

Designing a sustainability program pathway for the Grinsing weaving industry: a prospective MULTIPOL approach

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DOI: 10.22437/ppd.v12i2.28979	Received: 27.10.2023	Revised: 09.03.2024	Accepted: 26.03.2024	Published: 21.06.2024
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Abstract

Grinsing weaving, a traditional art form unique to Bali, represents a significant aspect of the island's cultural heritage. This study aims to analyze the sustainability of the Grinsing weaving industry program by developing scenarios and formulating recommendations. Primary data were collected through surveys and Focus Group Discussions (FGDs) with 19 craftsmen and stakeholders. The MULTIPOL approach was employed for the analysis. The results indicate that the sustainability of the Grinsing weaving industry can be enhanced through policy scenarios focused on strengthening institutions and regulations to protect nature, customs, and culture, as well as developing the skills of craftsmen. This research provides valuable insights for stakeholders in shaping the development policies for the Grinsing weaving industry at the research site.

Keywords: *Grinsing weaving, Sustainability, Local economy*

JEL Classification: L67, O13, Q56

INTRODUCTION

Bali is renowned for its cultural values and local wisdom, which have been preserved since ancient times and continue to be applied today. Integrating culture with nature is a value system in various activities, including economic endeavors (Karyada et al., 2022). As a prominent tourist destination in Indonesia, Bali also boasts a textile handicraft industry that embodies this local cultural wisdom. According to Sandin & Peter (2018), textiles sent for recycling are considered free from environmental burdens, such as allocation cuts, and reused products and products made from recycled materials replace those made from pure fibers through expansion systems. Weaving, an ancient cloth-making technique, has been preserved across generations.

This study aims to design a sustainable development pathway for the Grinsing weaving industry using the MULTIPOL analysis framework, addressing economic, cultural, environmental, and social challenges. Aarika & Ritalo (2017) outlined a framework that views the ecosystem as both an analytical layer and a perspective, with implications for management in business and innovation networks and developed related guidance for managers. The cultural practice of weaving has evolved alongside human development in various regions, with the diversity of colors, ornamental

varieties, and woven patterns reflecting the uniqueness of each area.

Like other regions in Indonesia, Bali has a rich tradition of fabrics, including the Grinsing woven cloth produced by the Bali-Aga Tenganan Pegringsingan community in Karangasem. Tenganan Pegringsingan Traditional Village is recognized as a geographical indication area for ‘*Tenun Grinsing Bali*’ (Kurniawan et al., 2021). According to Sulisty (2019), tourism activities in Tenganan Pegringsingan Village represent a form of community-based tourism development. Historically, the weaving craft has experienced a long journey as an ancestral heritage and local wisdom of the Balinese people (Telagawathi, 2021).

Grinsing woven fabric, or *wastra Grinsing*, is a traditional Balinese product made from cotton yarn. According to Kade & Sukmadewi (2021), the Tenganan weaver community believes that the most appropriate way to achieve economic benefits is to market what they have, particularly the double ikat Grinsing woven fabrics, as a commodity. This fabric's ornamental variety and motifs are created through double ikat or double weaving techniques, which involve tying warp and weft threads together. This unique technique is the only one in Indonesia that makes the Grinsing cloth created by the Tenganan people renowned worldwide (Arimbawa, 2017).

Grinsing cloth is used for various ceremonial purposes, such as offerings, *ranasan*, *ider-ider*, and *penganggo* (clothing) during tooth-cutting ceremonies, weddings, and other religious events. In death ceremonies, Grinsing also functions as *ampok-ampok* (pubic cover) and *as rurub kajang* (Parimatha, 2009). According to Geertz (1992), culture consists of patterns of notions or meanings that are thoroughly interwoven in transmitted historical symbols—a system of conceptions inherited in symbolic forms through which humans communicate, preserve, and develop knowledge and attitudes toward life.

Creating this fabric is time-consuming, takes one to five years, and involves intricate techniques. The resulting weave produces geometric patterns that are neat, harmonious, and eye-catching (Utami, 2015). Grinsing woven fabric is a source of pride for the Balinese, reflecting the beauty of traditional art and craftsmanship passed down through generations. This Grinsing weaving represents a balanced system, illustrating human relationships with other humans, nature, and God (Sukawati, 2020).

In the era of globalization, the art of weaving, such as Grinsing woven cloth, has become not only a local heritage but also has potential in the global market. However, globalization brings challenges as well. The influence of global trends can alter consumer tastes, threatening the sustainability of traditional fabric production. Therefore, exploring sustainable business models that integrate local values and traditional arts is important to navigate the global market dynamics. This approach ensures that the art of weaving in Bali, including Grinsing woven fabrics, can continue to develop and preserve cultural sustainability amid the changing currents of globalization (Pranoto et al., 2019).

In addition to the artistic heritage of its people, Bali is renowned for its unique, authentic, and rare Grinsing woven fabrics. Grinsing woven cloth is one of Bali's ancient cultural treasures that endures to this day. The commercialization of Bali's cultural artifacts, including Grinsing woven fabrics, is an effort to transform these items into commodities. Grinsing fabric stands out due to its manufacturing process, which uses natural materials found exclusively in authentic Bali. The production process is lengthy, often spanning several generations, and the intricate creation of motifs adds to

its uniqueness. According to Niinimäki (2011), various Grinsing weaving design strategies highlight the role of consumers, turning them into active value creators rather than passive recipients of consumer value. All design approaches that require greater commitment and effort from consumers transform them into co-creators in value creation. The co-creation approach also offers social value to consumers. Furthermore, open-source design challenges the current industry system and offers consumers a leading role in the creation process.

The increased demand for Grinsing woven fabrics has quickly led to greater production efforts, resulting in little change in production quality. This shift from sacred values to commercial values aims to meet the market needs of the economy. In an era of globalization, where local culture and heritage face new challenges and opportunities, it is important to formulate policies that support the growth of the Grinsing weaving industry while preserving Bali's rich cultural roots. The process of modification and the prevailing societal relationships often change the value and function of Grinsing weaving production into a commodity. This transformation involves both traditional and modern collaboration. Grinsing woven cloth from Tenganan Pegriingsingan Tourism Village in Karangasem Regency, Bali, is one of the creative economy products used as souvenirs for delegates at the G20 Summit in Bali. This activity significantly impacted the development of Grinsing woven fabrics produced by craftsmen.

The Grinsing weaving industry in Bali faces several significant challenges, including the impact of globalization and commercialization. Globalization brings changes in market tastes and consumer demand, which can threaten the sustainability of traditional fabric production. This challenge is evident in the increasing competition from global textile products that are mass-produced and often more affordable. Commercialization also pressures the Grinsing weaving industry to keep up with market trends and standards, potentially altering its unique characteristics. Additionally, globalization presents challenges in terms of international market access. While there is an opportunity to expand market share globally, competition with larger, more well-known, and accessible industrial products can hinder the marketing of Grinsing woven fabrics. The local economy is still unable to compete with other industries, and the fate of the craftsmen remains uncertain. The local economy has not developed to its full potential, and a clear, holistic, and integrative solution to this complex problem has yet to be found (Telagawathi, 2019). As Purnamawati et al. (2021) highlight, another problem is the limited number of weavers and the absence of regeneration. The younger generation considers the work of being a weaver less promising (Sanjiwani, 2019). Local communities involved in production must also adapt to modern technology to face global competition, which may require investment and upskilling. Commercialization risks reducing quality or adjusting traditional motifs to suit broader market tastes, potentially compromising authenticity and cultural value.

Therefore, to ensure the sustainability of the Grinsing weaving industry, a prudent strategy that combines innovation and tradition is needed. These steps must maintain the sustainability of Grinsing's weaving production while preserving the cultural values passed down through generations. In addressing the challenges faced by the Grinsing weaving industry in Bali, researchers feel encouraged to formulate a comprehensive strategic approach. This approach aims to build sustainability in the Grinsing weaving industry in Bali. Researchers will develop a series of actions, policies, and programs to achieve this goal. By applying the MULTIPOL method, this study aims to produce two

different but complementary scenarios: holistic scenarios and specific scenarios. This research will discuss various aspects of the Grinsing weaving industry and identify sustainable solutions through the MULTIPOL analysis framework.

The MULTIPOL approach shows certain differences and advantages compared to conventional policy analysis methods in the context of cultural preservation and sustainable development in the Grinsing weaving industry. The MULTIPOL approach incorporates strong elements of future and prospective analysis, evaluating existing policies and designing policy scenarios to support cultural preservation and sustainable development in the Grinsing weaving industry. This approach facilitates more adaptive decision-making in response to environmental changes. MULTIPOL analysis is a comprehensive and multidimensional method for evaluating and comparing various policy alternatives, considering multiple relevant criteria. Considering the economic, cultural, environmental, social, and innovation aspects of the Grinsing weaving industry, it promotes more effective policy planning, encourages innovation, and raises public awareness of the importance of local cultural preservation and community economic empowerment.

This study is expected to contribute significantly to academic knowledge and practical policy-making related to the grinsing weaving industry in Bali. In terms of academic knowledge, it is anticipated to provide holistic insights into the factors affecting the sustainability of the Grinsing weaving industry, enriching academic literature with new understanding. Additionally, using the MULTIPOL approach is expected to offer valuable methodological contributions. From a policy-making perspective, this study aims to provide a foundation for more integrated and effective policy formulation to address sustainability challenges in the Grinsing weaving industry. The resulting policy recommendations are also expected to assist stakeholders and policymakers in designing effective and sustainable solutions. Thus, this study aims to provide useful guidance for the development of the Grinsing weaving industry and positively impact the local economy and cultural preservation in Bali.

METHODS

This research was conducted in Tenganan Pegringsingan Village in Karangasem Regency, Bali Province. The analysis method employed primary data obtained through two main approaches: surveys and Focus Group Discussions (FGDs). Nineteen craftsmen and stakeholders attended the FGDs, including experts in the field of Grinsing woven fabrics, representatives from government institutions such as the Industrial Office of Karangasem Regency and the Industrial Office of Bali Province, and community leaders from Tenganan Pegringsingan Village. Surveys were distributed to a broader range of stakeholders, including weavers, local business owners, and tourists, to gather diverse perspectives on the sustainability of the Grinsing weaving industry. FGDs were structured around key themes identified from preliminary survey results to facilitate in-depth discussions. Participants were selected based on their direct involvement in the Grinsing weaving industry, including representation from different roles within the weaving process, local government officials responsible for cultural preservation, and community leaders advocating for sustainable development.

This research adopts a strategic design model for the sustainability of Grinsing weaving by considering economic, social, and environmental aspects through MULTIPOL's multicriteria policy analysis. This method integrates a participatory

approach through stakeholder involvement in multicriteria research. It evaluates the choice of actions or program alternatives against the criteria used and as an interaction of three components: Actions, Policy, and Scenarios (Fauzi, 2019). The results of data analysis are discussed again by comparing theories and concepts with field conditions according to the analysis results. Findings will be obtained as a result of the research and by the research objectives.

MULTIPOL applies the principle of multicriteria by using scores and weights to determine the best hierarchy or choice. The two main elements distinguishing MULTIPOL from other multicriteria methods are integrating participatory approaches through stakeholder involvement and evaluating three main components: Actions, policy, and scenarios. In its use, MULTIPOL requires input criteria from stakeholders represented through an input matrix with predetermined criteria. This participatory approach is implemented through FGDs as an initial stage to formulate evaluation criteria, weigh scenarios and policies, and assess the impact of actions on objectives. The next stage involves confirming the results through a second FGD to achieve the desired policies, actions, and Policy Framework hierarchy. MULTIPOL uses different weights for scenarios, policies, and actions during this process. Scenarios have weights between 1 and 6, while policies and actions have weights ranging from 0 to 100. The MULTIPOL software then determines the best action hierarchy based on predefined policies and scenarios, with the hierarchy determined depending on the action component score based on predefined criteria, with a score range from 0 to 20 (Godet et al., 2004).

The MULTIPOL method is appropriate because it provides a prospective approach to sustainable development. This method allows the design of future scenarios and policies, considering the long-term impact on the sustainability of Grinsing's weaving industry. The advantage of MULTIPOL lies in stakeholder involvement through FGDs, ensuring that local community perspectives become an integral part of sustainability policy formulation. Thus, MULTIPOL is an analytical tool and a means of building mutual understanding and consensus to support the future sustainable development of the Grinsing weaving industry.

RESULTS AND DISCUSSION

The MULTIPOL analysis identifies key stakeholders through Focus Group Discussions (FGDs) to determine evaluation criteria, including economic, social, environmental, and cultural dimensions. Stakeholders assign weights to these criteria based on their importance. The next step involves selecting future scenarios and policies supported by stakeholders. The scenarios outline forecasted future conditions, and the policies include concrete measures. Stakeholders assign weights to scenarios, policies, and actions according to their contribution to sustainability goals.

Through MULTIPOL software analysis, a relative hierarchy of scenarios, policies, and actions is determined, forming the basis for holistic recommendations. The MULTIPOL process ensures that criteria and policies are selected and prioritized by incorporating stakeholder contributions, thereby creating a solid foundation for formulating sustainability recommendations for the Grinsing weaving industry. Based on the results of the FGD, scenarios, criteria, policies, and actions related to the sustainability of Grinsing weaving in Karangasem District can be formulated, as described in Table 1.

Table 1. Analysis of Grinsing weaving scenario, criteria, policy, and policy sustainability

A Scenario	Code
1 Holistic scenario	holistic
2 Specific scenario	specific
B Criteria	
1 Economic improvement and income of craftsmen	economy
2 Group development activities (microenterprises: dyes, design, woven fabrics)	groupwork
3 Labor absorption	labor
4 Growth of new creativity (weaving and textiles)	creative
5 Conservation culture	conserve
6 Meeting cultural and artistic needs	needs
7 Preservation of customs and culture (weaving)	culture
C Policy	
1 Market share expansion	market
2 Strengthening institutions and regulations for the protection of nature, customs, and culture	institute
3 Traditional Grinsing weaving supply	input
4 Development of craftsmen human resource skills	skill
D Action (Program)	
1 Making an exhibition of modifications of Grinsing weaving products	modify
2 Provide capital assistance	capital
3 Development of weaving group activity	coaching
4 Building partnerships with suppliers	partner
5 Digitization of product marketing	marketing
6 Socialization of loom training	socialize

Results from the MULTIPOL analysis based on mean values, standard deviations, and scores for each policy are shown in Table 2. Standard deviation values illustrate the sensitivity of each action to policy. At the same time, mean scores represent how each action performs against policy (or program versus policy) (Stratigea et al., 2013).

Table 2. Evaluation based on actions and policies

Actions	Policy				Mean Value	Standard Deviation	Position
	Market	Institute	Input	Skill			
Modify	13.4	10.5	10.7	11.9	11.8	1.2	5
Capital	8.6	11.7	10.1	9.2	9.7	1.1	3
Coaching	8.6	10.3	11.1	9.6	9.8	0.9	4
Partnership	13.5	12.4	12	14.2	13.1	0.9	6
Marketing	8.8	9.4	10.4	9.4	9.5	0.6	2
Socialize	8.7	8.2	7.2	8.2	8.1	0.6	1

As shown in Table 2, the highest scores were obtained for the socialization of looms, digitization of product marketing, and provision of capital assistance. Furthermore, Figure 1 presents the results of MULTIPOL in the form of a map illustrating the proximity between programs (actions) and policies. It is illustrated that the traditional Grinsing weaving supply policy (input) is closer to the development of weaving group activities (coaching) and the digitalization of product marketing (marketing). Moreover, strengthening institutions and regulations for protecting nature, customs, and culture (institute) is closer to providing capital assistance (capital). Additionally, some advances or adjustments are technological, institutional, and

ideological to the various demands of existing conditions (Todaro, 1994). According to Wiwin (2018), the community directly engages in tourism activities regarding natural and cultural resource management, thus having a solid commitment to managing resources sustainably as it concerns their livelihoods. As a concrete form of this concept, it would be beneficial to form a policy aimed at developing the skills of craftsmen (skills) and expanding market share (market), which tends to be closer to socializing loom training (socializing), building partnerships with suppliers (partners), and organizing exhibitions of modified Grinsing weaving products (modify).

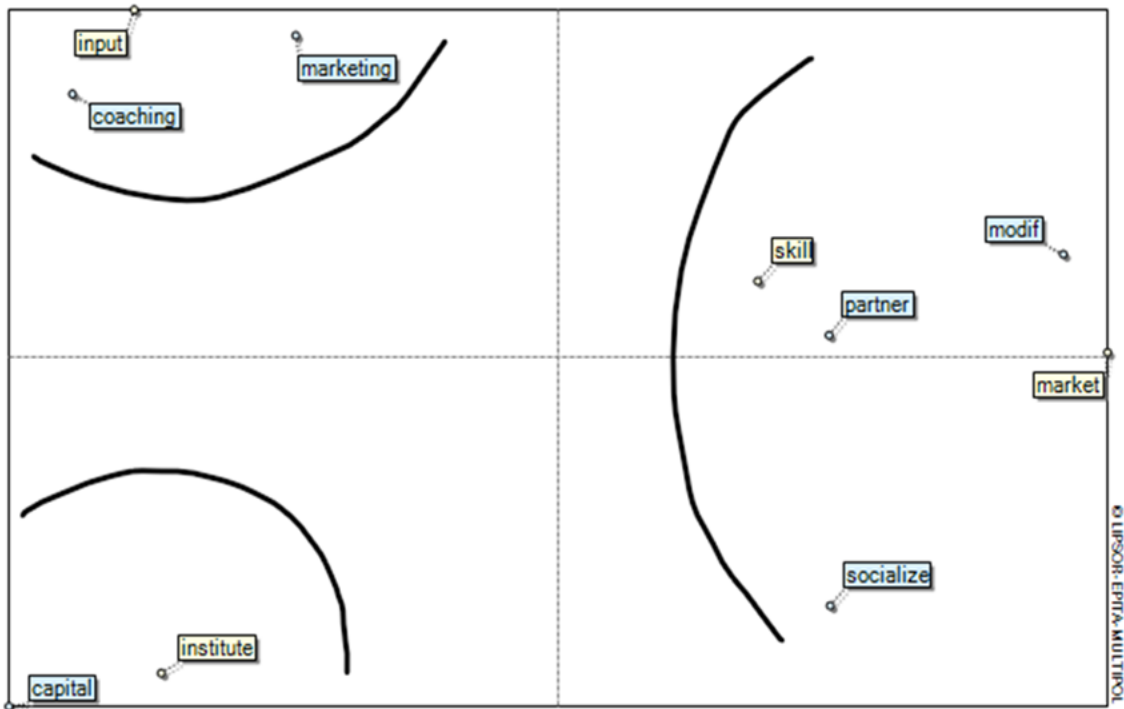


Figure 1. Action/policy closeness map

MULTIPOL also generates a profile map that links scores for each program (actions) with policies (policy) (Figure 2).

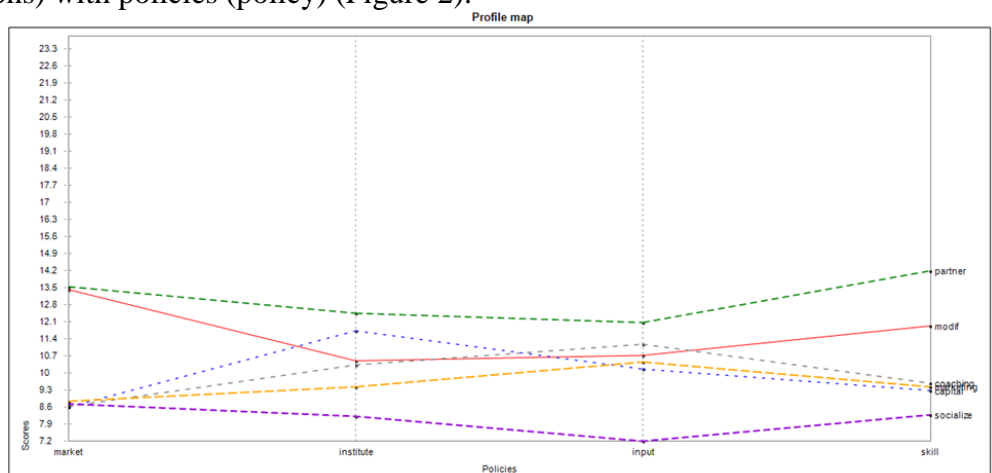


Figure 2. Profile Map of Grinsing Weaving Sustainability Analysis

As shown in Figure 2, the program builds partnerships with suppliers. Partnerships with suppliers help in maintaining production continuity. With the support

of reliable suppliers, the risk of raw material scarcity, which can threaten the Grinsing weaving industry, is reduced. It also contributes to the empowerment of local craftsman communities, an important element in Bali's economic and social development. Grinsing weaving is an integral part of Bali's cultural heritage, and forging strong partnerships with local suppliers helps preserve sustainable traditional production practices.

Meanwhile, organizing exhibitions of modified Grinsing weaving products and developing weaving group activities are programs with higher scores than other programs. This is understandable because the modification exhibitions facilitate a wider introduction to Grinsing weaving, and the development of weaving group activities aids in the holistic dissemination of Grinsing weaving products.

Furthermore, Table 3 and Figure 3 present the score of each policy against the scenario.

Table 3. Policy on scenario

Policy	Holistic scenario	Specific scenario	Average value	Standard deviation	Position
Market	15.7	15.9	15.8	0.1	3
Institute	13.4	12	12.7	0.7	1
Input	15.1	16.8	15.9	0.9	4
Skill	15.5	14.6	15	0.5	2

Based on Table 3 and Figure 3, in the holistic scenario, the policy of expanding market share and developing the skills of craftsmen has the highest value. The best position is obtained in the traditional graining weaving supply based on the average value of the two scenarios.

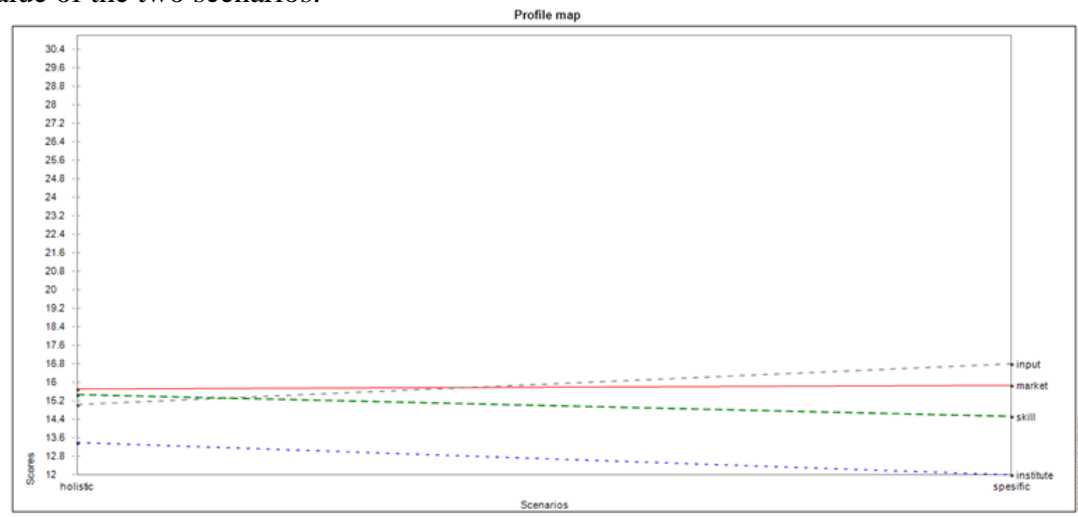


Figure 3. Profile map for policy on the scenario

As shown in Figure 4, policies for strengthening institutions and regulations for the protection of nature, customs, and culture (institute), as well as developing the skills of craftsmen (skills), can be implemented in Holistic Scenario 1 (economy and culture of Grinsing weaving). Meanwhile, the policy of expanding market share (market) and the supply of traditional Grinsing weaving (input) are more suitable for implementation in specific scenarios. Efficiency is how resources are used to achieve results or outputs (Gaspersz, 2007). The overall results of the MULTIPOL analysis can be presented in the form of potential policy paths that can be achieved with appropriate programs for

specific policies and scenarios.

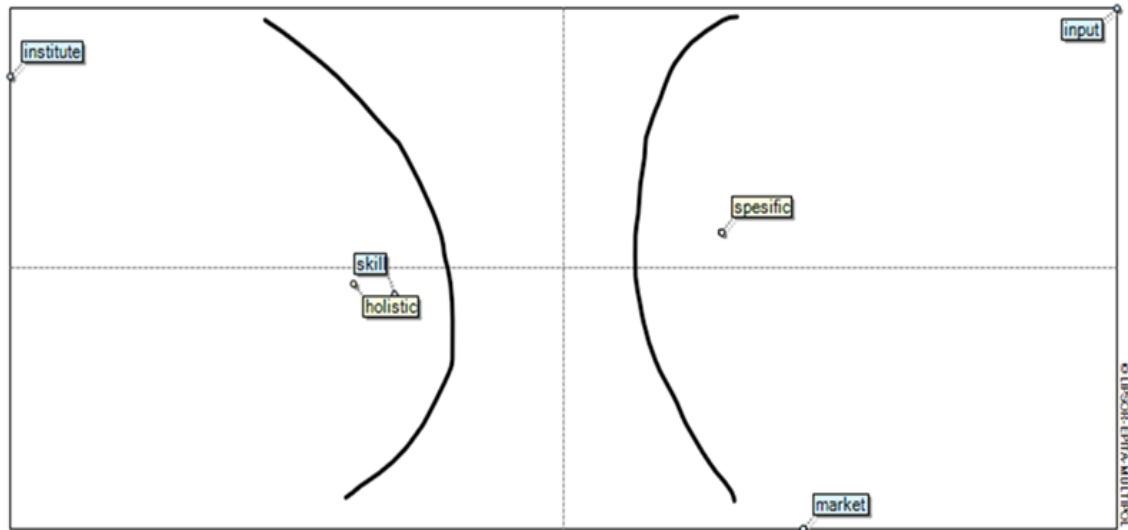


Figure 4. Policy/scenario closeness map

Figure 5 presents potential policy paths that can be taken in holistic scenarios (economy and culture of Grinsing weaving), namely strengthening institutions and regulations for the protection of nature, customs, and culture (institute) and developing the skills of craftsmen (skills) through various programs (actions) by policies. Based on Rintuh’s research (2005), it was found that policies that indirectly lead to the target but provide the basis of an atmosphere that supports the achievement of socioeconomic activities of rural communities, such as the provision of supporting facilities and infrastructure and the improvement of laws and regulations that support the socioeconomic activities of the community. Similarly, policies exist in specific scenarios (commercial side of Grinsing weaving).

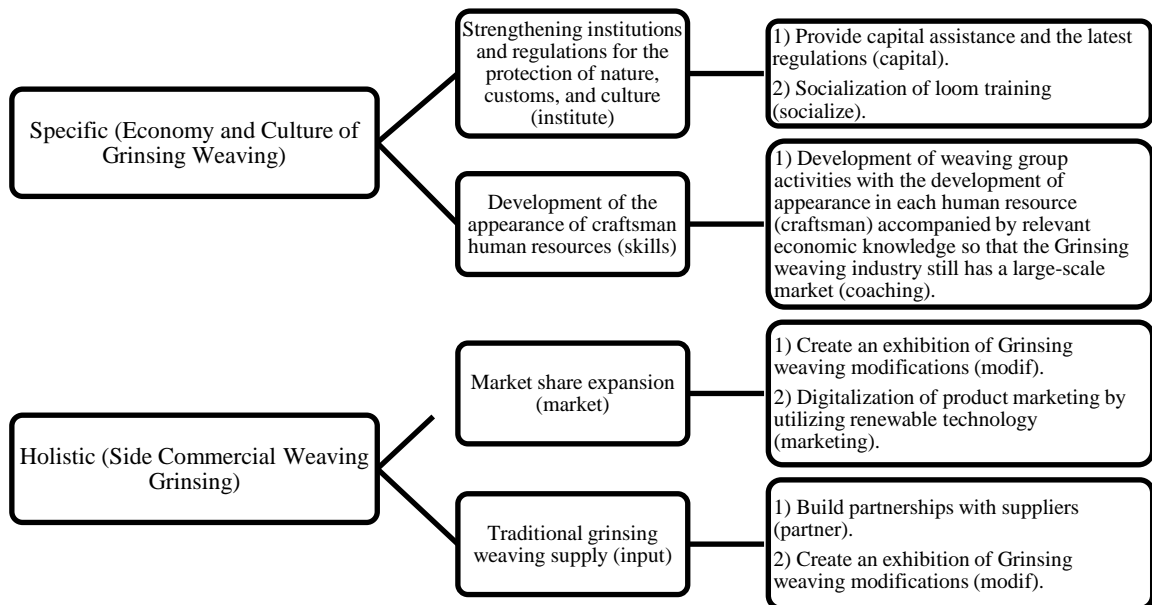


Figure 5. Potential policy path and Grinsing weaving sustainability program recommendations

Analysis of the sustainability of Grinsing weaving cultivation in the era of globalization

According to Appadurai (2001), globalization brings changes through ideology, modernization via technology and media, and capitalization in various sectors of life. This cultural industry presents symbolic, authentic, historical, and aesthetic meanings derived from cultural values to cultural products and certain visual attributes (Fahmi & Koster 2016). Currently, globalization penetrates the most basic level, namely the institutions directly related to society. For example, the Tenganan Pegringsingan Traditional Village in Bali, which boasts local wisdom, knowledge, and customs, must naturally interact with global issues. Local wisdom derived from culture and maintained by local communities takes various forms (Posumah et al., 2023). This interaction enhances the exposure to local values, such as the uniqueness of indigenous traditions, culture, and the art and craft of weaving, making it attractive to other countries worldwide. Society often associates globalization with capitalism.

The impact of globalization tends to be significant on the world economy, even affecting other aspects such as social, cultural, and religious dimensions. Globalization raises several problems in the cultural realm, including the loss of original cultural aspects of a region or country, the erosion of cultural values, and a decline in the spirit of nationalism and patriotism. For example, in the context of Grinsing woven fabrics, global cultural influences drive changes in the form, motif, and quality of the fabrics, creating visible transformations. Change is a social phenomenon that can be perceived, objectively observed, and often difficult to suppress or prevent. In line with Hoovelt (Sajogyo, 1990), change will remain as long as social communities interact with their environment. The artwork-making process facilitates entrepreneurs in creative companies to release emotions, express thoughts, and convey ideological visions. The opportunity to create artwork will generate satisfaction for artists and creative businesses (Purnomo, 2019). Whatever form it takes, change often induces anxiety, conflict, and social shock within the supporting community.

Grinsing woven cloth is an element that identifies Tenganan Pegringsingan Traditional Village as a unique cultural entity. Despite the global cultural influences reaching the village, the community manages to nurture and use these elements as assets to preserve and develop their culture. Community leaders of Tenganan Pegringsingan Traditional Village are aware of the cultural impact of globalization, including changes in infrastructure and cultural values, such as the transformation of people's houses into art shops, the shift from a sacred to a secular dimension in culture, and changes in views on economic, social, and cultural aspects.

Global culture is not outright rejected, as it has become an integral part of people's lifestyles and ways of thinking. As globalization develops, so does the emphasis on religious aspects and rituals, encouraging the birth of artifacts and values considered media with a metaphysical dimension.

The influence of the Grinsing weaving industry in Bali on globalization and the cultural economy is a meaningful phenomenon from many perspectives. In an era of globalization, when modernization threatens many traditional cultures worldwide, the Grinsing weaving industry emerges as a successful custodian of culture. This art of weaving not only retains unique traditional techniques but preserves meaningful motifs, playing an important role in maintaining Bali's cultural identity. The Grinsing weaving industry has succeeded in marketing local products to the global market, even being used as souvenirs in major conferences, such as the G20, given to delegates. Grinsing

woven products, with their distinctive beauty and meaning, have attracted the attention of tourists and antique collectors worldwide. This has opened up significant export opportunities, generating income for craftsmen and local communities.

Several strategic policies and actions can be identified to address the challenges of globalization and improve the sustainability of the Grinsing weaving industry. Firstly, there needs to be a push to utilize digital technology in promotion and marketing, such as building custom e-commerce platforms or partnering with global platforms. Economic growth in the digital era essentially depends on individuals, companies, and the government using digital technology (Telagawathi, 2021). For hardware, software, and connectivity to play a role in value creation and productivity improvement, digital technology must be utilized promptly and effectively (Bukht and Heeks, 2017).

Furthermore, implementing sustainability certification standards can be key to encouraging environmentally and socially friendly production practices. International partnerships and collaborations must also be stepped up, involving the Grinsing weaving industry in collaborative programs with global brands prioritizing sustainability. Education and training are important aspects, providing skills improvement to grinsing weaving craftsmen for more efficient production practices that align with sustainability standards.

Product diversification can also be an effective strategy, developing innovative products that align with global trends in the textile and fashion industry. Local community empowerment is a key focus, with policies that support community participation and ownership in Grinsing's weaving value chain. Meanwhile, sustainable management of natural resources and raw materials is a key principle in production. Sustainable market development through international exhibitions and marketing events must also be considered to expand market reach. Overall, implementing these policies and actions is expected to create an environment that supports the growth of the Grinsing weaving industry globally while still paying attention to local values and sustainability aspects.

The Grinsing weaving industry faces several significant challenges related to globalization and sustainability. Globalization brings impacts such as fierce competition with imported textile products and dynamic changes in consumer trends. Yang et al. (2018) found that products are becoming commoditized due to industrialization, and machine-made products are replacing traditional handicrafts. As a result of increased competition at the global level, handicrafts are competing with other similar substitute products. Meanwhile, sustainability demands the adoption of environmentally friendly production practices and the preservation of local cultural values.

These challenges can be turned into opportunities for cultural preservation and economic development. The Grinsing weaving industry can creatively leverage digital technology and e-commerce to reach global markets, turning competitive challenges into opportunities to expand market share. Implementing sustainability standards can improve product image and attract consumers who care about the environment, opening up new market opportunities. Education and training for Grinsing weaving craftsmen can prepare them for trends in more efficient and sustainable production practices.

Diversification of innovative products, by the demands of the global market, can create added value and support local economic growth. Empowering local communities by involving them in value chains can create sustainable and inclusive ecosystems. The Grinsing weaving industry can balance environmental and economic sustainability through sustainable natural resources and raw materials management. Sustainable

market development through international exhibitions and marketing events becomes a platform to expand global reach and promote the distinctive values of Grinsing products. With creativity, collaboration, and innovation, the challenges facing the Grinsing weaving industry in an era of globalization and sustainability can be transformed into opportunities to strengthen cultural preservation, advance local economic development, and ensure the industry's long-term sustainability.

The Grinsing weaving industry makes a positive contribution that cannot be ignored. Revenue from the sale of Grinsing weaving products has improved the welfare of the craftsmen and the surrounding community. With increasing demand in the global market, the industry has also created additional jobs, providing a noticeable economic impact. Grinsing weaving craftsmen have adopted modern technologies such as online marketing and social media to promote their products globally, perfectly blending cultural traditions with technological innovation and creativity. The growing influence of tourism in Bali has greatly boosted the Grinsing weaving industry. Grinsing weaving products increasingly attract tourists, and the tourism industry has influenced how they are marketed and sold. The influence of Bali's Grinsing weaving industry on globalization and the cultural economy creates an interesting balance between heritage preservation and local economic growth. In the context of continued globalization, Grinsing's weaving industry is a successful example of how traditional culture can remain relevant and contribute to the development of local economies.

Scenarios, recommendations, and sustainability strategies of the Grinsing weaving industry

Several scenarios and strategies can be considered to maintain the sustainability of the Grinsing weaving industry in Bali. One significant scenario involves increasing production. This strategy focuses on developing production capacity to meet growing domestic demand and enhancing the presence of Grinsing weaving products in the international market through international exhibitions, cooperation with global distributors, and robust online marketing. Additionally, the preservation of culture and product quality remains a primary focus. This includes strengthening training related to traditional Grinsing weaving techniques, maintaining distinctive cultural motifs, and continuously improving product quality through strict quality monitoring and innovative design.

Empowering local communities is also a key element in maintaining the sustainability of this industry. This strategy involves community engagement in the Grinsing weaving industry.

Furthermore, it is essential to prioritize sustainable practices in the production process, such as using natural dyes and implementing wise waste management practices to maintain environmental balance. Product diversification is another strategy worth considering, including creating accessories or products related to Grinsing weaving to reach a wider market. Close cooperation with the tourism industry in Bali can also support the promotion of Grinsing weaving products. This involves strengthening partnerships with popular tourism destinations, creating travel experiences that involve visitors in Grinsing's weaving process, and providing sales outlets at tourist locations.

Developing strong cultural preservation policies by local and national governments is crucial in maintaining the sustainability of the Grinsing weaving industry. Recognizing the economic potential of the cultural and creative industries provides a practical way to integrate culture into a broader economic development agenda (Černevičiūtė et al., 2017). The sustainability of this industry must consider

various factors, including economic, cultural, social, and environmental aspects, to ensure that this rich cultural heritage continues to thrive in an ever-changing era.

Although most development visions in the village focus on labor-intensive infrastructure, few are directed toward community empowerment programs. Economics has generally ignored the role of entrepreneurship in economic systems, just as entrepreneurship studies have largely overlooked the role of systems in explaining the prevalence and performance of entrepreneurship. The entrepreneurial ecosystem approach holds promise to correct these shortcomings. Its two dominant lineages are the regional development literature and the strategy literature. Both lineages share common roots in ecological systems thinking, providing fresh insights into the interdependence of actors in a particular community to create new value (Acs et al., 2017).

The lagging village economy further exacerbates this issue due to economic transformations driven by rural-urban migration (Virananda, 2019). However, with the development of strategies and recommendations supported by business actors (weavers) and related stakeholders, a modern economy related to the Grinsing weaving industry in Tenganan Village can be realized. According to Jennen et al. (2016), there are various disconnections in the ecosystem, including access to business support and services, investor funding and skilled labor, use of social media, idea generation, innovation development, and support of investors.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Grinsing weaving is crucial in preserving culture and supporting local economic growth. The Grinsing weaving industry in Bali has successfully maintained traditional techniques and distinctive cultural motifs, which are essential for preserving Balinese cultural identity amidst the challenges of globalization. This industry positively impacts the local economy by increasing the income of craftsmen and surrounding communities by selling Grinsing weaving products. Additionally, it creates jobs, further supporting economic development.

Moreover, the Grinsing weaving industry has become an attraction for Bali's rapidly growing tourism sector, offering unique tourist experiences and enhancing Bali's tourism appeal. The paradigm of sustainable cultural tourism includes maintaining the quality of natural and cultural resources, increasing the welfare of local communities, and ensuring tourist satisfaction (Ardika, 2006).

Integrating modern technology with traditional techniques in the Grinsing weaving industry has had a significant impact. Information and communication technology (ICT) in marketing and distribution has opened access to the global market. E-commerce, social media, and digital marketing platforms provide broader opportunities to promote products internationally, reach more consumers, and increase industry visibility. A wise approach to integrating modern technology with traditional techniques must consider training and support to ensure the continuity of Grinsing's weaving expertise. Overall, integrating modern technology opens new opportunities for the Grinsing weaving industry, from increased production efficiency to global marketing. However, ensuring these changes are made with cultural sustainability is crucial, respecting the traditional values inherent in the Grinsing weaving process.

The Grinsing weaving industry faces several obstacles due to globalization and market competition. The main issues include intense price competition with imported products, limited access to global markets, and challenges in adopting modern

technology. Additionally, global market uncertainty, lack of education and labor skills, and unstable production costs are significant obstacles that must be addressed. Protecting intellectual property rights is critical to maintaining product authenticity. Understanding these barriers is key to designing strategies to improve the competitiveness and sustainability of the Grinsing weaving industry.

Policymakers and scholars now recognize the relevance of more systemic support toward a holistic approach to developing an entrepreneurial culture. This includes providing greater access to information, networks, entrepreneurial finance, and infrastructure (Zacharakis et al., 2003; Isenberg, 2010; Rodriguez-Pose, 2013; Audretsch et al., 2015).

The findings of this study are directly connected to the MULTIPOL analytical framework, contributing to understanding the sustainability path of the Grinsing weaving industry. Challenges such as price competition and limited market access can be integrated into MULTIPOL, enabling the development of sustainable international marketing policies. Barriers to adopting modern technology can be overcome through training programs articulated in the MULTIPOL analysis approach. Meanwhile, global market uncertainty and consumer trends can be reflected in MULTIPOL to formulate adaptive scenarios. With a focus on concrete actions and participatory approaches, MULTIPOL becomes an effective tool to support the sustainability of the Grinsing weaving industry.

Despite the challenges of global competition, the Grinsing weaving industry must continuously seek ways to maintain product authenticity and quality while remaining relevant in a rapidly changing global marketplace. Amidst the dynamics of globalization, modern technology has begun to integrate cultural traditions with technological innovation. Grinsing weaving craftsmen in Bali have effectively utilized online marketing and social media to promote their products. Overall, this study shows that Bali's Grinsing weaving industry exemplifies how cultural preservation can be combined with local economic growth.

Efforts are being made to introduce the craft to the younger generation by involving them directly in the regeneration process (Tas'au, 2016). According to Pryanka (2023), the younger generation must be allowed to learn about Grinsing weaving, its cultural values, and the technical skills required. The industry continues to grow and contribute to Bali's economy and cultural heritage by focusing on cultural preservation, product quality, and market development.

Recommendations

Apart from implementing holistic and specific Grinsing weaving techniques, educational programs should be developed on traditional Grinsing weaving methods and cultural motifs. This will help ensure the preservation of cultural heritage. Grinsing weaving must also consider product diversification, including creating accessories or other related products to reach a wider market. This can help improve business sustainability and diversify revenue. Adopting innovative approaches to natural dye production and waste management is also crucial. Applying green technologies and clean processes, such as extracting environmentally friendly dye plants and using production waste as raw materials or energy, can reduce environmental impact. Collaborations with research institutions and environmental organizations can help create sustainable solutions in the natural dye industry.

Stakeholders, such as the Grinsing weaving community in Tenganan, can initiate activities like workshops for visitors to the Tenganan Tourism Village. Alternatively,

considering the village's remote location, they can host online courses. An online approach makes the unique knowledge and skills of Tenganan more accessible, supporting educational activities amid geographical challenges. Providing managerial training in finance, marketing, and digital literacy for craftsmen would be beneficial. Financial training will help them manage finances more effectively, while marketing training will improve their product marketing skills, including digital marketing strategies. Digital literacy training focuses on using technology to improve operational efficiency and conduct business online. Thus, craftsmen can enhance their skills to effectively manage and develop their businesses.

Government and community organizations can support the Grinsing weaving industry through strategic measures. Governments can provide fiscal incentives, support infrastructure development, and launch skills training programs. Product promotion, strengthening marketing networks, and implementing sustainability standards should also be prioritized. The Grinsing weaving industry can gain broad support for its growth and sustainability by involving the government and other stakeholders. Expanding innovation in Grinsing weaving product design is also essential. Responding to global market trends and preferences with attractive and relevant designs will help maintain product appeal. Responding to global market trends and preferences with attractive and relevant designs will help maintain product appeal. Environmental responsibility requires sustainable production practices, such as using natural dyes and managing waste effectively. To avoid Grinsing weaving being viewed merely as a souvenir, it is recommended that Grinsing woven fabric be used in various products such as bags, bandanas, or other fashion items, where the woven fabric is applied as a motif to enhance aesthetics and uniqueness, aligning with general fashion product trends.

Effective collaborations and initiatives can be applied to promote grinsing weaving products. Partnerships with tourist villages, involvement of international designers, and digital marketing can significantly increase product visibility. Cultural education programs and special events like the Grinsing Weaving Festival can attract tourists. Skills training for craftsmen is also important to improve the quality and variety of products. With this strategy, it is expected that Grinsing weaving products will attract more attention and support the development of the industry as a whole. Finally, increasing the managerial capacity of the craftsmen is crucial. All related parties, especially the government and the community, significantly influence achieving the potential of policy and program paths for the sustainability of the Grinsing weaving industry in Karangasem Regency, especially in Tenganan Village.

For future research, exploring the socioeconomic impacts, technological innovations, and comparison of sustainability strategy outcomes in the Grinsing weaving industry is recommended. Focus can also be given to innovative product development, inhibiting factor analysis, and global market exploration. Additionally, assessing the industry's continuous performance after strategy implementation and enhancing local values are promising research areas to support the industry's sustainable growth. Continuous engagement with craftsmen, local communities, government, and the tourism sector is key to the sustainability of the Grinsing weaving industry. This ensures direct support from craftsmen and creates a bond with the local cultural heritage. Involving governments in regulation and policy supports industry growth, while the tourism sector provides a vast marketing opportunity. The involvement of all these parties creates a solid foundation to maintain the sustainability of the Grinsing weaving industry.

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