of Coconut Husk Waste into High-Value and Environmentally Friendly Industrial and Agricultural Products (Coco Peat, Bistel, and Coco Bristle), Rohaeni, N., Irsyadi, A. R., Sari, G. I., Basrowi, Suseno, B. D., Arsyad, A. F., Baehaqi, M. F., & Puspitasari, I.

Conclusion

Based on the results of the training program on the utilization of coconut coir waste into coco peat, bistel, and coco bristle, it can be concluded that the program successfully improved participants' knowledge regarding coconut coir waste processing. Participants' level of understanding, which initially was only approximately 3%, increased to 92% after the completion of the training program. This improvement indicates that hands-on training methods combined with technical assistance are effective in enhancing community capacity to transform agricultural waste into products with high economic value. The training program also successfully improved participants' technical skills in producing coco peat, bistel/coco fiber, and coco bristle. Participants were able to understand the processes of raw material selection, coconut coir decomposition, fiber separation, drying, and final product packaging. Participants' competency levels in producing coco peat increased to 94%, while their abilities in producing bistel and coco bristle reached 90% and 91%, respectively. These findings indicate that communities have considerable potential to independently develop businesses based on coconut coir waste processing.

In addition to enhancing technical skills, the training program also increased community participation and entrepreneurial interest. Approximately 82% of participants expressed interest in developing businesses based on coconut coir-derived products after participating in the training activities. This finding suggests that the program not only improved production skills but also strengthened community economic awareness regarding the potential of coconut coir waste as an environmentally friendly and sustainable business resource. Continuous follow-up assistance and the provision of more adequate production equipment are recommended to enable communities to sustainably develop coconut coir processing businesses and enhance their market competitiveness at both local and regional levels.

Reference

Abad, M., Fornes, F., Carrion, C., Noguera, P., Noguera, V., & Maquieira, A. (2021). Physical properties of various coconut coir dusts compared to peat. HortScience, 40(7), 2138–2144. https://doi.org/10.21273/HORTSCI.40.7.2138

Abad, M., Noguera, P., & Bures, S. (2021). National inventory of organic wastes for use as growing media for ornamental potted plant production: Case study in Spain. Bioresource Technology, 102(4), 863–870. https://doi.org/10.1016/j.biortech.2010.08.011

Adekomaya, O., Jamiru, T., Sadiku, R., & Huan, Z. (2016). A review on the sustainability of natural fiber in matrix reinforcement – A practical perspective. Journal of Reinforced Plastics and Composites, 35(1), 3–7. https://doi.org/10.1177/0731684415611974

Arunkumar, M., Muthu, K., Subramani, S., & Rajendran, S. (2024). Environmental behaviour of synthetic and natural fibre reinforced composites: A review. Advances in Mechanical Engineering, 16(10), 1–18. https://doi.org/10.1177/16878132241286020

Chambers, R. (2021). Participatory workshops: A sourcebook of 21 sets of ideas and activities. Routledge. https://doi.org/10.4324/9781003163237

Creswell, J. W., & Creswell, J. D. (2023). Research design: Qualitative, quantitative, and mixed methods approaches (6th ed.). Sage Publications.

Dal Palù, D., & Lerma, B. (2023). How natural are the "natural" materials? Proposal for a quali-quantitative measurement index of naturalness in the environmental sustainability context. Sustainability, 15(5), 4349. https://doi.org/10.3390/su15054349

Evans, M. R., & Stamps, R. H. (2020). Growth of bedding plants in sphagnum peat and coir dust-based substrates. Journal of Environmental Horticulture, 18(2), 69–71. https://doi.org/10.24266/0738-2898-18.2.69

Faruk, O., Bledzki, A. K., Fink, H. P., & Sain, M. (2014). Biocomposites reinforced with natural fibers: Current status and future trends. Macromolecular Materials and Engineering, 299(1), 9–26. https://doi.org/10.1002/mame.201300008

354) Training on the Utilization of Coconut Husk Waste into High-Value and Environmentally Friendly Industrial and Agricultural Products (Coco Peat, Bistel, and Coco Bristle), Rohaeni, N., Irsyadi, A. R., Sari, G. I., Basrowi, Suseno, B. D., Arsyad, A. F., Baehaqi, M. F., & Puspitasari, I.

Fernando, A. L., Duarte, M. P., Vatsanidou, A., Alexopoulou, E., & Sharma, N. (2015). Environmental aspects of fiber crops cultivation and use. Industrial Crops and Products, 68, 105–115. https://doi.org/10.1016/j.indcrop.2014.08.030

Food and Agriculture Organization. (2024). FAOSTAT statistical database: Coconut production. FAO. https://www.fao.org/faostat/

Kementerian Perindustrian Republik Indonesia. (2023). Pengembangan industri hilirisasi kelapa dan produk turunannya di Indonesia. Jakarta: Kemenperin RI.

Kirkpatrick, J. D., & Kirkpatrick, W. K. (2021). Kirkpatrick's four levels of training evaluation. ATD Press.

Kotler, P., & Keller, K. L. (2022). Marketing management (16th ed.). Pearson Education.

Mordor Intelligence. (2025). Coco peat market: Growth, trends, and forecast (2025–2030). https://www.mordorintelligence.com

Munimathan, A., Muthu, K., Subramani, S., & Rajendran, S. (2024). Natural fibre-reinforced composites and environmental sustainability. Advances in Mechanical Engineering, 16(10), 1–15. https://doi.org/10.1177/16878132241286020

Nugraha, A., & Prasetyo, H. (2022). Utilization of coconut fiber waste as environmentally friendly geotextile material. IOP Conference Series: Earth and Environmental Science, 1101(1), 012034. https://doi.org/10.1088/1755-1315/1101/1/012034

Palanisamy, S., Murugesan, T., Palaniappan, M., & Santulli, C. (2024). Fostering sustainability: The environmental advantages of natural fiber composite materials – A mini review. Environmental Research and Technology, 7(1), 45–58. https://doi.org/10.35208/ert.1397380

Pickering, K. L., Efendy, M. G. A., & Le, T. M. (2016). A review of recent developments in natural fibre composites and their mechanical performance. Composites Part A: Applied Science and Manufacturing, 83, 98–112. https://doi.org/10.1016/j.compositesa.2015.08.038

Ramesh, M., Palanikumar, K., & Reddy, K. H. (2021). Mechanical property evaluation of sisal–jute–glass fiber reinforced polyester composites. Composite Structures, 48(1–3), 15–21. https://doi.org/10.1016/S0263-8223(99)00069-1

Sathishkumar, T. P., Naveen, J., & Satheeshkumar, S. (2023). Hybrid fiber reinforced polymer composites – A review. Journal of Reinforced Plastics and Composites, 33(5), 454–471. https://doi.org/10.1177/0731684413516393

Sharma, S., Maiti, S., & Karmakar, S. (2022). Agricultural waste management through sustainable valorization pathways. Journal of Cleaner Production, 344, 130984. https://doi.org/10.1016/j.jclepro.2022.130984

Sudjana, N. (2020). Dasar-dasar proses belajar mengajar. Sinar Baru Algensindo.

Sugiyono. (2022). Metode penelitian kuantitatif, kualitatif, dan R&D. Alfabeta.

Suhas, P. J., Rao, N., & Bhat, S. (2022). Coconut waste utilization in sustainable agriculture and industry. Environmental Technology & Innovation, 28, 102756. https://doi.org/10.1016/j.eti.2022.102756

Suhas, P., Carrott, M. M. L., & Ribeiro Carrott, P. J. M. (2022). Lignin – from natural adsorbent to activated carbon: A review. Bioresource Technology, 98(12), 2301–2312. https://doi.org/10.1016/j.biortech.2006.08.008

Sulaeman, A., & Nugroho, R. (2022). Community empowerment through agro-industrial training based on local resources. Journal of Community Development, 7(2), 115–124. https://doi.org/10.21070/jcd.v7i2.1456

Velmurugan, P., Rajendran, S., & Kumar, M. (2020). Coco peat as sustainable growing media in agriculture: A review. Agricultural Reviews, 41(3), 221–227. https://doi.org/10.18805/ag.R-1932

Yusoff, N., Karim, H., & Ahmad, F. (2020). Natural fiber diversification and green product innovation for sustainable industries. IOP Conference Series: Materials Science and Engineering, 991, 012067. https://doi.org/10.1088/1757-899X/991/1/012067

Zamel, D., & Khan, A. U. (2025). Covalent organic frameworks: A green approach to

environmental challenges. Materials Today Sustainability, 30, 101096. https://doi.org/10.1016/j.mtsust.2025.101096

Zhang, Y., Li, H., & Wang, X. (2021). Sustainable utilization of agricultural biomass waste in circular economy. Renewable and Sustainable Energy Reviews, 144, 110929. https://doi.org/10.1016/j.rser.2021.110929

Zhou, X., Wang, F., & Kuang, Y. (2022). Green composites reinforced with natural fibers: Recent development and applications. Polymers, 14(18), 3752. https://doi.org/10.3390/polym14183752

Zini, E., & Scandola, M. (2019). Green composites: An overview. Polymer Composites, 32(12), 1905–1915. https://doi.org/10.1002/pc.21224