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Exploring the intersection of sustainable design and cultural heritage: Enhancing community enterprise through product innovation in bamboo basketry using post-harvest sugar cane leaves

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Abstract: This research explores the dynamic intersection of sustainable design, cultural heritage, and community enterprise, focusing on the innovative utilization of post-harvest sugar cane leaves in bamboo basketry production from various provinces in Thailand. This study aims to investigate how design anthropology principles can enhance community enterprises' resilience and sustainability by employing a qualitative case study approach. Findings reveal that while traditional bamboo basketry reflects the region's rich cultural heritage, a shift towards sustainable practices offers environmental benefits and economic opportunities. Design anthropology informs the development of culturally relevant products, fostering market competitiveness and preserving traditional craftsmanship. Moreover, government policies play a pivotal role in supporting or hindering the growth of community enterprises, with soft power initiatives holding promise for promoting cultural heritage and sustainability. Collaboration between policymakers, design anthropologists, and local stakeholders is essential for developing inclusive policies that empower communities and foster sustainable development. Overall, integrating sustainable design practices and cultural insights holds significant potential for enhancing the resilience and effectiveness of community enterprises, ensuring a prosperous and sustainable future for both the industry and the communities it serves. This study is a testament that design anthropology provides a powerful framework for addressing complex social and environmental issues through the lenses of culture and design.

Keywords: sustainable design; design anthropology; cultural heritage; qualitative case study; collaboration; Thailand

1. Introduction

Scholars recognize community enterprises, defined as locally owned businesses, for their role in sustainable development by leveraging local resources and fostering social cohesion (Dangelico and Vocalelli, 2017; Gupta et al., 2020; Ingold, 2018; Phillips et al., 2015; Westley and Antadze, 2010). While scholars acknowledge their potential to address socio-environmental challenges, these enterprises often face barriers such as limited resources and market constraints, necessitating innovative strategies for sustainability (Adams et al., 2016; Borzaga and Defourny, 2004; Defourny, 2001; Doherty et al., 2014; Loorbach and Rotmans, 2010; Smith et al., 2013; Vedula et al., 2022).

Rooted in ethnography, design anthropology is an interdisciplinary field that blends anthropology's principles and methods with those of design practice to enhance the design of products, services, settings, and systems. It can provide insights into local cultures and practices, enabling participatory design processes that promote resilience and empowerment within communities (Clarke, 2017; Clarke and Clarke, 2011; Gunn

et al., 2013; Gunn and Donovan, 2016; Murphy, 2016; Miller, 2017; Sanders and Stappers, 2008; Suchman, 2011). Sustainable product design, integral to sustainability efforts, emphasizes the integration of ecological, social, and economic considerations to preserve cultural heritage and promote local identity (Brown, 2009; Chapman, 2012; Escobar, 2012; Carella et al., 2022; Jegou and Manzini, 2003; Lang and Armstrong, 2018; Lilley, 2009; Walker, 2006). However, challenges persist in balancing tradition with innovation and ensuring cultural authenticity alongside commercial viability. This research aims to address this gap, specifically focusing on how design interventions informed by anthropological insights can contribute to upgrading the community enterprise paradigm towards sustainability. To achieve the goal of the study, this study utilized the case study of sugar cane leaves as an alternative to produce bamboo baskets. This case study exemplifies the practical use of theoretical principles from design anthropology in a real-world setting.

2. Materials and methods

2.1. Design

This research adopted a qualitative case study approach to investigate the intersection of design anthropology, sustainable development, and community enterprise. We utilized a multiple-case study design to conduct an in-depth examination of a specific community engaged in bamboo basketry production using post-harvest sugar cane leaves. Participants as key informants in this study included members of the bamboo basketry producing community, including artisans, community leaders, local entrepreneurs, and other relevant stakeholders. Design anthropologists specialize in comprehending cultural settings and user behaviors to ensure that sustainable product designs align with the values and lifestyles of the local cultures. They offered valuable perspectives on how design might effectively transcend cultural divides and promote sustainable habits. Sustainable development experts provided their knowledge in conducting environmental impacts, managing resources, and implementing sustainability frameworks. They offered valuable perspectives on the environmental advantages and difficulties of guiding the advancement of sustainable products and activities. Community enterprise stakeholders possess valuable knowledge of market dynamics, community demands, and operational issues. They provided valuable information about the current state of the local economy, potential business prospects, and community goals, which helped shape plans for creating sustainable products and expanding the enterprise. Purposive sampling guided participant selection to ensure representation of diverse perspectives and expertise relevant to the research questions.

2.2. Data collection

We collected data using a combination of methods, such as semi-structured interviews, field observation, and document analysis (American Psychological Association, 2020). The data collection took place in 2023, specifically during the post-harvest period of sugar cane in June and July. We conducted semi-structured interviews with 15 key informants to gain insights into the challenges, opportunities,

and strategies related to sustainable product design and community enterprise (American Psychological Association, 2020, pp. 353–354). We conducted one type of semi-structured interview design. We conducted these interviews to gather insights from key informants about the challenges, opportunities, and strategies related to two main areas: (1) sustainable product design, which aims to integrate design practices with sustainability principles, considering environmental impact and community needs, and (2) community enterprise, which aims to explore strategies for enhancing community enterprises through sustainable product development, focusing on economic viability and social impact. We conducted one type of semi-structured interview design to gather insights from key informants about the challenges, opportunities, and strategies related to two main areas: (1) sustainable product design, which aims to integrate design practices with sustainability principles, considering environmental impact and community needs, and (2) community enterprise, which aims to explore strategies for enhancing community enterprises through sustainable product development, focusing on economic viability and social impact. Field observation involved immersive engagement with the community to observe daily activities, interactions, and cultural practices related to bamboo basketry research and development production (American Psychological Association, 2020, pp. 355–356). Document analysis entailed reviewing relevant documents, such as community development plans, policy documents, and previous research reports (American Psychological Association, 2020, pp. 367–368).

2.3. Instruments

To ensure consistency and depth in data collection, we developed semi-structured interview guides for instruments for data elicitation. These guides included open-ended questions designed to explore participants' perspectives on topics such as traditional craft techniques, market dynamics, environmental sustainability, and cultural heritage preservation. We used field notes to systematically record observations during participant observation sessions, capturing details such as material use, production processes, and social dynamics within the community.

2.4. Data analysis

Data analysis followed a thematic analysis approach, involving the identification and interpretation of patterns, themes, and categories within the data (Braun and Clarke, 2006). We coded and analyzed transcriptions from interviews, field notes, and document extracts using NVivo qualitative data analysis software. We generated initial codes through open coding, then organized them into broader themes and sub-themes through iterative rounds of coding and discussion. The research questions guided the analysis, specifically focusing on identifying insights about the role of design anthropology in upgrading community enterprises towards sustainability.

2.5. Reliability and validity checks

We employed several strategies to enhance the reliability and validity of the findings. First, we conducted member checking by sharing preliminary findings with participants for validation and feedback, ensuring that interpretations accurately

reflected their perspectives. We employed triangulation by comparing data from multiple sources (interviews, observations, and documents) to corroborate findings and enhance credibility. Finally, reflexivity was practiced throughout the research process, with the researcher maintaining awareness of their own biases and assumptions and documenting reflections on how these influenced the interpretation of data. The reflection on biases and assumptions acknowledged that the researcher's subjective position could influence data interpretation. This reflection was crucial for transparency and credibility but also highlighted ongoing challenges in maintaining objectivity. Documenting reflections on biases and assumptions helped me understand how these factors may have influenced the research process and findings. This introspective process contributed to the study's reliability and validity by demonstrating an awareness of potential sources of bias. This study therefore employed triangulation based on the assumption that data from different sources (interviews, observations, and documents) would naturally corroborate each other.

3. Results and discussion

3.1. Overview of the case study context: Bamboo basketry community

The chosen communities being examined manufacture bamboo baskets. The communities and local markets have a mutually dependent economic relationship based on the sale of bamboo baskets. The interdependence between the bamboo basket and its equivalent made from sugar cane leaves establishes a direct economic relationship between the communities and local markets, where bamboo baskets are a significant commodity. The interdependence between bamboo baskets and products made from sugar cane leaves forms the foundation for understanding niche market dynamics. This includes exploring consumer preferences, market demand for sustainable products, and the economic viability of diversifying basketry materials. The introduction of products made from sugar cane leaves, which serve as an alternative material to bamboo for basketry, introduces a new dynamic to this economic relationship. The use of sugar cane leaves potentially diversifies the product offerings of the communities, catering to niche markets interested in sustainable, eco-friendly products. The case studies from various parts of Thailand, as shown in **Figure 1**, provide geographical diversity and context to how these economic dynamics play out in different community settings. This diversity enriches the understanding of local variations in production practices, market interactions, and potential for niche market development. Therefore, the economic relationship centered on bamboo basket production evolves with the introduction of sugar cane leaf products, influencing niche market dynamics and illustrating broader implications for sustainability, economic resilience, and market diversification within the communities studied.



Figure 1. The case studies for site observation from various regions of Thailand. (a) participants at Ban Na Tan village, Yasothon Province; (b) participants at Ban Kham Pia in Yasothon Province; (c) participants at Baan Thung Yao Community in Chiang Mai Province; (d) sugar cane basketry products; (e) participants at Baan Thung Yao Community in Chiang Mai Province; (f) sugar cane basketry product-making process; (g) participants at Ban Na Tan village, Yasothon Province; (h) participants at Ban Kham Pia in Yasothon Province; (i) sugar cane resources.

Figure 1 illustrates the site observation process in the case studies. The studies represent various parts of Thailand. All are a testament to the creativity, craftsmanship, and cultural vitality of bamboo basketry production: These village case studies are selected for these reasons. They are characterized by skilled craftsmanship, a rich cultural heritage, and a commitment to sustainability. In these communities, artisans utilize locally sourced bamboo materials to create a diverse range of products, including baskets, trays, mats, and handicrafts. The community employs traditional weaving techniques, passed down through generations, to craft intricate patterns and designs that reflect their unique style and artistic sensibilities. Despite facing challenges such as limited market access, competition from mass-produced goods, and changing consumer preferences, bamboo basketry artisans in the case studies remain resilient and adaptable. Through collaborative efforts with local government agencies, non-profit organizations, and educational institutions, these communities have

implemented initiatives to promote sustainable practices, enhance market linkages, and preserve cultural heritage. Overall, bamboo basketry production in these case studies serves as a testament to the creativity, craftsmanship, and cultural vitality of Thailand. By embracing innovation, collaboration, and sustainability, these communities are not only sustaining their traditional livelihoods but also contributing to the promotion of sustainable development and the preservation of cultural heritage for future generations. The case studies are drawn from the material resources, consisting of the following:



Figure 2. Map of Thailand.

Figure 2 illustrates the map of Thailand, displaying the locations of the case studies. First, Baan Thung Yao Community, Chiang Mai Province (No. 9), is a traditional village located in Chiang Mai Province, Northern Thailand, known for its expertise in bamboo basketry. The community has a long-standing tradition of bamboo

weaving, passed down through generations, and produces a wide range of bamboo baskets, trays, and containers. Despite facing modernization and competition from mass-produced goods, the Baan Thung Yao community has maintained its cultural heritage and craftsmanship by incorporating traditional techniques with contemporary designs. To promote sustainable tourism and support local artisans, the community has also implemented community-led initiatives like cultural festivals and eco-tourism programs.

Second, the Baan Ta Kam Community in Nakhon Nayok Province (No. 25), Central Thailand, is a rural village known for its bamboo basketry industry. The community specializes in crafting intricate bamboo baskets and containers used for various purposes, including storage, transportation, and household decoration. With support from government agencies and non-profit organizations, the Baan Ta Kam community has implemented initiatives to enhance the sustainability of its bamboo weaving practices, such as promoting eco-friendly materials, improving production techniques, and expanding market access through online platforms and export markets. These efforts have not only contributed to the economic empowerment of local artisans but also fostered pride in cultural heritage preservation.

Third, Baan Rai Nong Prue, a small village in Surin Province (No. 64), northeastern Thailand, is known for its traditional bamboo basketry craftsmanship. The community specializes in weaving intricate patterns and designs using locally sourced bamboo materials, creating a distinctive style that reflects the region's cultural identity. Despite facing challenges such as dwindling natural resources and limited market opportunities, the Baan Rai Nong Prue community has embraced innovation and collaboration to sustain its bamboo basketry tradition. Collaborative efforts with local universities, design institutions, and government agencies have led to the development of new product designs, marketing strategies, and eco-friendly practices, ensuring the continued vitality of the community's cultural heritage and livelihoods.

Fourth, Ban Wang Hin is a rural village located in Yasothon Province (No. 73), known for its unique bamboo basketry craftsmanship and cultural heritage. The community's artisans are skilled in weaving intricate patterns and designs using locally sourced bamboo materials, creating a distinctive style that sets their products apart. Customers from across the region prize Ban Wang Hin's bamboo baskets for their quality craftsmanship and artistic value. Despite facing challenges such as limited access to resources and changing consumer preferences, the Ban Wang Hin community has remained resilient by embracing innovation and collaboration. Through partnerships with local businesses, educational institutions, and government agencies, the community has been able to explore new market opportunities, develop innovative designs, and preserve its cultural heritage for future generations.

Fifth, Ban Kham Pia is a village located in the Yasothon Province of northeastern Thailand (No. 73), renowned for its traditional bamboo basketry craftsmanship. The community specializes in weaving various types of bamboo baskets, trays, and containers using locally sourced bamboo materials. The intricate designs and patterns of Ban Kham Pia's bamboo products reflect the community's rich cultural heritage and craftsmanship. Despite facing challenges such as limited market access and competition from mass-produced goods, the Ban Kham Pia community has remained resilient by preserving its traditional weaving techniques and adapting to changing

market demands. Collaborative efforts with local government agencies and non-profit organizations have been instrumental in promoting sustainable practices, enhancing market linkages, and preserving cultural heritage.

Lastly, Ban Na Tan is another village in Yasothon Province (No. 73), known for its vibrant bamboo basketry industry. The community’s skilled artisans produce a wide range of bamboo products, including baskets, mats, and handicrafts, using traditional weaving techniques passed down through generations. The durability, functionality, and aesthetic appeal of the Ban Na Tan community’s bamboo baskets make them highly sought after by both local consumers and tourists. To sustain their bamboo basketry tradition, the community has implemented initiatives to promote eco-friendly materials, improve production efficiency, and diversify product offerings. These efforts have not only supported the livelihoods of local artisans but have also contributed to the preservation of cultural heritage and the promotion of sustainable development in the region.

A summary of a SWOT analysis for each of the six study locations, focusing on their bamboo basketry traditions and efforts in cultural heritage preservation is shown in **Table 1**.

Table 1. SWOT Analysis results for the six locations under study.

Baan Thung Yao Community, Chiang Mai Province	
Strengths	Strong Cultural Heritage: Long-standing tradition of bamboo basketry passed down through generations Craftsmanship: Expertise in weaving traditional bamboo baskets, trays, and containers Innovation: Incorporation of traditional techniques with contemporary designs Community Initiatives: Implemented cultural festivals and eco-tourism programs to promote sustainable tourism and support local artisans
Weaknesses	Modernization Pressures: Competition from mass-produced goods and changing consumer preferences. Limited Market Reach: Potential challenge in accessing broader markets beyond traditional tourism.
Opportunities	Sustainable Tourism: Growing interest in eco-friendly and culturally authentic experiences Market Expansion: Potential to leverage online platforms and expand export opportunities Collaboration: Further partnerships with designers and businesses for new product lines
Threats	Economic Sustainability: Balancing economic viability with cultural preservation efforts Environmental Impact: Challenges in sustainable sourcing of bamboo and environmental degradation Policy Support: Dependence on supportive policies for cultural preservation and sustainable development
Baan Ta Kam Community, Nakhon Nayok Province	
Strengths	Government Support: Backing from government agencies and NGOs Eco-friendly Practices: Focus on sustainable materials and production techniques Market Access: Expansion into online platforms and export markets Pride in Heritage: Cultural pride and strong community involvement

Table 1. (Continued).

Baan Ta Kam Community, Nakhon Nayok Province	
Weaknesses	Dependency: Reliance on external support from government and NGOs Market Dependency: Vulnerability to market fluctuations and competition Technological Adaptation: Potential challenges in adapting to rapid technological changes
Opportunities	Global Markets: Increased export opportunities for eco-friendly products Tourism Growth: Potential for cultural tourism and artisanal experiences Capacity Building: Further enhancing production techniques and market strategies
Threats	Resource Constraints: Limited access to sustainable bamboo resources External Economic Factors: Global economic downturns impacting export markets Cultural Dilution: Risk of losing traditional techniques amidst modernization
Baan Rai Nong Prue, Surin Province	
Strengths	Distinctive Craftsmanship: Unique patterns and designs reflecting local identity Innovation: Collaboration with universities and design institutions Cultural Identity: Strong preservation of regional cultural heritage
Weaknesses	Resource Challenges: Dwindling natural resources like bamboo Market Limitations: Limited market reach beyond local and regional levels Skill Development: Need for continuous skill enhancement and training
Opportunities	Product Diversification: Developing new designs and product lines Tourism Development: Cultural tourism and heritage preservation initiatives Educational Partnerships: Further collaboration with educational institutions for innovation
Threats	Environmental Factors: Climate change and its impact on bamboo growth Commercialization: Balancing tradition with market demands Urbanization: Pressure from urban development on rural traditions
Ban Wang Hin, Yasothon Province	
Strengths	Artistic Value: High-quality craftsmanship and artistic value of products Collaboration: Partnerships with local businesses and educational institutions Cultural Pride: Strong community commitment to preserving heritage
Weaknesses	Access to Resources: Limited access to raw materials and resources Market Competitiveness: Pressure from cheaper, mass-produced alternatives Skills Development: Need for ongoing skill development and innovation

Table 1. (Continued).

Ban Wang Hin, Yasothon Province	
Opportunities	<p>Market Expansion: Exploring new market opportunities locally and internationally</p> <p>Heritage Tourism: Potential for cultural tourism initiatives</p> <p>Technological Integration: Adopting technology for production and marketing</p>
Threats	<p>Globalization: Competition from global markets and products</p> <p>Regulatory Challenges: Compliance with changing regulations</p> <p>Cultural Erosion: Risk of losing traditional techniques and knowledge</p>
Ban Kham Pia, Yasothon Province	
Strengths	<p>Traditional Techniques: Expertise in traditional bamboo basketry</p> <p>Community Support: Collaboration with government and NGOs</p> <p>Cultural Heritage: Strong emphasis on preserving cultural heritage</p>
Weaknesses	<p>Market Challenges: Limited market access and competition from mass-produced goods</p> <p>Infrastructure: Potential lack of infrastructure for tourism and market expansion</p> <p>Training Needs: Continuous training needs for artisans</p>
Opportunities	<p>Sustainable Practices: Promoting eco-friendly practices and materials</p> <p>Market Development: Enhancing market linkages and online presence</p> <p>Educational Initiatives: Training programs and workshops for skill development</p>
Threats	<p>Economic Sustainability: Balancing cultural preservation with economic viability</p> <p>Changing Demands: Adapting to changing consumer preferences</p> <p>Climate Change: Impact on bamboo growth and sustainability</p>
Ban Na Tan, Yasothon Province	
Strengths	<p>Diverse Product Range: Wide variety of bamboo products catering to different needs</p> <p>Quality Craftsmanship: Reputation for durability and aesthetic appeal</p> <p>Community Engagement: Initiatives promoting eco-friendly materials and production</p>
Weaknesses	<p>Resource Management: Challenges in sustainable bamboo sourcing</p> <p>Market Dynamics: Vulnerability to market fluctuations and economic changes</p> <p>Technological Adoption: Potential gaps in technology adoption for production efficiency</p>
Opportunities	<p>Market Expansion: Tapping into new markets and tourism opportunities</p> <p>Cultural Exchanges: Collaborating with other cultural communities for mutual benefit</p> <p>Innovation: Developing new designs and products for evolving market demands</p>

Table 1. (Continued).

Ban Na Tan, Yasothon Province	
Threats	Environmental Impact: Sustainable sourcing amidst environmental challenges
	Global Competition: Competition from global and regional markets
	Policy Support: Dependence on supportive policies for cultural preservation and economic development

Table 1 presents SWOT analysis results for the six sites under study. Each community faces unique challenges and opportunities in preserving their cultural heritage while adapting to modern economic and environmental realities. The SWOT analysis helps in identifying areas where each community can focus to enhance their strengths, mitigate weaknesses, capitalize on opportunities, and prepare for potential threats.

This study conducted observation, semi-structured interviews, field notes, and document analysis during the site visits. The study’s results are presented in accordance with the research questions. In response to the second research question (How can design anthropology help to upgrade the community enterprise paradigm towards sustainable development?), below are the results of the study.

3.2. Utilizing design anthropology to enhance sustainable development in community enterprises

3.2.1. The current state of community enterprises in Thailand

In Thailand, community enterprises blend traditional methods with new possibilities. Bamboo basketry, a longstanding tradition, remains prevalent due to skilled artisans. However, there is a growing interest in sustainable approaches, such as using post-harvest sugar cane leaves. Despite skilled artisans and a strong tradition in bamboo basketry, obstacles include transitioning to sustainable practices like using sugar cane leaves, navigating economic pressures, and embracing innovation. Despite these obstacles, community members exhibit resilience and a readiness to embrace innovation.

3.2.2. Design’s role in shaping community enterprise development

Design plays a critical role in community enterprise development, extending beyond aesthetics to include functionality, sustainability, and cultural significance. Integrating design principles enhances product quality, opens new markets, and sustains traditional craftsmanship while addressing evolving consumer and environmental needs. “Design concepts can boost product quality, commercial potential, workmanship, and adapt to consumer tastes and environmental concerns.” The role of design in the development of enterprises is obvious. It can enhance functionality, sustainability, and cultural significance of products. It supports traditional craftsmanship while adapting to consumer and environmental needs, thus opening new markets and improving economic prospects for communities.

3.2.3. Achieving sustainability challenges for community enterprises

Community enterprises encounter several challenges in achieving sustainability, including access to sustainable materials, competition in the market, technological constraints, and balancing economic viability with environmental conservation. Supportive policies and capacity-building initiatives are necessary to effectively address these challenges. “Access to sustainable materials, market competitiveness, technology limits, and economic viability with environmental protection are community enterprises’ main sustainability concerns. These concerns require supportive policies and capacity-building.”

3.2.4. Design’s role in fostering community enterprise growth: Exploring successful sustainable development initiatives

Design is crucial in community enterprise development, driving innovation, competitiveness, and cultural preservation. Successful sustainable development initiatives within community enterprises include eco-friendly production, resource conservation, and market diversification, resulting in improved economic viability and environmental sustainability. “Several community enterprise sustainable development ideas have been successful.” Eco-friendly production, resource conservation, and market diversification boost economic and environmental sustainability.

3.2.5. Successful examples of sustainable development initiatives within community enterprises

Community enterprises have successfully implemented various sustainable development initiatives. For instance, artisans have adopted eco-friendly practices like using natural dyes and exploring alternative materials such as post-harvest sugar cane leaves, reducing environmental impact and opening new market opportunities. Upcycling waste creatively repurposes discarded materials; fair trade certification ensures ethical sourcing and fair wages; community-based tourism generates income while showcasing local traditions; natural resource management preserves ecosystems; and social enterprise models prioritize social and environmental impact alongside financial sustainability. These initiatives contribute to environmental conservation, social equity, and economic prosperity, enhancing the long-term resilience and well-being of community enterprises.

3.2.6. The contribution of design anthropology principles to addressing challenges faced by community enterprises

Design anthropology principles offer valuable insights for addressing challenges encountered by community enterprises by facilitating a profound understanding of local cultures, values, and needs. “We can co-create solutions that are culturally sensitive, environmentally sustainable, and economically viable through ethnographic research methods and participatory design approaches.” Design anthropology serves as a bridge between traditional knowledge and modern design practices, empowering communities to innovate while safeguarding their heritage. Design anthropology helps communities develop while maintaining their legacy by combining traditional knowledge with new design methods.

3.2.7. Examples of design anthropology applied to upgrade community enterprises

Participatory design workshops, where local artisans collaborate with designers to co-create sustainable solutions, effectively apply design anthropology to enhance community enterprises. This approach ensures that products are culturally resonant, environmentally conscious, and economically feasible by incorporating the insights and preferences of community members into the design process. “Design anthropology has helped community firms create sustainable solutions. Designing with community members helps designers understand their requirements and create culturally meaningful, environmentally friendly, and financially viable solutions.”

3.2.8. The potential benefits of integrating design anthropology into community enterprises’ development strategies

Integrating design anthropology into community enterprises’ development strategies offers numerous benefits. “For example, design anthropology may aid community enterprise development in many ways (namely facilitating cultural sensitivity, empowering community participation, enhancing economic viability, and preserving heritage). Also, it can promote market competitiveness, community participation and empowerment, traditional handicraft preservation, culturally meaningful and environmentally sustainable products, and artisans’ livelihoods.” Past records show that design anthropology has been used to revitalize traditional crafts in Mexico, Kenya, Brazil, and India. By understanding cultural significance and working closely with artisans, they developed products that appealed to both local and international markets. In Kenya, anthropologists partnered with conservation organizations to involve local communities in wildlife conservation efforts. In Brazil, anthropologists facilitated the development of community spaces and housing solutions, fostering social cohesion and improving living conditions. In India, anthropologists promoted sustainable agricultural practices and improved healthcare access in indigenous communities. These experiences demonstrate the transformative potential of anthropological insights in community enterprises (Whitford and Ruhanen, 2021).

3.2.9. The potential benefits of integrating design anthropology into community enterprises’ development strategies

Integrating design anthropology into community enterprises’ development strategies offers numerous benefits. “Design anthropology may aid community enterprise development in many ways. It can promote market competitiveness, community participation and empowerment, traditional handicraft preservation, culturally meaningful and environmentally sustainable products, and artisans’ livelihoods.”

3.2.10. Envisioning the future of community enterprises with the incorporation of design anthropology principles

Incorporating design anthropology principles envisions a culturally vibrant and economically sustainable future for community enterprises. By honoring traditional knowledge and embracing innovation, these enterprises can produce culturally relevant products while preserving heritage. Design anthropology empowers artisans,

fosters community resilience, and positions community enterprises as leaders in sustainable development.

In response to the second research question (What are the key challenges and opportunities associated with sustainable product design and development in a bamboo basketry-producing community using post-harvest sugar cane leaves?) below are the results of the study.

3.3. Exploring challenges and opportunities in sustainable product design for bamboo basketry communities utilizing post-harvest sugar cane leaves

3.3.1. Community bamboo basketry production: traditional methods and materials

Bamboo basketry is a vital craft in our community, steeped in tradition, where artisans employ age-old techniques passed down through generations. Artisans use hand tools to split, shape, and weave bamboo from local woods into basket designs. Baskets, which store grains and transport things, are part of our culture.

3.3.2. Factors influencing the exploration of post-harvest sugar cane leaves as a material for basketry

A variety of factors, including environmental sustainability, raw material accessibility, and a drive for craft innovation, influenced the decision to consider post-harvest sugar cane leaves for basketry. With a growing consciousness about the ecological effects of conventional materials and the plentiful supply of sugar cane in our area, utilizing sugar cane leaves offers a chance to produce eco-friendly goods and expand our product range. “With the increased awareness of the environmental impact of traditional materials and the abundance of sugar cane in our region, we can make eco-friendly products while expanding our offerings by using sugar cane leaves.”

3.3.3. Environmental sustainability of basketry production using sugar cane leaves

Incorporating sugar cane leaves into basketry production improves environmental sustainability by reducing dependence on traditional materials like bamboo, which are sourced from forests. “As a byproduct of the sugar industry, sugar cane leaves serve as a renewable resource, reducing waste and deforestation while fostering eco-friendly practices within our community.”

3.3.4. Exploring the economic and social benefits of transitioning to sustainable product design in communities

Transitioning to sustainable product design in our community has yielded both economic and social advantages. Economically, it has expanded market opportunities for our bamboo basketry products, driven by increasing consumer interest in eco-friendly items. This heightened demand has led to better prices and boosted competitiveness through reduced long-term production costs. Socially, embracing sustainability has unified our community, fostering a shared sense of purpose and responsibility. Initiatives focused on sustainability have garnered support from local authorities and organizations, elevating our social standing and strengthening relationships within the broader community. Overall, this transition has not only

brought economic prosperity but also enhanced social well-being. “Our community’s reputation and partnerships have improved because local authorities and organizations have supported our environmental efforts.”

3.3.5. Exploring opportunities for collaboration and partnership in advancing sustainable product design initiatives

Collaboration opportunities are abundant for advancing sustainable product design initiatives, from partnering with local government agencies to collaborating with Non-Governmental Organizations (NGOs) and businesses focused on sustainability. Partnering with government agencies can provide funding, resources, and infrastructure support while also offering incentives for adopting sustainable practices. Collaborating with environmental NGOs can offer technical expertise, capacity building, and networking opportunities, promoting market access for eco-friendly products and ensuring community engagement. Additionally, partnerships with businesses can expand market reach and increase visibility for sustainable bamboo products, driving economic growth and environmental stewardship while enhancing social well-being. Leveraging these partnerships can accelerate the development of sustainable initiatives in case studies’ bamboo basketry communities.

“Sustainable bamboo products benefit from local and global commercial connections. Collaboration with retailers, distributors, and eco-conscious companies may raise customer awareness of sustainable design and promote product innovation and market differentiation. Bamboo basketry villages in Yasothon case studies can promote sustainable product design projects that increase economic growth, environmental protection, and social well-being by cooperating with stakeholders.”

3.3.6. Envisioning the future of bamboo basketry production through sustainable design practices

Embracing sustainable design practices in bamboo basketry production promises a bright future, with increased market demand, improved environmental stewardship, and enhanced community well-being. This shift opens up new market opportunities driven by consumer preferences for eco-friendly products, leading to higher prices and increased demand. Furthermore, sustainable practices contribute to environmental stewardship by reducing the industry’s ecological footprint through renewable resources and eco-friendly production processes. Additionally, prioritizing sustainability fosters social cohesion, pride in craftsmanship, and economic empowerment within communities, while also preserving cultural heritage. Overall, the adoption of sustainable design practices holds the potential to drive economic growth, environmental conservation, and social development, ensuring a prosperous and sustainable future for the bamboo basketry industry and the communities it serves.

“Sustainable communities foster community, pride in traditional craftsmanship, and economic empowerment. Sustainable design programs conserve cultural assets and empower communities via capacity building and skill development.”

In summary, three key issues need to be highlighted: sustainability, cultural heritage, and craft techniques within the context of bamboo basketry and the use of sugar cane leaves. On sustainability, the shift to using sugar cane leaves contributes to environmental sustainability, reducing ecological footprint and promoting eco-

friendly production processes. On cultural heritage, the cultural significance of bamboo basketry within the community highlights its historical roots, traditional techniques, and the importance of preserving these practices for future generations. On craft techniques, the traditional methods used by artisans include the tools, materials, and processes involved in bamboo basketry production.

In response to the second research question (How can we use soft power policy initiatives, informed by design anthropology principles, to strengthen the resilience and effectiveness of community enterprises?), below are the results of the study.

3.4. Harnessing soft power policy initiatives informed by design anthropology to enhance community enterprise resilience and effectiveness

3.4.1. The impact of government policies on community enterprise growth: a perspective analysis

Government policies have a significant impact on the growth of bamboo basketry community enterprises. Supportive policies can offer vital resources, infrastructure, and incentives, facilitating expansion and sustainability. Financial assistance, such as grants or low-interest loans, helps with equipment and marketing investments. According to document analysis, policies promoting sustainability, such as resource management regulations, encourage eco-friendly practices.

“Government policies aid and hinder community enterprise. Government programs can help bamboo basketry community enterprises grow and prosper. Legislation, infrastructure, and incentives can support growth and sustainability. With grants and low-interest loans, community companies can develop by investing in equipment, training, and marketing. Resource management and environmental conservation legislation can also encourage community enterprises to produce sustainably. Incentives or subsidies from governments can help community enterprises be profitable and environmentally responsible.”

However, bureaucratic hurdles and favoritism toward larger corporations can impede growth. Crafting inclusive, sustainable, and empowering policies is essential for fostering the resilience and prosperity of community enterprises. In the interviews, the key informants revealed that “government policies may impede community enterprise growth. Regulations, bureaucracy, and uneven law enforcement can hinder community businesses. Policies may aggravate inequalities and undermine local enterprises.”

3.4.2. Exploring the concept and impact of soft power policy initiatives

Thailand’s soft power policy initiatives rely on non-coercive methods such as culture and diplomacy to influence others. In Yasothon Province’s bamboo basketry communities, these initiatives could promote the cultural significance of basketry and enhance Thailand’s global reputation. For example, supporting cultural exchanges and showcasing bamboo basketry as traditional art could foster understanding between nations. Educational programs that preserve craftsmanship and pass on knowledge to future generations could also be part of such initiatives. Though not directly linked to basketry, these policies can indirectly benefit communities by preserving cultural heritage and creating economic opportunities as disclosed by the entrepreneurs.

“We understand soft power policies. Instead of military or economic force, governments influence others through culture, diplomacy, and morals. These projects shape attitudes, relationships, and national goals through cultural heritage, educational exchanges, and humanitarian aid. To improve Thailand’s cultural diplomacy and global reputation, soft power initiatives should highlight Yasothon Province’s bamboo basketry expertise. For instance, the government may promote bamboo basketry and cultural exchanges to promote understanding and respect.”

3.4.3. Utilizing design anthropology principles to inform policy development for supporting community enterprises

Design anthropology examines human behavior, culture, and society in specific circumstances. These concepts can help policymakers understand bamboo basketry communities’ needs, goals, and challenges while developing community enterprise policies as revealed by key informants as follows:

“First, design anthropology encourages community participation in policymaking. Policymakers can incorporate local knowledge, preferences, and goals by actively engaging stakeholders. Community ownership and empowerment through co-design lead to more effective and sustainable policy solutions. Second, to acknowledge community diversity, design anthropology values empathy and cultural awareness. Participant observation and in-depth interviews can help policymakers understand bamboo basketry communities’ social, economic, and cultural contexts. Using ethnographic research, policymakers can identify community enterprise entrepreneurship, resource limitations, and market constraints. Design anthropology encourages iterative and adaptable problem-solving. Policymakers can test new ideas, get stakeholder feedback, and alter policy based on real-world results. Iterative learning and development ensure that policies adapt to changing community demands and dynamics.”

Overall, by integrating design anthropology principles into policy development processes, policymakers can develop more inclusive, context-sensitive, and effective strategies for supporting community enterprises in bamboo basketry communities. These policies can empower communities, preserve cultural heritage, and promote sustainable economic development.

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3.4.6. Examining successful policy initiatives to enhance community enterprises across different regions

Governments in various regions have implemented policies to support community enterprises, facilitating their growth and success. Examples include microfinance programs offering small loans and business support services, public procurement policies prioritizing purchases from local enterprises, and technical assistance initiatives providing training and mentorship. Certification schemes like fair trade and organic certification help community enterprises differentiate their products and access niche markets, while policies recognizing community land rights ensure equitable access to resources. These policy interventions have proven effective in catalyzing the growth and resilience of community enterprises, contributing to poverty reduction, economic empowerment, and inclusive development, as recorded on the field notes.

“In some regions, governments have implemented policies to provide financial incentives or grants to community enterprises, enabling them to invest in infrastructure, equipment, and training programs. Additionally, supportive regulatory frameworks that promote sustainable practices, facilitate access to markets, or provide technical assistance have also contributed to the success of community enterprises in various regions.”

Examples of successful policy initiatives that have strengthened community enterprises in other regions, as recorded on the field notes:

“Community enterprises may receive government financing. These initiatives provide small loans, financial literacy training, and business assistance to rural and underprivileged businesses. Microfinance helps local businesses. In various countries, local firms receive government contracts. Government contracts for small firms or cooperatives boost community businesses’ sales and visibility. Local economies, jobs, and sustainability benefit from public procurement. Government and development agencies provide technical aid and capacity building to community entrepreneurs. It could be mentoring, training, or business advice. These efforts educate and network local businesses.”

These examples illustrate how targeted policy interventions can catalyze the growth and resilience of community enterprises, contributing to poverty reduction, economic empowerment, and inclusive development in diverse contexts.

3.4.7. Anticipating challenges in implementing soft power policy initiatives at the community level

Implementing soft power policy initiatives within bamboo basketry communities in Baan Ta Kam Community, Nakhon Nayok Province, Baan Rai Nong Prue in Surin Province, and Ban Wang Hin in Yasothon Province may face a variety of challenges, including limited resources for cultural promotion, the dilemma of balancing tradition with modernization, and ensuring inclusive community participation and representation. Additional challenges, as revealed by the interviewee, include:

“Due to fiscal constraints and institutional support, community companies may struggle to sponsor cultural promotion. Traditional practices and innovation may collide, making soft power measures to promote cultural legacy, adaptation, and market relevance challenging. Inclusivity and Representation: Removing obstacles to community perspectives and underrepresented groups in decision-making is tough. Soft power efforts must maintain cultural integrity and promote fair benefit sharing with local people in order to avoid cultural appropriation or misrepresentation. Soft power efforts may need institutional support and capacity building to maintain momentum and commitment.”

Addressing these challenges will require collaborative efforts among stakeholders to design and implement soft power policies that are responsive, inclusive, and culturally sensitive, ultimately supporting the resilience and vitality of bamboo basketry communities in Baan Thung Yao Community in Chiang Mai Province, Ban Kham Pia, and Ban Kham Pia in Yasothon Province.

3.4.8. The role of local stakeholders in shaping effective policy interventions for community development

Local stakeholders, including community leaders and entrepreneurs, play a crucial role in shaping effective policy interventions by providing insights into community needs, advocating for their interests, and participating in the policy-making process. As recorded in the interviews, local stakeholders can contribute further by:

“First, engagement with community members can help stakeholders identify pressing issues and unmet requirements, such as raw material access or market potential, to inform policy. Second, advocate for community interests. Stakeholders can promote sustainable resource management and fair trade policies by raising community awareness. Third, participating in policy formulation and implementation: Stakeholders can advise on local artisan training and marketing programs to ensure relevance, practicality, and impact. Lastly, collaboration with NGOs or academia can help stakeholders tackle complicated problems and promote sustainable development in bamboo basketry villages.”

Overall, the engagement and leadership of local stakeholders are critical for shaping inclusive, equitable, and sustainable policy interventions that respond to the needs and aspirations of bamboo basketry communities in all village cases in this study. As reviewed by opinion leaders and local governors, “local stakeholders, including community leaders and entrepreneurs, can contribute to shaping effective policy interventions by providing insights into community needs, priorities, and aspirations, advocating for their interests, and actively participating in the policy-making process.”

3.4.9. Envisioning collaborative strategies: policymakers, design anthropologists, and community members in policy development

Collaboration between policymakers, design anthropologists, and community members is vital for developing effective policies that are contextually grounded, culturally sensitive, and responsive to community needs and aspirations. This study has synthesized additional details on how this collaboration can drive policy development from the interviews of key informants and document analysis.

“Policymakers, design anthropologists, and community stakeholders collaborate to address bamboo basketry production challenges through a participatory approach. Drawing insights from design anthropologists’ studies of community dynamics, cultural practices, and livelihood strategies, policymakers gain a valuable understanding of the issues at hand. Workshops and consultations provide platforms for stakeholders to share perspectives and policy suggestions, fostering participatory decision-making. Design anthropologists advocate for community-based discourse and policy, bridging academic research with grassroots insights. Policymakers receive comprehensive advice from academic research and traditional knowledge through consultations with both design anthropologists and community members. Together, stakeholders co-design creative solutions tailored to the community’s needs, developing, testing, and promoting bamboo basketry instruction and marketing strategies for sustainable development.”

Overall, collaboration enables a holistic and inclusive approach to policy development, ensuring interventions address local realities and promote the sustainability of community enterprises. By working together, stakeholders drive the development of effective policies that support the resilience of bamboo basketry communities.

4. Discussion

Promoting sustainable development at the local level is pivotal for managing resources effectively, preserving cultural heritage, and fostering social cohesion. This discussion explores key themes within the context of community enterprises engaged in basketry, focusing specifically on innovative practices such as the use of post-harvest sugar cane leaves as a substitute for traditional bamboo materials.

4.1. Theoretical grounding and policy support

The study begins by grounding its assumption in established theoretical frameworks and models. These frameworks highlight the role of community enterprises in generating economic value and promoting resilience (Dangelico and Vocalelli, 2017; Gupta et al., 2020; Ingold, 2018; Phillips et al., 2015; Westley and Antadze, 2010). Despite the theoretical foundation, the study acknowledges the critical role of government policies in supporting sustainable practices and competitiveness among community enterprises. Initiatives such as microfinance and land rights programs are essential for empowering local artisans and fostering sustainable development (Adams et al., 2016; Borzaga and Defourny, 2004; Defourny, 2001; Doherty et al., 2014; Loorbach and Rotmans, 2010; Smith et al., 2013; Vedula et al., 2022). However, these efforts are not without challenges, including limited funding and cultural misrepresentations, underscoring the need for participatory policy formulation to ensure long-term effectiveness and relevance.

4.2. Empowerment, stewardship, and sustainability

Further exploration into specific areas enriches our understanding and practical application in sustainable development. Engaging local communities actively in cultural heritage preservation through initiatives such as community workshops, skill-sharing sessions, and co-design activities is critical for community empowerment and heritage preservation (Clarke and Clarke, 2011; Murphy, 2016; Sanders and Stappers, 2008). These participatory processes empower residents to take ownership of their cultural practices and traditions, ensuring their sustainability across generations.

4.3. Environmental stewardship through material reuse

In terms of environmental stewardship through material reuse, the innovative use of post-harvest sugar cane leaves in basketry not only reduces agricultural waste, but also promotes sustainable resource management. Quantifying the environmental impact of this practice, whether in terms of waste reduction metrics or qualitative ecological benefits, underscores its significance in advancing sustainability goals (Jegou and Manzini, 2003; Lang and Armstrong, 2018).

4.4. Economic sustainability and community livelihoods

With respect to economic sustainability and community livelihoods, case studies demonstrate how sustainable basketry practices contribute to local economic development. Income generation opportunities, enhanced market access, and capacity-building initiatives strengthen economic resilience within communities, fostering a sustainable livelihood for artisans (Carella et al., 2022).

4.5. Cultural heritage preservation and design innovation

Finally, in terms of cultural heritage preservation and design innovation, basketry is not only a craft, but also a cultural heritage that reflects local identities and traditions. Integrating traditional basketry techniques with innovative design approaches revitalizes cultural practices, ensuring their relevance in contemporary contexts (Chapman, 2012; Walker, 2006). Documenting and transmitting cultural knowledge related to basket weaving is critical for preserving cultural heritage.

5. Conclusion

The study reveals how Thai community enterprises integrate traditional bamboo basketry with sustainable practices such as post-harvest sugar cane leaves. This transition not only addresses environmental concerns but also enhances economic prospects and social cohesion. By prioritizing sustainable design practices and fostering collaboration with policymakers and design anthropologists, these enterprises can navigate challenges, leverage market opportunities, and contribute to environmental conservation and community well-being.

The research questions results of the study could lead to four distinct conclusions. First, community enterprises in Thailand blend traditional practices like bamboo basketry with emerging sustainable opportunities such as utilizing post-harvest sugar cane leaves. Despite challenges, there is notable resilience and innovation among community members. Design plays a pivotal role in their development, emphasizing functionality, sustainability, and cultural significance, with successful initiatives including eco-friendly production and fair trade certification. Design anthropology principles provide insights into how to address challenges by understanding local cultures, resulting in co-created solutions. Integrating design anthropology into development strategies promises benefits like culturally relevant products, increased market competitiveness, and the preservation of traditional craftsmanship. Envisioning the future, this integration holds the potential for a culturally vibrant and economically sustainable trajectory, empowering artisans and positioning community enterprises as leaders in sustainable development.

Second, in these cases, bamboo basketry production has deep roots in traditional techniques, reflecting the community's rich cultural heritage. However, a shift toward sustainable practices, such as using post-harvest sugar cane leaves as materials, is gaining traction due to concerns about environmental sustainability and a desire for innovation within the craft. This transition offers environmental benefits by reducing reliance on traditional bamboo materials, promoting eco-friendly practices, and minimizing waste. Furthermore, embracing sustainable product design has brought economic prosperity and social cohesion to the community, fostering new markets,

cutting production costs, and uniting community members around a shared purpose. The potential for collaboration with local government agencies, NGOs, and businesses interested in sustainability presents opportunities for funding, technical expertise, and market access, driving economic growth and environmental stewardship. Looking ahead, the adoption of sustainable design practices holds promise for bamboo basketry production, with anticipated increases in market demand, improved environmental stewardship, and enhanced community well-being. By prioritizing sustainability, the industry can not only seize new market opportunities but also contribute to environmental conservation and social development, ensuring a prosperous and sustainable future for both the industry and the communities it serves.

Finally, government policies have a significant influence on the growth of community enterprises, with supportive measures fostering sustainability and competitiveness while hindering policies erecting barriers in favor of larger corporations. Soft power policy initiatives, despite initial unfamiliarity, hold potential to promote cultural heritage and international engagement, indirectly benefiting bamboo basketry communities. Drawing on design anthropology principles, contextual understanding, stakeholder engagement, and inclusivity can enhance policy development, leading to participatory and adaptive processes. Successful policies, including microfinance programs and community land rights, empower communities and foster sustainable development. However, through community engagement and collaboration, we must address challenges such as limited funding and cultural misrepresentation. Local stakeholders play a pivotal role in identifying needs and shaping inclusive policies, ensuring relevance and long-term sustainability. Collaboration between policymakers, design anthropologists, and community members facilitates understanding, participatory processes, and co-designed solutions, resulting in effective policies that support the resilience and sustainability of community enterprises.

Theoretically, the findings of this study reiterate the importance of the study in advancing sustainable development goals and preserving cultural heritage in these major aspects. The study fostered community sustainability community sustainability by actively involving local communities in heritage preservation efforts, including key aspects like skill transfer, community involvement in decision-making, and empowerment of local artisans. In addition, this study promoted environmental sustainability by emphasizing the environmental benefits of using post-harvest sugar cane leaves instead of bamboo. This practice reduces pressure on bamboo resources, contributes to waste reduction, and potentially lowers carbon footprint associated with material sourcing. Moreover, this study enriched economic sustainability by providing a financial return to the local community. This will involve income generation for artisans, economic diversification in rural areas, and sustainable livelihoods through the production and sale of basketry products. This study nurtured cultural sustainability by highlighting efforts to preserve basketry as a cultural heritage craft. Discuss the importance of maintaining traditional skills and techniques, passing down knowledge to future generations, and ensuring the sustainability of basketry design within the context of changing material use.

Practically, the research on the intersection of sustainable design and cultural heritage in bamboo basketry, using post-harvest sugar cane leaves, highlights

implications for entrepreneurs and policymakers alike. It emphasizes the potential for community empowerment and innovation, as demonstrated by Thai community enterprises blending traditional practices with sustainable opportunities, suggesting that entrepreneurs in other regions can enhance product innovation by integrating local traditions with eco-friendly materials. Moreover, embracing sustainable design not only fosters economic prosperity but also promotes social cohesion within communities, offering entrepreneurs avenues to tap into new markets, reduce production costs, and unite community members around shared values. Recognizing the significant influence of government policies on sustainability, we encourage collaboration between entrepreneurs and policymakers to develop supportive measures that address challenges like limited funding and cultural misrepresentation, all while fostering competitiveness. Furthermore, prioritizing sustainable practices not only enhances market competitiveness but also contributes to environmental stewardship, allowing entrepreneurs to anticipate increases in market demand by minimizing waste and promoting eco-friendly practices.

Future inquiries in this field could focus on several key areas. First, conducting cross-cultural comparisons would allow for an understanding of universal principles and unique challenges in integrating sustainable design with cultural heritage across different community enterprises. Second, longitudinal studies could assess the long-term economic, social, and environmental impacts of sustainable design initiatives on community enterprises and their surrounding ecosystems, providing insights into their sustainability. Additionally, investigating the implementation and effectiveness of policies aimed at supporting sustainable development in community enterprises would identify best practices and areas for improvement, enhancing policy outcomes. Furthermore, examining strategies for scaling up successful sustainable design initiatives from local community enterprises to broader regional or global markets while maintaining cultural authenticity and environmental integrity could offer valuable insights into achieving widespread impact while preserving local identity and ecological balance. Finally, future research could explore cross-cultural comparisons, the longitudinal impacts of sustainable initiatives, policy effectiveness, and strategies for scaling sustainable practices globally while preserving local identities and ecosystems. Such endeavors promise to enrich understanding and advance sustainable development goals across diverse community enterprises worldwide.

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