



# Analysis Of Strategies For Increasing The Potential Of Digital-Based MSMEs Using A Triple Bottom Line Approach To Implement A Green Economy In Border Areas

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## ABSTRACT

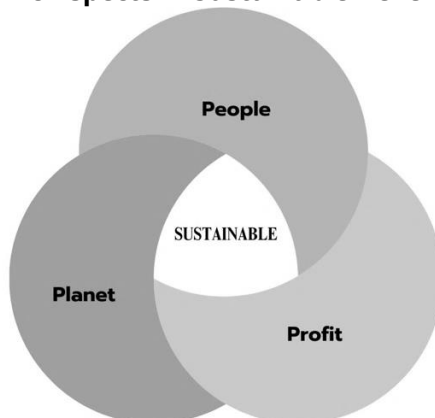
This study uses the Triple Bottom Line approach to analyze strategies for increasing the potential of digital-based MSMEs to implement a green economy in border areas. In the digital context, it is urgent to study this topic because MSMEs that cannot adapt to information technology risk being left behind. Therefore, it is important to identify strategies that can support the transformation and competitiveness of MSMEs in the market. Integrating the principles of the green economy and the Triple Bottom Line emphasizes balancing social, economic, and environmental dimensions while encouraging innovation and collaboration between the government, private sector, and community. This research was conducted using qualitative methods. Data sources were obtained through observation, a literature study, questionnaires, and in-depth interviews with respondents from four MSME clusters in border areas. MSME clusters were grouped into three categories: creative industries, services, and culinary. Data validation was carried out in the form of problem-based learning (PBL)-based focus group discussions (FGDs) with all informants. The results of this study describe strategies to improve MSME human resources, including building a digital education platform, training digital practitioners, strengthening infrastructure, branding, product differentiation, and designing a digital payment system.

## INTRODUCTION

The development of digital technology has significantly impacted the transformation of various business sectors, including micro, small, and medium enterprises (MSMEs) (Almunawar et al., 2025). In this digital era, MSMEs face the challenge of adapting to rapid changes, especially regarding human resource (HR) management. In border areas, where access to technology and information is often limited, HR development based on digital technology is becoming increasingly important (Darius & Tanggur, 2022). This aligns with efforts to support the implementation of a sustainable green economy, which requires the active involvement of all sectors, including MSMEs (Atlantika et al., 2025). Bengkayang Regency, an Indonesia-Malaysia border area, has problems with digitalization in MSME development in remote areas. This requires information technology governance across all sectors (Tanaamah et al., 2021). Although the potential of MSMEs to support a green economy is enormous, many still face obstacles in effectively developing their human resources, including those in Bengkayang Regency (Manggu et al., 2024). The main problem is the lack of understanding of, and skills in, utilizing digital technology for human resource management (Atlantika et al., 2023). Additionally, the absence of an integrated approach between human resource development and green economy principles poses a challenge. This can hinder MSMEs' ability to contribute to achieving sustainable development goals, especially in border areas with unique characteristics (Ifeanyi-Obi et al., 2022).

The Triple Bottom Line (TBL) approach is relevant for addressing these challenges. The TBL approach emphasizes balancing environmental, social, and economic aspects in sustainable development (Nichols et al., 2023). In the context of MSMEs, TBL considers not only financial returns, but also the impact on environmental sustainability and community well-being (Korkmaz, 2022). For instance, using environmentally friendly digital technology can reduce the carbon footprint (Ma & Lu, 2024), and providing digital training to MSMEs can increase inclusive participation (Abdi et al., 2022). It is urgent to conduct this research in the digital context because MSMEs that cannot adapt to information technology risk being left behind. Therefore, it is crucial to identify strategies that can support MSME transformation and competitiveness in the market (Siokalang et al., 2024). The urgency of this research lies in integrating green economy principles and the Triple Bottom Line approach to emphasize the balance between social, economic, and environmental dimensions while encouraging innovation and collaboration between the government, private sector, and community (Siokalang, 2023). The findings of this study are expected to inform policymakers' development of programs that support the digitalization and sustainability of MSMEs in border areas, thereby enhancing the effectiveness of government interventions. The study is also expected to provide new insights into how MSMEs can adapt to climate change and contribute to a green economy (Ifeanyi-Obi et al., 2022).

**Figure 1. Triple Bottom Line Emphasizes The Balance Between Environmental, Social, And Economic Aspects In Sustainable Development**



In fact, as owners, MSMEs play a crucial role in shaping work practices, culture, and behavior. With their broad perspective on business, MSMEs are ideally positioned to convey the impact of green human resource management (Green HRM), reflecting both risks and opportunities for the entire business. They can develop a culture within the business environment that fosters sustainable practices. This fosters sensitivity to climate change. Studies show that sustainability-focused HR practices increase awareness and action on climate issues within and beyond the business environment. This demonstrates that MSMEs can positively impact their surroundings (Utomo et al., 2022). Furthermore, this research is crucial for providing policy recommendations that support strategies for improving MSMEs in border areas and enabling them to play an active role in sustainable economic development. Numerous studies have addressed human resource development and the green economy. However, this study identified a gap in the literature linking these two topics in the context of MSMEs in border areas. Previous research tends to focus on large-scale issues or fails to consider the specific local characteristics of border areas, particularly with regard to human resources. Therefore, this study explores how MSMEs can implement digital-based development strategies within the TBL framework to support a sustainable green economy.

Research related to “Strategies for Increasing the Potential of Digital-Based MSMEs Using the Triple Bottom Line Approach in Implementing a Green Economy in Border Areas” indicates that the digitalization of MSMEs has become a major concern in recent literature. Various studies emphasize the importance of digital technology in enhancing the competitiveness of MSMEs, particularly in regions with limited infrastructure. One study revealed that implementing digital technology improves operational efficiency (Siokalang, 2024) and opens access to wider markets for MSMEs (Tajudeen et al., 2025). This study emphasizes that MSMEs can reach new consumers and increase the visibility of their products by utilizing digital platforms. Furthermore, in this context, the TBL approach demonstrates that social, environmental, and economic sustainability must be considered simultaneously to achieve sustainable growth.

Furthermore, other studies have shown that incorporating green economy principles into MSME business strategies can provide significant competitive advantages. Previous research has found that MSMEs that adopt environmentally friendly practices reduce their negative environmental impact and increase customer loyalty and brand reputation (Sultan & Riyadh, 2025). Therefore, integrating digitalization and the TBL approach into the development of MSMEs in border areas is crucial for driving inclusive and sustainable economic growth.

## **LITERATURE REVIEW**

### **Human resource development strategy**

A human resource development strategy is a fundamental step in maximizing the contributions of individuals within an organization and enabling them to compete globally. This approach involves strengthening competencies, enhancing skills, and utilizing cutting-edge technology to accelerate adaptation to changing dynamics and demands. A key strategy is developing a systematic, data-driven, empirically evidence-based HR roadmap to support effective HR management (Fadilah & Anshori, 2025). Additionally, developing superior, adaptive human resources is crucial. This requires an emphasis on quality education and adequate access to healthcare services to ensure individuals are ready to compete globally (Gunawan, 2024). The use of technology, including artificial intelligence (AI), can improve the efficiency of human resource management, particularly in recruitment, training, and performance evaluation (Pratama et al., 2023). This approach is also supported by implementing flexible work policies and remote work options, which support productivity while maintaining work-life balance. Academic studies confirm the transformation of human resource development's role from an administrative function to an innovative, sustainable strategy that prioritizes increasing the strategic value of human resources (Thomas & Lloyd, 2018). Therefore, an effective human

resource development strategy must integrate competency development, technology, and work flexibility in a comprehensive, sustainable manner.

**Triple Bottom Line**

The Triple Bottom Line (TBL) concept evaluates organizational success based on three key factors: economic, social, and environmental. Over the past five years, scientific studies have demonstrated a significant evolution in TBL implementation, especially when combined with Environmental, Social, and Governance (ESG) principles and the United Nations’ Sustainable Development Goals (SDGs). The TBL approach is considered a comprehensive managerial framework for optimizing resource use, reducing negative environmental impacts, and systematically and measurably implementing social responsibility (Nogueira et al., 2025).

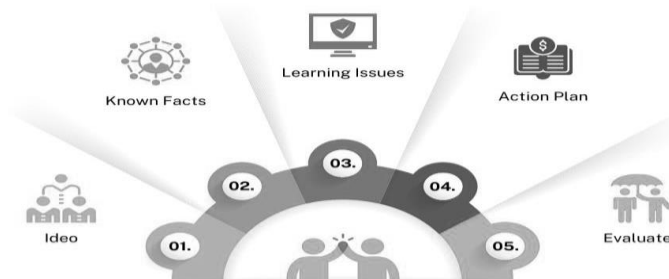
Numerous recent studies confirm that implementing TBL positively impacts a company’s reputation and financial performance. It also plays a crucial role in minimizing social and ecological risks and enabling access to sustainable markets. The literature primarily focuses on developing more objective and reliable quantitative indicators for assessing social and environmental performance, which has often been complex and subjective. Nevertheless, evaluation methods continue to be refined to ensure that TBL can effectively facilitate business transformation toward comprehensive sustainability (Edeigba & Arasanmi, 2022).

In the last five years, TBL has been recognized as an essential framework that balances economic, social, and environmental dimensions, enabling organizations to holistically and continuously develop sustainable business strategies (Mishra & Pandey, 2025).

**METHODS**

This research was conducted using qualitative methods by which the data were obtained from observations, literature studies, Delphi-based questionnaires, and in-depth interviews with respondents from four micro, small, and medium enterprises (MSMEs) in border areas. This study aims to explore the characteristics of problems that could increase the potential of digital MSMEs in border areas by implementing a green economy using the TBL approach. MSMEs were grouped into three clusters: creative industries, services, and culinary. Respondents were selected using a purposive sampling technique from each cluster and had to meet the criterion of being located in Bengkayang Regency in West Kalimantan, an area on the Indonesia-Malaysia border. After collecting the initial data, the next step was to confirm them through focus group discussions (FGDs) based on problem-based learning (PBL) (Wang & Lin, 2022).

**Figure 2. Focus Group Discussions (FGDs) Based On Problem-Based Learning (PBL)**



The confirmed and validated data from the FGD process were processed using NVivo 15 QDA software. In this method, the collected data came from the problems faced by each MSME cluster so that the research results align with the established objectives. The PBL stage is a relevant approach for exploring strategies to increase the potential of digital MSMEs using the triple bottom line to implement a green economy in border areas. Table 1 presents a list of informants in this study.

**Table 1. List of informant**

No	Informant	MSMEs Cluster
1	HA	Culinary
2	YM	Service
3	A	Service
4	S	Creative economy

**RESULTS**

**Planet**

In the Planetary dimension, the primary focus is on encouraging MSMEs to adopt environmentally and socially sustainable business models that adhere to green economy principles. This includes managing resources more efficiently, producing less waste, and adopting environmentally friendly technologies to reduce carbon footprints and adverse environmental impacts. Digital technology is essential for enhancing the effectiveness of monitoring and sustainable resource management, especially in border areas with highly sensitive ecosystems.

MSMEs face the challenge of balancing business growth and environmental sustainability. However, they have the potential to implement green innovations due to their flexible business nature and close ties to local communities. Digital transformation in MSME environmental management improves energy efficiency and waste management, which indirectly contributes to environmental preservation and strengthens the green economy in border areas (Raihan, 2024). Moreover, green financing and incentives from financial institutions, such as green banks, help MSMEs invest in clean technologies and sustainable practices. Thus, MSMEs can increase their resilience to climate change and address the issue of natural resource depletion, which is a major challenge in border areas (Kadaba et al., 2022).

Based on the processed data, it is clear that businesses must prioritize a safe and orderly business environment to meet environmental standards. In this regard, MSMEs have implemented online stores with digital content to attract consumers. This trend reduces the use of paper and banners for advertising. In addition to a broader reach, this is perceived as having an impact on environmental sustainability. Previous research has shown that using digital media to market products not only reduces plastic use, but also improves customer satisfaction and service (Setyawan et al., 2024).

**Figure 3. Planetary Aspects in the Triple Bottom Line**



Source: Data Processed, 2025

**People**

In the People dimension, the primary emphasis is on empowering human resources through education, training, and mentoring, utilizing digital technology to strengthen the capabilities and expertise of MSMEs. This approach improves more than just technical skills; it also prioritizes the active participation of local communities through problem-solving learning methods and other participatory techniques. These techniques strengthen social networks and collaboration among business actors and stakeholders. Thus, MSMEs can develop social capacity inclusively and sustainably while upholding the principles of social justice and equitable distribution of economic benefits to all levels of society in border areas. Over the past five years,

recent research has shown that integrating digital technology into empowerment programs effectively expands access to information, encourages innovation, and supports the social sustainability of MSMEs, particularly in areas facing unique geographic and economic challenges (Sachrir & Mustari, 2025).

Furthermore, this strategy emphasizes strengthening social networks and collaboration among MSMEs. This enables them to work together in the face of market changes and the ongoing digitalization process. It is believed that this approach enhances the socioeconomic resilience of MSMEs and improves the quality of life in local communities. Thus, it contributes to the formation of a more inclusive and sustainable social order (Nanda & Aristyanto, 2024).

Based on the processed data from the research, it is clear that their businesses also have a social impact. This phenomenon is the provision of social assistance derived from profits. On average, around 18% of profits are allocated to social assistance. MSMEs believe that there must be a balance between profits earned and social impact. Another demonstrated phenomenon is that this assistance is not only set aside as profits, but also provided through social activities. From the perspective of MSMEs, this is a form of social responsibility and a promotional strategy for their business.

### **Profit**

The People dimension emphasizes the empowerment of human resources through education, training, and mentoring programs integrated with digital technology. This approach improves the technical competence of MSMEs and encourages the active participation of local communities through problem-solving learning methods and other participatory techniques. These methods strengthen social networks and collaboration among stakeholders. In border areas, digital empowerment has been shown to expand access to information, stimulate innovation, and strengthen the social sustainability of MSMEs (Bengu et al., 2025). Furthermore, strengthening social networks creates synergies that enhance the socioeconomic resilience of MSMEs and improve the quality of life in local communities (Ibrahim, 2022).

Meanwhile, the Profit dimension aims to increase the competitiveness and sustainability of MSMEs by encouraging the adoption of digital technologies that expand market reach, improve operational efficiency, and enhance product quality. This strategy promotes inclusive economic growth by leveraging e-commerce platforms and sustainable marketing practices while integrating green economy principles to foster circular economy innovations. Recent research indicates that the combination of digitalization and environmentally friendly innovations positively contributes to MSME economic growth and strengthens business sustainability (Fauziah et al., 2025). Additionally, the efficiencies resulting from digital technology reduce operational costs and strengthen MSMEs' competitive position in national and international markets (Ndraha et al., 2024).

This study demonstrates that increasing business profits requires identifying a target market. For micro, small, and medium-sized enterprises (MSMEs), determining a target market aims to optimize the allocation of limited resources by focusing marketing budgets on consumer segments with the highest potential and developing more relevant promotional messages. Gaining in-depth insights into the needs, preferences, and behaviors of specific market segments allows MSMEs to tailor their products or services to better meet customer expectations. They can also identify market gaps that can be exploited for innovation. This strategy also strengthens competitive advantage by enabling appropriate differentiation and pricing and fostering more intimate, loyal relationships with consumers. Furthermore, this process facilitates monitoring business performance, accelerates growth and scalability, and reduces the risk of failure because decisions are based on targeted market data analysis. MSMEs will build a perception of compliance with their business tax obligations by achieving profits from the sale of products and services provided to consumers.

### Strategies for Increasing the Potential of Digital-based MSMEs in Implementing a Green Economy in Border Areas

The processed results demonstrate the challenges and issues that arise when trying to increase the potential of digital-based MSMEs in border areas. These issues are outlined in Table 2 below.

**Table 2. Problems in Increasing the Potential of Digital-Based MSMEs in Border Areas**

No	Problems
1	There is no digital-based education concerning the green economy through websites in these regions.
2	Constrained by the adoption of information technology.
3	The internet-based technology infrastructure is not yet stable enough to support
4	The emergence of similar products with different brands
5	The uneven distribution of digital-based payment systems.

Source: Data Processed, 2025

All identified issues were discussed with all informants in a Problem-Based Learning (PBL)-based Focus Group Discussion (FGD). This validation method is designed to facilitate cooperative discussions that explore the complexities of real-world problems in depth. The goal is to facilitate the development of evidence-based problem-solving skills and enhance analytical and critical thinking through the exchange of ideas from different perspectives. Based on the FGD, a strategy was developed to increase the potential of digital MSMEs in implementing a green economy in border areas, as shown in Table 3.

**Table 3. Strategies to Increase the Potential of MSMEs**

No	Strategies
1	Building a green economy education platform that is oriented towards local wisdom
2	Digital practitioner program
3	Strengthening Border Area Infrastructure
4	Product or service branding and differentiation based on the green economy.
5	Design of a digital-based payment system

Source: Data Processed, 2025

## DISCUSSION

First, a local-language green economy education platform broadens the technical and conceptual knowledge of MSMEs entrepreneurs. By integrating folklore, legends, and traditional agricultural practices into interactive modules, MSMEs entrepreneurs acquire digital skills and understand historically proven sustainability principles for local consumers. This enhances their capacity for product innovation as they can adapt traditional techniques to create digitally designed, eco-friendly products that can be marketed at a premium.

Second, the Digital Practitioner Program embodies the spirit of mutual cooperation in technology transfer. Buddy teams, consisting of creative youth, senior artisans, and students, serve as knowledge intermediaries, accelerating the adoption of digital tools such as e-commerce, social media, and payment applications. With cultural mentoring from the village head, the risk of technological resistance is reduced, enabling MSMEs to enter regional and national digital markets more quickly. Localized Wi-Fi access in village halls fosters a collaborative learning environment, bolstering business community networks and broadening knowledge exchange channels among MSMEs. Third, strengthening border infrastructure that is designed to

harmonize with traditional architecture and is supported by solar panels increases the availability of renewable energy and stable internet connectivity. Clean energy lowers production costs, and the internet enables supply chain tracking, product quality monitoring, and integration with data-driven logistics platforms. Collective management of hubs by village working groups fosters a sense of shared ownership, ensuring the maintenance of sustainable infrastructure and the operational sustainability of MSMEs.

Fourth, branding and differentiating green economy-based products or services involves creating a visual identity that incorporates traditional symbols and motifs showcasing traditional manufacturing processes based on inherited techniques. This strategy allows for product differentiation within a modern ecological culture and increases their appeal to consumers concerned about socio-cultural and environmental issues. Cultural heritage products protect intellectual property rights and open opportunities for access to capital through financial institutions that support cultural preservation. These products also increase MSMEs' trust in domestic and international markets.

Fifth, the design of a digital payment system (QRIS) increases financial inclusion for MSMEs that lacked banking access previously. Adorned with batik or woven motifs, QRIS facilitates the adoption of payment technology, strengthens financial literacy, and reduces the risk of fraud. With transparent cash flow, MSMEs can more easily apply for microloans, optimize working capital for production expansion, and market products or services to meet consumer needs in border areas.

## CONCLUSION

Integrating local wisdom into every step of digitalization creates economic and environmental value while revitalizing the cultural heritage that strengthens border communities. This strategy improves MSME human resources. This balanced triple bottom line approach ensures sustainability by integrating environmental, social, and economic well-being. Community engagement deepens because the solutions feel "theirs," fostering a sense of ownership and motivation to innovate and grow. MSME products become symbols of sustainable cultural identity, providing strong market differentiation amidst global competition. By combining traditions and digital technology, MSMEs in border areas can reach consumers who increasingly value sustainability and culture. Hopefully, this plan will serve as an inspiring and applicable roadmap for advancing MSMEs in border areas, combining wisdom and vision.

## LIMITATION

This study has several limitations, one of which is the data processing, which did not utilize source triangulation. Future research is encouraged to expand the research process by incorporating source triangulation.

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