Correlation of community characteristics with ecoprint's expertise in supporting a more sustainable Bukit Barisan Selatan National Park

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ABSTRACT

The buffer area of the Bukit Barisan Selatan National Park (BBSNP) has the potential to be developed through the creative economy, including ecoprint. Ecoprint is one of the textile dyeing techniques that uses natural materials, making it environmentally friendly and having artistic and economic value. This study aims to analyze the social characteristics of the BBSNP community, the level of ecoprint skills, and the relationship between the two in supporting regional Sustainability. The research uses quantitative methods through questionnaires that are analyzed descriptively and analytically. The results of the study show that the productive age group dominates the community, secondary education is common, farming is common, and the community has a good environmental experience. Ecoprint skills are at the basic to intermediate level and contribute as an additional income. The study also found that environmental experience and social engagement were more influential on ecoprint skills. Community empowerment through ecoprint training has been proven to foster new skills, build creativity, and strengthen collaboration between the government, academics, and business actors. Thus, ecoprints not only have aesthetic value but also serve a strategic role in supporting a creative economy based on local wisdom and environmental conservation.

Keywords: Community Empowerment, Creative Economy, Ecoprint, Environment, Local Products, Natural dyes

1. Introduction

Bukit Barisan Selatan National Park (BBSNP) plays an important role in maintaining ecosystem balance and is designated as a UNESCO World Heritage Site. The existence of BBSNP is not only a protected area, but also directly intersects with the activities and lives of the people living around it [1]. One of the current causes is the presence of various challenges, such as forest encroachment, land-use change, and the lack of active participation by the surrounding community in supporting the region's sustainability [2]. The study [3] states that when forest resources are damaged, poverty can increase due to unmet community needs, especially if communities around forests earn income from agriculture. Therefore, various disasters threaten the livelihoods of communities around forests due to environmental damage [4].

The majority of the population in the region makes a living as farmers, indicating that the agricultural sector is a major component of the local economy [5]. On the other hand, the Sukaraja Hulu area around the BBSNP has great potential for natural resources to be used as nature-based products [6]. One potential is the development of ecoprint products that use natural materials from the surrounding environment, thereby providing economic added value without compromising environmental sustainability [7]. In the vicinity of the Bukit Barisan Selatan National Park (BBSNP), communities coexist with forest areas that are rich in biodiversity but also vulnerable to socio-economic pressures [8]. A sustainable livelihood approach can be applied to address problems in the national park buffer zone [9]. One emerging approach is the development of ecoprint products, an eco-friendly textile-dyeing technique that uses local plants, particularly leaves, to

create unique patterns on fabrics [10]. In addition to its aesthetic and environmental value, this method has gained popularity as a sustainable alternative to synthetic dyes, offering both aesthetic and economic value [11]. A concrete example of ecoprinting that offers not only aesthetic but also economic value is research by [12]. Tapak Patera earns annual revenue of IDR 4,045,373 from the sale of ecoprint primary fabrics and IDR 1,820,076 from the sale of ecoprint rayon fabrics, with production costs of IDR 139,797 for primary fabrics and IDR 122,359 for rayon fabrics [13].

According to [14], it is necessary to empower community groups, especially youth organizations, business actors, and others, to be more creative in developing their businesses. By leveraging local resources and promoting creative entrepreneurship, ecoprints can improve the local economy while minimizing environmental impacts [15]. Despite growing interest in ecoprint as an environmentally friendly product, research specifically examining the relationship between community characteristics and the development of ecoprint in buffer zones of national parks remains limited. In particular, there is a lack of studies that explore how social characteristics, skills, and local ecological conditions influence the Sustainability of ecoprint initiatives in high-biodiversity conservation areas such as BBSNP.

The objectives of this research are as follows:

1. Analyze the social characteristics of the communities around the BBSNP area, including age, education, occupation, and environmental experience.
2. Identify the level of community expertise in ecoprinting techniques and their contribution to the creative economy.
3. Analyze the relationship between community characteristics and skill levels in the development of ecoprint products.
4. Assessing the opportunities and challenges of ecoprinting development through SWOT analysis as a form of community empowerment that supports the sustainable conservation of the BBSNP area.

2. Literature Review

2.1. Bukit Barisan Selatan National Park (BBSNP)

According to [17], an ecoprint training research in Pekon Sukaraja Atas, the buffer zone of the BBSNP area shows that the local community has used various types of local leaves and flowers as sources of natural dyes in the ecoprint production process. Potential species to be used in the surrounding area include teak leaves (*Tectona grandis*), ketapang (*Terminalia catappa*), guava (*Psidium guajava*), castor oil plant (*Ricinus communis*), moringa (*Moringa oleifera*), and Japanese papaya (*Cnidoscolus aconitifolius*), while among the flowers used are hibiscus (*Hibiscus rosasinensis*). The use of this diverse flora reflects the potential of the BBSNP area not only as a biodiversity conservation area, but also as a resource for the development of ecoprints that focus on community empowerment and the strengthening of a conservation-based creative economy.

2.2. Ecoprint's Expertise in Supporting People's Income

Ecoprint is a printing technique with natural fabric dyeing that is simple but can produce unique patterns [18]. The ecoprint technique is used to produce works of art by utilizing natural materials as dyes and pattern motifs. The materials used in ecoprints are the bark, leaves, roots, fruits, and flowers of the plant [19]. Generally, the leaves that can be used are those with strong color pigments, but do not have.

Lots of moisture content. For example, it comes from the use of local natural resources such as teak leaves [20], moringa leaves, Japanese papaya leaves [21], fern leaves, passion fruit leaves, lyng flowers, natural flowers, and leaf waste of invasive plants of Mantangan. Research by [21] also discussed the use of local natural resources as natural dyes, such as *Bischofia javanica* and *Phyllanthus emblica* L., showing the potential to produce environmentally friendly ecoprint products with regional characteristics and functional added value. Strong motivation from the training provided will enable the community to find additional income to support its income. This is because the products of ecoprint training are suitable for sale, especially if ecoprint products are not limited to fabrics but can be more varied, such as clothing, veils, bags, and so on [19].

In addition to Suraja Village, BBSNP also has several National Parks in Indonesia that have practiced ecoprinting to preserve and support community income, such as Bukit Baka Bukit Raya National Park (TNBKBR) and Alas Purwo National Park. TNBKBR has carried out ecoprint training for the people of Ella Belan Village. This activity aims to increase public understanding of the sustainable use of natural resources

through ecoprint production. The results showed a remarkable increase in knowledge from 20% to 94% in various aspects of ecoprint, including materials, engineering, and product manufacturing [19]. In addition, the Hasta Karya Mandiri group, assisted by the Alas Purwo National Park Service, developed an ecoprint business following training in May 2022. They utilize natural materials from the surrounding environment to produce ecoprint products that are environmentally friendly, which are then marketed locally and through social media [22]. The application of ecoprints across various national park areas shows that this approach is not only relevant as an environmental conservation strategy but also effective in improving the welfare of communities around conservation areas. The ecoprint technique also aims to produce products with a fairly high selling value, whose implementation leverages the potential of the surrounding environment [23]. [24] Noted that ecoprint can contribute to the creative industry and potentially increase people's incomes. It also emphasizes how ecoprints can create economic opportunities, especially for rural communities facing economic challenges [25]. Ecoprint can serve as a medium of creative expression and has the potential for economic development, as it involves making crafts from natural materials that can have economic value [26].

3. Research Methods

3.1. Time and Place

The research was conducted in Sukaraja Atas Village, Semaka District, Tanggamus Regency, Lampung Province, 2024. This study was conducted between [months, years] and focused on communities living in the buffer zone of Bukit Barisan Selatan National Park (BBSNP). The research employed a descriptive qualitative approach using a case study design to examine the potential development of ecoprint. This figure is considered sufficient to estimate the average normal distribution of a sample using the Central Limit Theorem (CLT) and is suitable for community-based case studies [27]. Products are a community-based creative economic activity supporting conservation efforts.

3.2. Research Respondents

A total of 30 respondents were deliberately selected, namely those involved in the training. Respondents in this study consisted of local community members who are directly involved in or have participated in ecoprint-related activities and conservation programs in the BBSNP buffer zone. Respondents were selected using purposive sampling, based on specific criteria to ensure relevance to the research objectives. The selection criteria included: (1) residence within the buffer zone of BBSNP, (2) involvement in community-based conservation or creative economic activities, and (3) willingness to participate in the study.

These respondents were considered representative of the local community because they possess direct experience with forest resource utilization, conservation challenges, and alternative livelihood initiatives. Their perspectives reflect the socio-economic and ecological conditions faced by communities surrounding BBSNP, making them suitable informants for analyzing the development potential of ecoprint products within a conservation context.

3.3. Data Types and Sources

3.3.1. Primary data

Primary data were obtained through observation and questionnaires distributed to ecoprint training participants. The questionnaire included the community's social characteristics (age, education, occupation, environmental experience), their skills in ecoprinting techniques, their contributions to the creative economy, their participation in training, and their perceptions of environmental conservation around the BBSNP.

3.3.2. Secondary data

Secondary data includes literature from scientific journals, books, research reports, official documents, and documentation of ecoprint training activities and Eco-friendly molds.

3.4. Data Collection and Analysis

The collected data was analyzed using the SWOT (Strengths, Weaknesses, Opportunities, Threats) framework. Analysis. The SWOT analysis is important in this study because it identifies strengths, weaknesses, opportunities, and threats affecting the community's ecoprint capabilities, enabling the formulation of development strategies to support community empowerment and the conservation of Bukit Barisan Selatan National Park [28]. The following measures, adapted from [29], were applied to analyze community characteristics related to ecoprint expertise to support the Sustainability of Bukit Barisan Selatan National Park.

3.4.1. Identification of Internal and External Factors

The data obtained from interviews with respondents were analyzed and categorized into internal and external factors. This stage uses the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) matrices. Information related to strengths and weaknesses is classified as internal factors, while opportunities and threats are categorized as external factors (Figure 1).

3.4.2. Strategic Assessment Analysis

The next stage aims to formulate relevant strategies to strengthen ecoprint expertise to support the Sustainability of Bukit Barisan Selatan National Park. Internal and external factors are combined to produce strategic alternatives. Each SWOT factor is assessed by multiplying its assigned weight (b) and rating (r).

Weight (b) in the SWOT framework, horizontal indicators (strengths and weaknesses), and vertical indicators (opportunities and threats) are weighted from 1 to 4, based on [30]:

1 = the horizontal indicator is the least important compared to the vertical indicator,

2 = horizontal indicators are more important than vertical indicators,

3 = the horizontal indicator is quite important compared to the vertical indicator,

4 = the horizontal indicator is the most important compared to the vertical indicator.

Rank (r). Each SWOT factor is assessed on a scale of 1–4. For example, in the strength category:

4 = very strong,

3 = strong,

2 = weak,

1 = very weak.

The results of the IFE and EFE matrices are then plotted into SWOT quadrants (Figure 3). The SWOT quadrant serves to systematically identify factors and describe how opportunities and threats can be aligned with strengths and weaknesses. Based on this analysis, a strategy was formulated to enhance ecoprints' expertise in supporting the more sustainable management of the Bukit Barisan Selatan National Park (Figure 3).
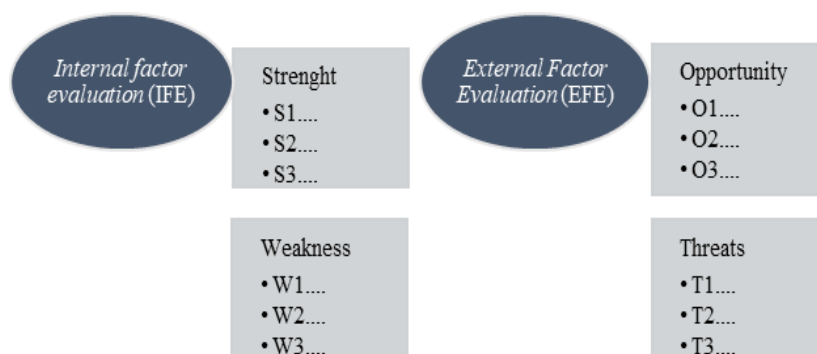
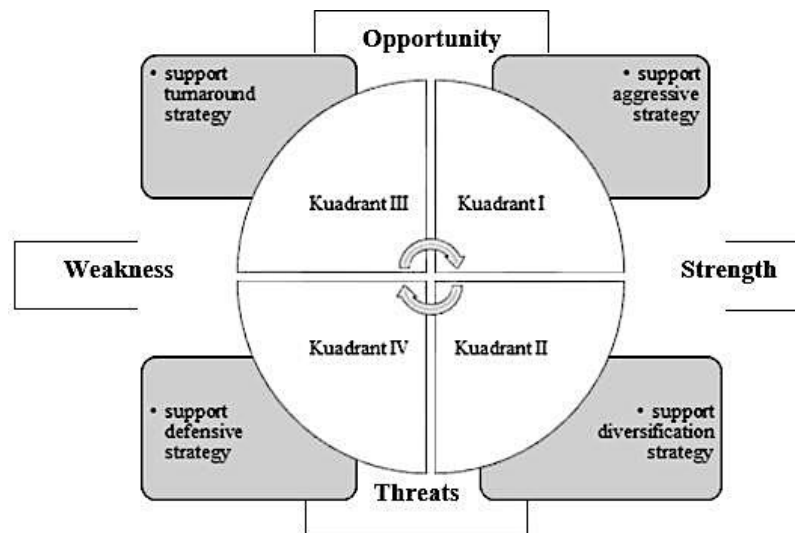Figure 1. Data clustering at the first stage of SWOT analysis

Figure 2. General framework of SWOT analysis and quadrant division
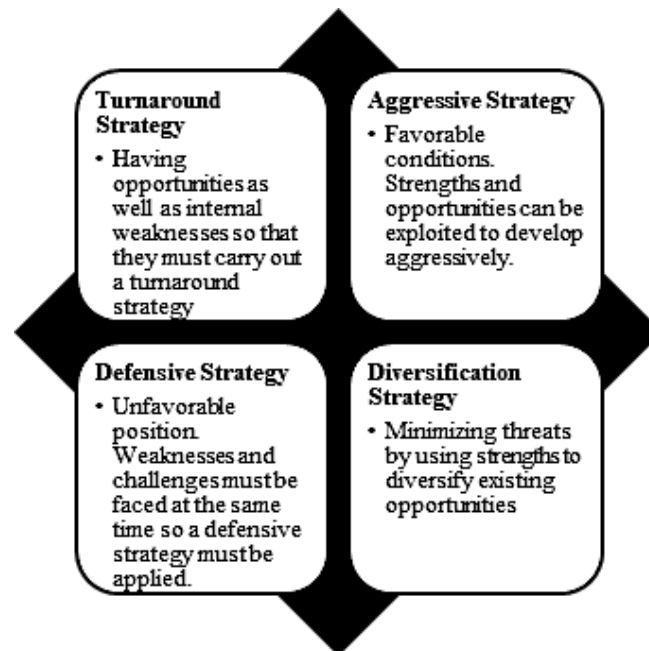Source: Wulandari et al. (2021)

Figure 3. A reasonable strategy was developed from the results of the SWOT analysis (modified from Rangkuti, 2013).

4. Results and Discussion

4.1. SWOT Table

To gain a clear understanding of the strategic conditions of community-based ecoprint product development, a SWOT analysis was conducted that considered internal and external factors. This analysis aims to identify strengths to leverage, weaknesses to minimize, opportunities to support, and threats to anticipate. The scope of research is not limited to economic aspects, but also includes biodiversity, community participation, institutional support, and market dynamics of environmentally friendly products. Based on this, a more directed, effective, and sustainable ecoprint development strategy it can be formulated, as shown in Table 1 below.

Table 1. SWOT Analysis of Community-Based Ecoprint Product Development

Factor	Study Aspect	SWOT Score
Strengths		1.45
Availability of abundant natural raw materials	Biodiversity	0.50
High community enthusiasm for attending ecoprint training	Community Participation	0.35
Social support from local community groups	Community Participation	0.25
Potential for diverse motifs from local leaf resources	Biodiversity	0.20
The surrounding environment provides sustainable resources	Environment/Institution	0.15
Weaknesses		1.40
Limited community business capital	Economy	0.45
Limited market access	Economy	0.35
Low advanced technical skills in ecoprint	Human Resources	0.30
Digital promotion is not yet optimal	Technology	0.20
Product diversification is still limited	Economy	0.10
Opportunities		1.50
Trend of increasing eco-friendly products	Market	0.50
Government and NGO support for community empowerment	Policy	0.35
Market potential from ecotourism in conservation areas	Economy	0.30
Sustainable training programs from various parties	Institution	0.20
Support for local creative economy infrastructure	Policy	0.15
Threats		1.45
Competition with manufactured textile products	Market	0.50
Market demand fluctuations	Economy	0.35
Low community digital promotion capacity	Technology	0.25
Ecoprint products can be easily imitated without quality standards	Market	0.20
Lack of capital protection	Policy	0.15
Grand Total		5.80

The SWOT analysis, with a total score of 5.80, shows that the odds (1.50) are higher than the threats (1.45), indicating that the prospects for ecoprint development are quite promising. Its main strengths lie in the availability of natural raw materials (0.50) and high community participation (0.35), both of which are important assets for product development. However, the weakening can also be seen from limited working capital (0.45) and limited market access (0.35). This condition underscores the need for external support to help ecoprints develop more optimally and competitively. On the other hand, external opportunities such as the trend of increasing environmentally friendly products (0.50) and support from the government and NGOs (0.35) strengthen the potential for business sustainability. This aligns with the findings [34] on the importance of digital marketing in increasing the competitiveness of eco-friendly products. In addition, the view [25] of integrating ecoprint with education and conservation can strengthen the market position by utilizing local

resources and encouraging creativity and entrepreneurship. This is further supported by a SWOT analysis, which recommends strategies such as workshop development, social media promotion, and the creation of eco-friendly products [35].

4.2. Internal Factor Chart

Internal factor charts were developed to provide an overview of the strengths and weaknesses in the development of ecoprints in the research area. Analyzing internal factors is critical because it highlights the potential to support program sustainability while identifying constraints that need to be minimized (Figure 4).
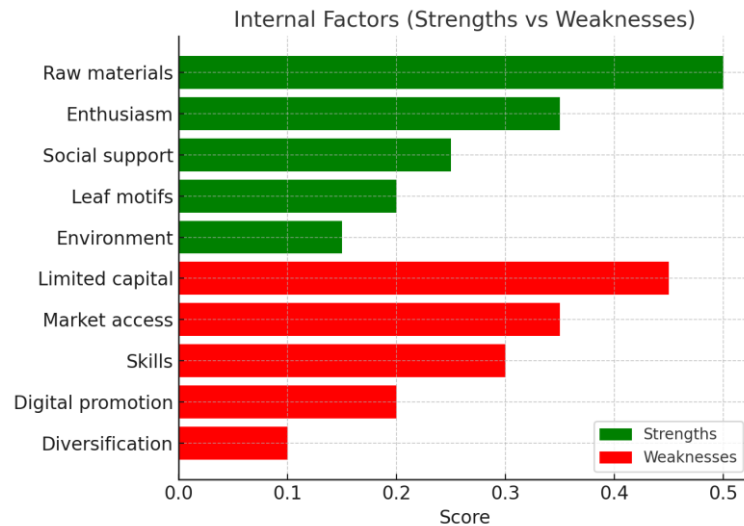

Figure 4. Internal Factors Chart

The graph shows that the most prominent strengths lie in the abundance of natural raw materials and the high enthusiasm of the local community to participate in the training program. However, weaknesses are also visible, especially limited access to capital and underdeveloped marketing skills. This underscores the need for strategies that strengthen weaknesses while optimizing available strengths. These findings are consistent with [18]. WHO emphasizes that ecoprint training significantly enhances local skills and creativity, making the availability of natural resources and community support key factors of internal success.

4.3. External Factors Chart

The external factors chart presents opportunities and threats from outside society that affect the development of ecoprint. These external factors include market conditions, policy support, the role of supporting institutions, and evolving social dynamics, as presented in Figure 5.
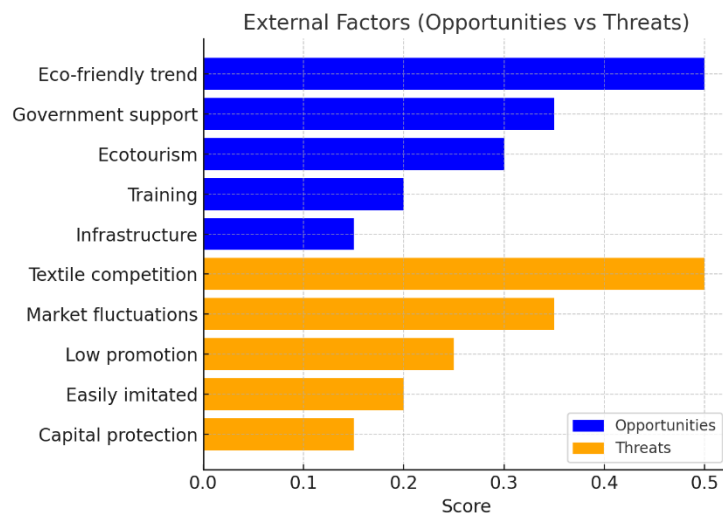

Figure 5. External Factors Chart

The graph shows that the biggest opportunities come from growing demand for eco-friendly products and from government and NGO support. However, threats remain in the form of market competition from similar products and potential shifts in consumer trends. Therefore, the ecoprint development strategy should focus on maximizing green-market opportunities while anticipating competition and evolving trends. Sustainable fashion and upcycling trends in Indonesia create significant opportunities for brands that emphasize eco-friendly values in their marketing strategies.

4.4. SWOT Quadrant

The SWOT quadrant is used to map the strategic position of ecoprint development by combining the identified internal and external factors. This mapping determines whether the strategy should be aggressive, diversified, defensive, or reversal, as illustrated in Figure 6.
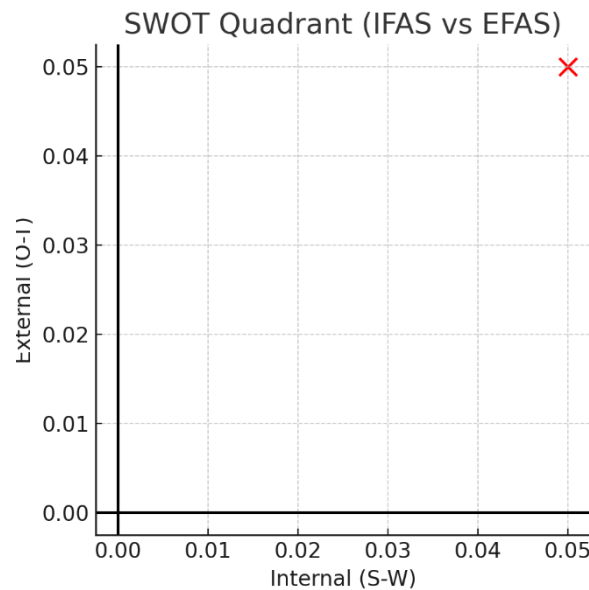

Figure 6. SWOT Quadrant

The analysis reveals that the position of ecoprint development lies in the aggressive quadrant (SO). This means that internal strengths can be leveraged to capitalize on external opportunities. The position indicates a positive outlook, with the development of ecoprints directed toward product diversification based on local resources and community capacity building to increase competitiveness in the market. This analyzes the business strategy of local fashion.

4.5. Aggressive (SO) Strategy Table

The aggressive strategy (SO) table is developed based on SWOT analysis by linking the strengths and opportunities identified in various aspects. This table aims to formulate concrete strategies that support the sustainable development of ecoprints, as shown in Table 2.

Table 2. Aggressive (SO) Strategy for Ecoprint Development

Aspect	Strengths (S)	Opportunities (O)	SO Strategy
Biodiversity	Availability of natural raw materials, potential of local leaf motifs	Trends in eco-friendly products, the ecotourism market	Diversification of ecoprint products based on local leaves according to green market trends
Community Participation	High enthusiasm for training, social support	Training programs & NGO support	Strengthening community capacity through advanced ecoprint training and creative entrepreneurship

Aspect	Strengths (S)	Opportunities (O)	SO Strategy
Economy/Policy	Support from community groups	Government & NGO support	Synergy between government and community to expand markets, access to capital, and product promotion
Institutions/HR	Environment provides sustainable resources	Local creative economy infrastructure	Building creative business networks based on community with product quality standards

The table shows several SO strategies: diversifying ecoprint products based on local leaves in line with green market trends; strengthening community capacity through advanced training and creative entrepreneurship; building synergy between the government and local groups to expand market access, capital, and product promotion; and building creative business networks with better quality standards. These strategies align with the findings of [31]. The WHO reports that ecoprint training in rural communities not only improves skills but also creates new entrepreneurial opportunities based on local creativity. This proves that a synergistic approach through product training and diversification is an effective way to strengthen Ecoprint's competitiveness in a sustainable market. The relevance of this strategy is further supported by empirical findings in Upper Sukaraja Village, which illustrate how internal forces and external opportunities can be integrated into aggressive strategies (SO) for the development of ecoprints, as shown in Figure 7.

Research conducted in Sukaraja Atas Village, a buffer area of the Bukit Barisan Selatan National Park (TNBBS), shows that the community is dominated by productive age groups with relatively low to medium educational backgrounds and a main livelihood as farmers. The experience of people who coexist with forests gives them knowledge of plant and leaf types, which have great potential for developing ecoprint products as a form of environment-based creative economy business. Although the community's expertise in ecoprint techniques is still in the low to medium category, the community's enthusiasm and participation in ecoprint are relatively high, so it will continue to develop. It can contribute to the community's creative economy as an additional source of income. From the analysis of internal and external factors, the total score was the same: 2.85 for both internal factors (strengths-weaknesses) and external factors (opportunities-threats). The summary of IFAS-EFAS scores places the ecoprint development position in Quadrant I (aggressive strategy/SO), indicating that the development strategy can be geared toward harnessing internal strengths to capture available external opportunities.

Figure 7. Ecoprinting outreach activities in Bukit Barisan Selatan National Park

The community's main strengths include abundant access to natural raw materials. The high enthusiasm of the community in participating in the Ecoprint training, as well as social support from local community groups. On the other hand, the remaining weaknesses are limited business capital and limited market access.

Figure 8. The ecoprinting technique uses three techniques (tapping, spraying, and steaming)

Meanwhile, opportunities that can be taken advantage of are the improvement of environmentally friendly products, government and NGO support for community empowerment programs, as well as market potential from the ecotourism sector in conservation areas. Nevertheless, threats remain, such as competition from manufactured textile products, fluctuations in market demand, and the community's limited digital promotion capacity.

The results of this study support the initial hypothesis that people's social characteristics are related to their ability to develop ecoprint skills. The public's enthusiasm for participating in training and the involvement of social groups are important capital that align with [36], which emphasizes the importance of empowering community groups, such as youth organizations and local business actors, to increase income.

The abundant availability of natural raw materials indicates that the environment around TNBBS can provide sustainable resources for the community without encroaching on the forest. This finding aligns with [32], which emphasizes the potential of using various types of local leaves to produce diverse ecoprint motifs. Natural resources have unique colors and shapes, making the eccoprint look more attractive, as shown in Figure 9. Thus, strategies for using local resources have proven relevant for supporting conservation and economic empowerment.

Figure 9. Ecoprinting results

In terms of opportunities, the increasing market interest in eco-friendly products provides a long-term outlook for ecoprints. This aligns with those who argue that ecoprint is a sustainable alternative to synthetic dyes because it has aesthetic and ecological value. Government support for the local creative economy is also a significant driving factor. In line with [33], government involvement is essential in creating a conducive environment through supportive policies and regulations, increasing human resource capacity, facilitating market access and financing, and developing infrastructure and technology.

Nevertheless, some weaknesses and threats need to be noted. The low technical skills of ecoprints indicate a need for capacity-building through advanced training. In addition, to increase the competitiveness of ecoprint products, a product development strategy is needed that not only diversifies product types but also creates unique characteristics rooted in potential and local identity, distinct to the region and not found elsewhere. [8] and [9] stated that the quality of ecoprint products will be more valuable if developed through product diversification into various forms such as bags, headscarves, clothing, t-shirts, and tote bags through structured training programs (Figure 8). Strengthening local elements, such as endemic leaf motifs, distinctive natural dyes, and local cultural narratives, is expected to increase the added value and differentiation of the community's ecoprint products. In addition, limited market access and digital promotion remain challenges. In [16] research, the government's role is to increase the capacity of creative economy actors through training in business knowledge and financial management, facilitated by conferences, competitions, and networks, as well as by creating policies for access to and protection of capital.

The main problem conveyed in the introduction is how to increase community participation in maintaining the area's preservation while achieving sustainable economic benefits. Based on the research results, it can be said that the development of ecoprints has the potential to be a solution that bridges conservation interests with improved community welfare. This supports the argument of [4] that the degradation of forest resources can increase communities' economic vulnerability. Several studies show that ecoprint can be an economic alternative for the community by utilizing local resources [20]. Ecoprint is one of the solutions because the materials that are abundant in the environment can be used as an additional source of income without damaging the environment, vegetation, or logging, where the raw materials are generally taken from fallen leaves, pruning residues or plants that grow abundantly around settlements, so that they do not involve logging or destruction of vegetation in forest areas. In Bantul, ecoprint training for homemakers is considered the right choice because the process is simple and the materials are readily available [17]. A similar program in Sorowajan has succeeded in increasing community groups' capacity to utilize the village's natural potential for the creative economy [14].

Thus, the hypothesis proposed in this study can be proven. People's social characteristics (age, education, occupation, and environmental experience) have been shown to influence their ability to develop ecoprints. Social support and the availability of local resources are key factors that strengthen the potential of ecoprint as a community empowerment strategy while supporting the sustainable preservation of TNBBS.

5. Conclusion

Based on this study's findings, the development of ecoprint products by communities in Bukit Barisan Selatan National Park (BBSNP) demonstrates strong potential when grounded in local ecological and socio-cultural conditions. The results show that the community possesses unique environmental characteristics, including access to local plant resources and traditional ecological knowledge, which differentiate ecoprint development in BBSNP from similar initiatives in other regions. Furthermore, this study found that community participation plays a crucial role in supporting ecoprint development, as reflected in the community's involvement in production activities, resource selection, and environmentally responsible practices. The findings also indicate that ecoprint activities contribute to conservation efforts by promoting the sustainable use of non-timber forest products and enhancing environmental awareness among community members. Finally, the study highlights that the long-term Sustainability of community-based ecoprint development in BBSNP requires institutional support, capacity building, and policy alignment to strengthen both conservation outcomes and local livelihoods.

References

[1] N. Natalia, R. Wirawan, and T. Sulastri, "The role of Bukit Barisan Selatan National Park in protecting the ecosystem and the life of the surrounding community," *Indonesian Journal of Forest Conservation*, vol. 15, no. 2, pp. 120–132, 2021.

[2] H. Hudaya, I. Santoso, and J. Wibowo, "Conservation challenges of Bukit Barisan Selatan National Park: Forest encroachment and community participation," *Journal of Tropical Nature Conservation*, vol. 8, no. 1, pp. 55–66, 2024.

[3] Y. Yakin, R. Hasyim, and S. Lestari, "The impact of forest destruction on the poverty level of communities around forest areas," *Journal of Rural Development and Forestry*, vol. 7, no. 2, pp. 211–222, 2019.

[4] R. A. Damiti, P. Pakaya, M. H. Prasetyo, D. W. K. Baderan, and R. Utina, "Stability of Indonesia's forest ecosystems in the face of deforestation and environmental damage: A review of the literature," *Botany: Publications of Plant Science and Agribusiness*, vol. 2, no. 2, pp. 176–188, 2025.

[5] L. Ismaini, H. Gunawan, and E. Haryono, "Plant diversity of Sumatran's mountainous forests," *Journal of Tropical Biology*, vol. 15, no. 3, pp. 157–166, 2015.

[6] D. Melnykovych, I. Soloviy, and A. Deyneka, "Forest degradation and its impact on rural livelihoods," *Journal of Environmental Management*, vol. 213, no. 1, pp. 72–84, 2018.

[7] J. Johan, K. Sari, and L. Putra, "The role of the agricultural sector in the economy of the community around TNBBS," *Journal of Agricultural and Development Economics*, vol. 11, no. 4, pp. 377–389, 2023.

[8] V. A. Bashiroh, U. K. N. Qomariah, and M. Chusnah, "Ecoprint of the color expression of teak leaves (*Tectona grandis*) on primissima cotton with alum, tunjung, and lime mordants," *Agroscience: Journal of Agricultural Sciences*, vol. 5, no. 1, pp. 17–23, 2022.

[9] Z. Zakaria, I. Nurhanifah, T. Oktafiyaningsih, E. N. Ariyani, S. Y. Nurtyas, and H. Admawati, "Effectiveness of the use of five types of plants in making ecoprint pounding techniques," *Journal of Biolearning*, vol. 10, no. 2, pp. 45–52, 2023.

[10] D. A. Asmara and M. Sarasati, "The application of ecoprint technique to foliage into products with selling value," *Journal of Art Service*, vol. 1, no. 2, pp. 16–26, 2020, doi: 10.24821/jas.v1i2.4706.

[11] G. Gai, "A sustainable livelihood approach in the buffer area of Bukit Barisan Selatan National Park," *Journal of Forestry Socioeconomics*, vol. 17, no. 3, pp. 201–212, 2020.

[12] M. Maryuningsih, O. Kurniawan, and P. Azizah, "Empowering local communities to increase creative entrepreneurship-based income," *Journal of Community Empowerment*, vol. 9, no. 3, pp. 245–259, 2021.

[13] D. Darmayanti, E. Prasetyo, and F. Laksmi, "Ecoprint as a sustainable alternative to synthetic dyes," *Journal of Environmental Technology*, vol. 12, no. 1, pp. 25–34, 2021.

[14] J. Jamilah, N. Safitri, P. D. Khairunnisa, P. P. Saragih, T. S. Zulkarnain, and N. Anas, "Management and training of local potential-based ecoprints in Bah Sarimah Village, Silau Kahean District, Simalungun Regency," *Martabe: Journal of Community Service*, vol. 5, no. 6, pp. 2165–2175, 2022.

[15] F. Widiani, R. Sari, and A. Fitriani, "Biodiversity conservation in Bukit Barisan Selatan," *Journal of Nature Conservation*, vol. 3, no. 1, pp. 60–71, 2019.

[16] R. B. Utomo and M. H. U. Dewi, "The role of government and private sector in the creative economy," *Jurnal Riset Akuntansi Mercu Buana*, vol. 7, no. 1, pp. 58–71, 2021.

[17] P. D. Cahyani, D. Prawita, and T. Suparyanto, "Community empowerment through business skills with ecoprint batik," *Journal of Community Service and Empowerment Literacy*, vol. 1, no. 2, pp. 113–118, 2022.

[18] P. Jongwe, M. W. Ladzani, and S. M. Seeletse, "Navigating the strengths and weaknesses of small and medium enterprises of Masvingo Province, Zimbabwe, based on profiles: Strategies for sustainable growth," *International Journal of Applied Research in Business and Management*, vol. 5, no. 2, 2024.

[19] S. E. Wahyuningsih *et al.*, "The role of fashion design education in developing ecoprint technique clothing to support final projects and increase sustainability awareness," in *Proc. 5th Vocational Education International Conference (VEIC-5)*, 2023, pp. 149–158.

[20] T. Wahyuningsih and S. C. Chen, "Determinants of virtual property prices in Decentraland: An empirical analysis of market dynamics and cryptocurrency influence," *International Journal Research on Metaverse*, vol. 1, no. 2, pp. 157–171, 2024.

[21] I. Risnasari *et al.*, "Characterization and application of Sikkam (*Bischofia javanica* Blume) as a natural dye and antibacterial agent for eco-printing textiles," *Waste and Biomass Valorization*, pp. 1–16, 2025.

[22] D. P. Sukmawati, I. Nurlatifah, and H. Fahri, "Ecoprint exploration in environment-friendly visual art with natural dyes from nature," in *Proc. ACCEPT: Annual Conference on Community Engagement for Peaceful Transformation*, vol. 3, no. 1, pp. 394–402, 2024.

[23] V. H. Satria, A. Baihaqy, N. F. Zuhroh, N. Laily, and Y. Yahya, "Pounding nature into profit with sustainable techniques for crafting high-value eco-print products," *South Asian Journal of Social Studies and Economics*, vol. 21, no. 6, pp. 111–120, 2024.

[24] D. Wulansari, N. Sukatmadirerja, and S. M. R. Benitez, "Development of creative industries based on local wisdom as a driver of the tourism industry," *Aplikasi Administrasi: Media Analisa Masalah Administrasi*, pp. 97–109, 2024.

[25] W. Rahmaningtyas, R. Widhiastuti, H. N. Purasani, and S. R. Apriliana, "Ecoprint-preneurship: Strategies for local economic development and sustainable tourism through ecoprint training," *Jurnal Pengabdian UNDIKMA*, vol. 5, no. 3, pp. 396–406, 2024.

[26] M. F. Naam *et al.*, "Development of eco print on leather craft products to increase production of Faro Leathercraft artisans," *Jurnal Abdimas*, vol. 28, no. 1, pp. 136–141, 2024.

[27] S. L. Mahajan *et al.*, "A theory-based framework for understanding the establishment, persistence, and diffusion of community-based conservation," *Conservation Science and Practice*, vol. 3, no. 1, p. e299, 2021.

[28] R. Soekmadi *et al.*, "Community perspectives on engaging stakeholders for human–Sumatran tiger coexistence in the Bukit Barisan Selatan landscape," *Forest and Society*, vol. 9, no. 2, pp. 623–640, 2025.

[29] A. Mardiyanto, R. Riyanto, C. P. Sianipar, and S. Shibata, "Forest ecosystem services and local communities neighboring Biha Resort in Bukit Barisan Selatan National Park, Southern Sumatra, Indonesia," *Asian Journal of Forestry*, vol. 8, no. 1, 2024.

[30] E. Comino and V. Ferretti, "Indicators-based spatial SWOT analysis: Supporting the strategic planning and management of complex territorial systems," *Ecological Indicators*, vol. 60, pp. 1104–1117, 2016.

[31] A. Rohani and M. A. Salamah, "Integration of creative economy values and local wisdom in early childhood education: Perspectives on the Sustainable Development Goals (SDGs) 2030," *Asian Journal of Engineering, Social and Health*, vol. 1, no. 3, pp. 296–306, 2022.

[32] N. Oktyajati *et al.*, "Ecoprint totebag training for RA Hidayatul Insan Karanganyar students: Realizing environmentally friendly art education and potential creative tourism attractions," *Academic Journal of Community Service*, vol. 3, no. 4, pp. 422–430, 2025.

[33] S. Sutono, I. Harsono, N. Nasruddin, and L. Judijanto, "The influence of regulatory policy, technology infrastructure, and human resource quality on economic growth in Surabaya City," *West Science Journal Economic and Entrepreneurship*, vol. 1, no. 11, pp. 547–556, 2023.

[34] D. Aqmala and F. I. F. S. Putra, "Gemas: Enhancing the distribution of integrated eco-friendly marketing strategies towards digital transformation and global competitiveness," *Journal of Distribution Science*, vol. 22, no. 5, pp. 39–57, 2024.

[35] P. Dhumal, P. Bhadane, B. Ibrahim, and S. Chakraborty, "Evaluating the path to sustainability: SWOT analysis of safe and sustainable by design approaches for metal-organic frameworks," *Green Chemistry*, 2025.

[36] D. Dushkova and O. Ivlieva, "Empowering communities to act for a change: A review of the community empowerment programs towards sustainability and resilience," *Sustainability*, vol. 16, no. 19, p. 8700, 2024.