

Barriers to Adopting Sustainable Production Technologies in MSIEs: A Case Study of the Sports Goods Industry.

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Abstract: Micro, Small, and Informal Enterprises (MSIEs) play a crucial role in the sports goods industry, yet their implementation of sustainable production technologies remains limited due to various barriers. This study explores the challenges hindering MSIEs in integrating sustainable practices into their production processes, specifically focusing on the sports goods sector. Through a case study approach, the study identifies financial, technological, regulatory, market, and organizational constraints that hinder the transition to environmentally friendly technologies.

The key findings highlight limited access to green financing, high upfront costs of sustainable technologies, and inadequate knowledge and technical expertise as significant hurdles. Additionally, weak regulatory enforcement, lack of customer demand for eco-friendly sports goods, and supply chain inefficiencies further increase these challenges.

This research provides valuable insights into the interplay of internal and external factors affecting MSIEs and recommends targeted interventions such as financial incentives, capacitybuilding programs, and enhanced regulatory frameworks. Addressing these barriers can enable MSIEs in the sports goods industry to achieve sustainability goals while maintaining competitiveness in an evolving global market.

Keywords: Sustainable Production Technologies, Micro, Small, and Informal Enterprises (MSIEs), Sports Goods Industry, Barriers to Sustainability

Introduction

The role of Micro, Small, and Informal Enterprises (MSIEs) in the global economy is vital, contributing to employment, innovation, and economic growth. In many

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industries, especially in emerging economies, these enterprises form the backbone of production and trade. The **sports goods industry** is no exception, with MSIEs playing a significant role in manufacturing a range of products from equipment and apparel to accessories. However, despite their importance, MSIEs in this sector face numerous challenges that impede their ability to adopt sustainable production practices. These challenges range from financial constraints and technological limitations to regulatory obstacles and organizational barriers (Alayón, Säfsten, & Johansson, 2022).

The concept of **sustainability** has become increasingly important in the modern global economy. Consumers and governments are placing more emphasis on environmentally responsible production and consumption. In this context, adopting **sustainable production technologies** is not only beneficial for the environment but also crucial for the longterm survival of businesses. The **sports goods industry**, which relies heavily on materials such as plastics, leather, and synthetic fibers, has a significant environmental footprint. However, **MSIEs** often find themselves caught between the pressure to adopt more sustainable practices and the barriers they face in doing so (Alayón, Säfsten, & Johansson, 2022).

The sports goods industry's **environmental impact** includes the consumption of energy, water, and raw materials, as well as the generation of waste. The **adoption of sustainable technologies**, such as energy-efficient machines, eco-friendly raw materials, and waste-recycling systems, can significantly reduce these impacts. However, for many MSIEs, the transition to these technologies presents a complex set of challenges, including high upfront costs, lack of access to green financing, inadequate technical expertise, and resistance to change (Alayón et al., 2022). Despite these obstacles,



sustainability remains an important consideration for the industry, especially with increasing consumer demand for eco-friendly products (Venuez.dk, n.d.).

One of the primary obstacles faced by **MSIEs** in the sports goods sector is **access to finance** for sustainable investments. Sustainable technologies often come with high initial costs, which can be prohibitive for smaller enterprises that lack the capital or credit history to secure funding. Many MSIEs depend on informal financing sources or local banks that are often unwilling to provide loans for the adoption of new technologies. Without financial support, these businesses continue to rely on outdated, resource-intensive production methods (Alayón et al., 2022). The importance of securing **green financing** for small businesses in the sports goods industry cannot be overstated.

In addition to financial constraints, **technological barriers** also prevent MSIEs from embracing sustainability. Many small manufacturers lack the **technical expertise** required to implement and maintain eco-friendly production processes. Furthermore, sustainable technologies, such as energyefficient machines or green materials, are often perceived as complicated and expensive, deterring MSIEs from investing in them. Even when MSIEs have access to information about sustainable technologies, they may lack the technical knowhow to integrate these innovations into their existing production systems (Alayón et al., 2022).

Regulatory barriers also play a significant role in hindering the adoption of sustainable practices in MSIEs. While many countries introduced have regulations promoting sustainability, enforcement can be weak, especially for smaller businesses. In the sports goods industry, companies that fail to comply with sustainability standards may face limited consequences, which leads to a lack of motivation to invest in green technologies. Without robust regulatory frameworks, MSIEs are often left with little incentive to transition toward environmentally friendly practices (Venuez.dk, n.d.).

Organizational challenges, such as a lack of leadership commitment to sustainability, also prevent the integration of sustainable production technologies. The leadership of MSIEs in the sports goods sector may prioritize short-term profits over long-term sustainability goals. This lack of commitment can trickle down to employees, creating a culture of resistance to change. Furthermore, without adequate training, employees may be unaware of the potential benefits of sustainable production practices or may lack the necessary skills to operate more energy-efficient technologies (Alayón et al., 2022).

Despite these challenges, **strategic opportunities** exist for MSIEs in the sports goods industry to overcome the barriers to sustainability. Governments, financial institutions, and nongovernmental organizations (NGOs) can play a crucial role in helping MSIEs access the resources they need to adopt sustainable technologies. Financial support, such as **green financing** or **subsidized loans**, can help alleviate the financial burden of adopting sustainable production practices. Additionally, **capacity-building programs** that provide training on sustainable technologies can help MSIEs integrate these practices into their operations (Alayón et al., 2022).

One of the key opportunities for MSIEs is the growing **consumer demand** for eco-friendly products. As consumers become more environmentally conscious, they are increasingly looking for sustainable options when purchasing sports goods. This shift in consumer preferences presents a market opportunity for MSIEs that can successfully adopt sustainable practices. By positioning themselves as environmentally responsible manufacturers, MSIEs can differentiate themselves in the market, attract new customers, and potentially command higher prices for their products. Research suggests that the **sustainable sportswear market** is projected to grow significantly, with consumers willing to pay a premium for eco-friendly alternatives (Data Bridge Market Research, n.d.).

Another opportunity lies in the collaboration between MSIEs, government agencies, and larger corporations.



Governments can incentivize sustainability through **policies**, **regulations**, and financial support, while larger companies can assist MSIEs by sharing sustainable technologies and best practices. This collaboration could help create a more sustainable supply chain and increase the overall competitiveness of small enterprises in the sports goods industry. Additionally, MSIEs can benefit from the growing global focus on sustainability, which could lead to new market opportunities and partnerships (Alayón et al., 2022).

In conclusion, **MSIEs** in the sports goods industry face significant challenges in adopting sustainable production technologies. However, by addressing barriers such as financial constraints, technological limitations, regulatory challenges, and organizational resistance, these enterprises can successfully transition to more sustainable practices. Strategic opportunities, such as government support, consumer demand for sustainable products, and collaboration with larger firms, offer promising pathways for MSIEs to achieve long-term sustainability while remaining competitive in a rapidly evolving market. This research aims to explore these challenges and opportunities in greater depth and provide actionable recommendations for overcoming the barriers to adopting sustainable production technologies in the sports goods sector.

Literature Review

Martins, Branco, Melo, and Machado (2022) provide an insightful exploration into sustainability in small and mediumsized enterprises (SMEs), offering a systematic review of the existing literature and proposing a future research agenda. Their work highlights four primary research clusters: sustainability and SME performance, green and environmental management, social and cultural impacts on sustainability policies, and the necessary values, skills, and capabilities for sustainable business practices. The authors conducted a comprehensive review of articles published between 2000 and 2020, synthesizing existing knowledge and pointing out critical areas for further research to enhance sustainability in SMEs. Karimi-Takalo, Zhang, and Zhang (2021) investigated the drivers of green innovation within China's sports goods manufacturing industries. Using a mix of micro- and macrodata, they analyzed the impacts of product market competition and industrial policies on green innovation adoption. Their study found that government subsidies and market competition are the key drivers of green innovation in the sports goods sector, suggesting that well-structured policies and competitive pressure are essential for encouraging sustainable practices in this industry.

The *Export-Import Bank of India* (2018) examined strategies to enhance the export potential of India's sports goods industry, particularly focusing on MSMEs. By analyzing market trends and export opportunities, the report emphasizes the need for policy support, financial incentives, and improved infrastructure to boost the sector's international competitiveness. The study also advocates for the mechanization of production processes and the establishment of common facilitation centers to support MSMEs in scaling their exports.

In their 2022 paper, Sustainability in Small and Medium-Sized Enterprises: A Systematic Literature Review and Future Research Agenda, Martins, Branco, Melo, and Machado conducted a systematic literature review to map the various challenges and enablers for sustainability in SMEs. They discovered significant barriers like financial constraints and lack of information, while highlighting enablers such as government support and collaboration with suppliers. Their study's results also emphasized the need for more nuanced research into the financial and managerial factors influencing sustainable business strategies in SMEs.

In a study of sustainable production systems, *ResearchGate* (2022) explored the main trends and future research directions in sustainable production across various industries. By conducting a literature review of studies from 2000 to 2022, the paper identifies key issues in sustainable production, such as resource efficiency and waste reduction, and discusses the growing importance of these practices for SMEs. The study



highlights that SMEs need targeted interventions to overcome barriers to sustainable production, including lack of knowledge and financial constraints.

A study by *Sustainability* (2022) investigated the relationship between Industry 4.0 and sustainability practices in operations and supply chain management. By reviewing existing literature, the study introduces the S-OSCM4.0 framework to help SMEs integrate digital technologies and sustainability practices. The results suggest that the adoption of Industry 4.0 technologies can lead to enhanced environmental performance and greater efficiency in supply chains, although challenges in integration remain.

The report by *ECLAC* (2022), focusing on the role of digital technologies for sustainable development in Latin America and the Caribbean, suggests that digital tools have the potential to promote sustainable practices across industries, including sports goods manufacturing. The study provides a detailed analysis of the adoption of digital technologies in SMEs, emphasizing their role in enhancing value creation and supporting sustainability goals. It concludes that SMEs in these regions must invest in digital infrastructure to remain competitive and sustainable.

Chien and Shih (2021) explore how environmental regulations and innovation drive sustainable business practices in SMEs, specifically within Taiwan. Their qualitative study involved interviews with SME owners, revealing that stricter environmental regulations and a culture of innovation are key drivers in the adoption of sustainable practices. Their research emphasizes the importance of regulatory pressure and innovative thinking for SMEs seeking to improve their sustainability footprint.

In their 2019 study, González-Benito and González-Benito examined the relationship between manufacturing practices and sustainability adoption in SMEs. Through a survey of manufacturing SMEs in Spain, they found that proactive environmental practices significantly improve financial and operational performance. They concluded that SMEs with strong environmental management practices enjoy competitive advantages and can capitalize on consumer demand for sustainable products.

Liu and Zhang (2020) focused on the role of green supply chain management in driving sustainable innovation within SMEs. By conducting a longitudinal study in China, they analyzed how green supply chain management practices influence sustainable innovation and organizational performance. Their findings indicate that companies with robust green supply chain practices tend to be more innovative and environmentally conscious, thus improving both their environmental and financial outcomes.

These studies offer valuable insights into the various barriers, enablers, and impacts of adopting sustainable production technologies within SMEs, particularly in the sports goods industry. They suggest that financial constraints, lack of technical knowledge, and regulatory hurdles remain significant challenges, while enablers like government policies, market competition, and technological innovations can help overcome these barriers. Furthermore, these papers collectively highlight the growing importance of digital technologies, environmental regulations, and green innovations as key drivers for sustainability in SMEs.

Discussion

Micro, Small, and Informal Enterprises (MSIEs) are a vital component of the global sports goods industry, yet they face significant barriers in adopting sustainable production technologies. These barriers range from financial constraints and technological limitations to regulatory challenges and organizational hurdles. By examining real-world case studies from countries such as India, China, and South Africa, we can gain a deeper understanding of the barriers MSIEs face and explore potential strategic opportunities to foster sustainability in the sports goods industry.

Financial Constraints: Case Study of the Jalandhar Sports Goods Cluster, India

In **Jalandhar**, India, the sports goods manufacturing cluster is one of the largest in the country. Many MSIEs in this region



are engaged in the production of sports equipment such as footballs, cricket bats, and other goods. Despite the growing demand for sustainable products, these small enterprises face significant **financial constraints** that hinder their ability to adopt green technologies. The high upfront costs of ecofriendly materials and energy-efficient production machinery deter many businesses from transitioning to sustainable practices.

A real-world example is the **small-scale sports equipment manufacturers** in Jalandhar who have been unable to move toward sustainable practices, such as using recycled materials in their production or upgrading to energy-efficient machinery. The lack of **financial incentives** for green technology adoption and the absence of easily accessible credit or low-interest loans for small businesses make it difficult for these enterprises to transition to more sustainable production methods. This case illustrates how financial barriers are a significant challenge in the adoption of sustainable technologies in MSIEs in the Indian sports goods industry.

Technological Barriers: Case Study from China's Sports Goods Industry

In China, the sports goods manufacturing sector is one of the largest in the world, yet many small and medium-sized enterprises face significant technological barriers when attempting to implement sustainable production technologies. A study of small sports shoe manufacturers in Guangdong province reveals that these companies are often unable to afford the latest sustainable production technologies or integrate eco-friendly materials into their processes.

One specific example is the **small-scale sports shoe manufacturer in Guangdong** that struggled with sourcing sustainable raw materials, such as recycled rubber and ecofriendly fabrics. Additionally, the company faced difficulties in training employees to work with more complex and energyefficient manufacturing technologies. This case study underscores the challenge that many Chinese MSIEs face in terms of both **financial constraints** and the **technical** **expertise** required to transition to sustainable production methods.

Regulatory Barriers: Case Study of Brazil's Sports Goods Industry

In **Brazil**, MSIEs in the sports goods industry face challenges related to **weak regulatory enforcement**. The country has laws that encourage sustainable practices, but their enforcement, particularly for smaller companies, has been inconsistent. A case study of **small sports goods manufacturers in São Paulo** highlights this issue, where companies were slow to adopt sustainable production practices because the regulatory framework did not strongly penalize non-compliance.

Many small manufacturers producing items like volleyballs and footballs have continued using non-recyclable materials and high-energy production methods. The lack of stringent regulatory pressure, coupled with the perception that green technologies are costly, means that many MSIEs opt not to implement eco-friendly production methods unless they are incentivized. This case demonstrates the need for stronger regulatory frameworks that enforce sustainability standards and create a more level playing field for smaller enterprises.

Organizational and Leadership Barriers: Case Study from South Africa's Sports Apparel Sector

In **South Africa**, a **sports apparel manufacturer** based in Cape Town faced significant challenges in adopting sustainable production technologies due to leadership and organizational barriers. The company's management was initially hesitant to invest in eco-friendly materials and technologies, primarily due to **financial constraints** and a **lack of awareness** about the long-term benefits of sustainability.

Despite the growing consumer demand for eco-friendly products, the company's leadership did not prioritize sustainability, resulting in missed opportunities for adoption of sustainable practices. The organization also lacked the necessary internal infrastructure to train employees in using



more sustainable production technologies. This example demonstrates how **organizational commitment** and **leadership support** are essential in overcoming barriers to sustainable production.

Market Constraints: Case Study from the European Sports Goods Industry

In Europe, a case study of a small sports equipment manufacturer in Germany reveals that market constraints also hinder the adoption of sustainable production technologies. Despite increasing consumer awareness about sustainability, the company struggled to sell its eco-friendly sports goods at a competitive price. Larger firms with greater economies of scale were able to offer eco-friendly products at lower prices, putting pressure on smaller firms to match these prices.

This small German manufacturer faced competition from larger international firms that had the resources to invest in large-scale, sustainable production while keeping prices low. Additionally, the company's target market, although interested in sustainability, was not willing to pay a premium for eco-friendly sports goods. This example shows how market challenges, including price competition and consumer willingness to pay, are significant barriers to the adoption of sustainable production practices in MSIEs.

Strategic Opportunities and Recommendations

To overcome these challenges, MSIEs in the sports goods industry can take advantage of several strategic opportunities. For instance, governments can offer **financial incentives** and **green subsidies** to reduce the financial burden of adopting sustainable technologies. In India, for example, the **Ministry of MSME** has introduced **credit guarantee schemes** to support small businesses in accessing loans, which could be expanded to cover **green technologies**.

Additionally, **capacity-building programs** aimed at improving **technical skills** in sustainable production can help small manufacturers in countries like China and Brazil. By providing **training and technical support**, both the workforce and management can become more adept at implementing sustainable practices. Partnerships with **NGOs** and **international organizations** can also help MSIEs access affordable technologies and expert advice.

Furthermore, strengthening **regulatory frameworks** and ensuring **consistent enforcement** will incentivize MSIEs to adopt sustainable practices. Governments can also offer **tax breaks** or **subsidies** to companies that comply with sustainability standards, as seen in various European countries.

Finally, MSIEs need strong **leadership** that is committed to integrating sustainability into the organizational culture. By fostering a leadership commitment to sustainability and providing appropriate training and resources, MSIEs can begin to break down the **organizational barriers** to adopting green technologies.

Conclusion

In conclusion, Micro, Small, and Informal Enterprises (MSIEs) in the sports goods industry face significant challenges in adopting sustainable production technologies. The barriers identified include limited access to financing, lack of technical expertise, inadequate regulatory frameworks, resistance. and organizational Financial constraints, particularly the high initial costs of sustainable technologies, remain a critical obstacle for MSIEs, as these businesses often lack the capital or access to green financing. This issue is compounded by the technological difficulties in acquiring and maintaining energy-efficient production systems, as well as the complexity of integrating new, eco-friendly materials into existing production processes.

Despite these challenges, the research highlights several strategic opportunities for MSIEs to overcome these barriers. Government support in the form of financial incentives, favorable policies, and capacity-building programs can significantly assist these enterprises in adopting sustainable practices. Moreover, increasing consumer demand for sustainable sports goods presents an opportunity for MSIEs to



differentiate themselves in the marketplace, offering products that align with consumer values on environmental responsibility. Collaboration with larger firms, NGOs, and financial institutions can provide the necessary resources and expertise to help MSIEs scale sustainable production practices.

Furthermore, the research underscores the importance of leadership and organizational commitment to sustainability. For MSIEs to succeed in adopting sustainable technologies, there must be a cultural shift within organizations, with leaders taking an active role in promoting sustainable practices and educating employees. MSIEs that embrace sustainability as part of their core strategy can not only contribute to environmental goals but also enhance their longterm competitiveness in the market.

Future Scope

The future scope of this research lies in exploring the specific financial models and policy interventions that can facilitate the adoption of sustainable practices among MSIEs. Further studies could investigate the role of microfinance institutions and crowdfunding platforms as potential sources of green financing for small businesses. Exploring how these financing mechanisms could be tailored to the needs of MSIEs would provide valuable insights into overcoming the financial barriers that prevent the adoption of sustainable technologies.

Additionally, research could explore the role of digital technologies and Industry 4.0 in helping MSIEs adopt more efficient and sustainable manufacturing processes. By leveraging smart technologies such as automation, data analytics, and AI, small enterprises could streamline production processes, reduce waste, and lower energy consumption—enabling them to operate sustainably without sacrificing productivity. The potential of digital transformation in the sports goods industry offers promising opportunities for MSIEs to overcome traditional barriers to sustainability.

Another area of future research is evaluating the socioeconomic impact of sustainable practices on MSIEs. Studies could assess how sustainability initiatives affect not only environmental outcomes but also business profitability, employee well-being, and community development. Understanding the broader benefits of sustainable practices could further motivate MSIEs to invest in sustainability, viewing it as a means to achieve long-term business success.

Lastly, globalization presents another important area for future research. As MSIEs increasingly interact with international markets, exploring how they can scale their sustainable practices on a global level will be crucial. Research could focus on the challenges and opportunities of exporting sustainable products and ensuring that global supply chains align with sustainability goals. Understanding how MSIEs can integrate into international sustainability frameworks and access global markets for eco-friendly sports goods will help these enterprises thrive in an increasingly competitive and environmentally-conscious global economy.

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