



EXPLORING THE INTERCONNECTEDNESS OF SUSTAINABLE PROCUREMENT PRACTICES TO DRIVE SUPPLY CHAIN SUSTAINABILITY IN MANUFACTURING INDUSTRY

INTRODUCTION

The manufacturing industry is a fundamental pillar of the global economy. The post-industrial manufacturing paradigm considers manufacturing as a business that deals with the difficulties that companies confront in adjusting to evolving customer demands and improving productivity in the post-industrial period [1]. However, in today's world, manufacturing is seen as a cohesive concept that encompasses everything from machines and production systems to the overall operation of a business.

The global manufacturing industry is a key driver of economic growth, encompassing the production of goods across various sectors such as automotive, consumer goods, industrial products, material products, and medical devices. As illustrated in Figure 1, the industry is projected to reach a total output of US\$35.1 trillion, with material products and consumer goods representing the largest segments. The industry is expected to grow at a compound annual growth rate (CAGR) of 1.10% from 2024 to 2029, driven by advancements in technology, increasing demand for consumer products, and the growing importance of industrial and material goods in global supply chains.

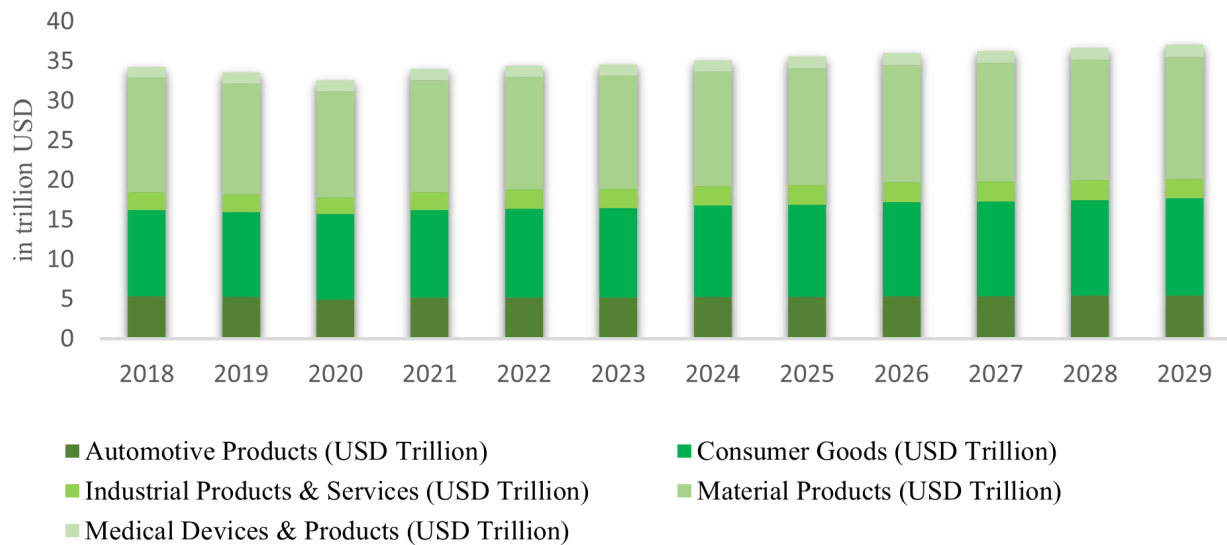


Figure 1: Global manufacturing market output [2]

Role of Sustainability in Procurement

The manufacturing industry is increasingly recognizing the importance of incorporating sustainable practices into procurement processes. The integration of sustainability into procurement processes is not merely a regulatory requirement but a strategic imperative that can drive long-term value creation and risk mitigation [3]. As manufacturing processes become increasingly complex and globalized, understanding the interrelationships between various sustainable procurement practices becomes essential for effective decision-making [4]. Although the adoption of sustainable procurement practices brings about numerous benefits, manufacturers encounter significant challenges when it comes to implementation. Common obstacles include high initial costs, technological barriers, and the need for cultural change within organizations [5]. In addition, the absence of consistent practices and methodologies for assessing sustainability performance adds complexity to the task of incorporating these practices throughout supply chains. To overcome these challenges, organizations need to gain a better understanding of the connections between various sustainable procurement practices.

The individual components of sustainable procurement have been the subject of extensive

research, which includes economic factors, environmental factors, and social factors. Nevertheless, the existing literature frequently examines these practices in isolation, failing to provide a comprehensive analysis of their interactions and mutual influences within the procurement framework. The advantages of sustainable procurement have been emphasized in prior research; however, the multidimensional nature of sustainability metrics has also been identified as a challenge in its implementation. The complexity of these interrelationships presents a substantial challenge, even though the advantages of an integrated approach are evident in enhanced operational efficiency and reduced environmental impact. The inability of existing frameworks to account for the interdependencies among sustainable procurement practices frequently results in their failure to provide actionable insights. This discrepancy underscores the necessity of a more advanced analytical methodology to resolve these intricacies.

Research Methodology

The Centre of Supply Chain, Operations, and Logistics Optimization at the University of Moratuwa conducted a study to identify the most prevalent sustainable procurement practices followed by industries in emerging economies. The study incorporated an extensive literature

review to develop a theoretical framework for the identified practices, offering a detailed comprehension of sustainable procurement in both academic and practical realms.

Empirical evidence gathered from interviews with industry experts was combined with insights from literature to develop a robust framework for implementing sustainable procurement practices. This integration of practical industry perspectives with academic insights ensures that the framework is both grounded in real-world challenges and supported by theoretical underpinnings. After developing the framework of sustainable procurement practices for the manufacturing industry in emerging economies, we applied the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method to analyze the interconnections between these practices. This structured approach to sustainable procurement practices ensures that the factors are not only relevant but also widely applicable across industries, particularly in emerging economies. By identifying and validating these practices, the framework provides a holistic and actionable guide for organizations aiming to enhance their sustainability performance. The alignment with the Triple Bottom Line ensures that companies can balance economic, environmental, and social priorities, thus fostering a more sustainable and resilient procurement strategy.

Results and Discussion

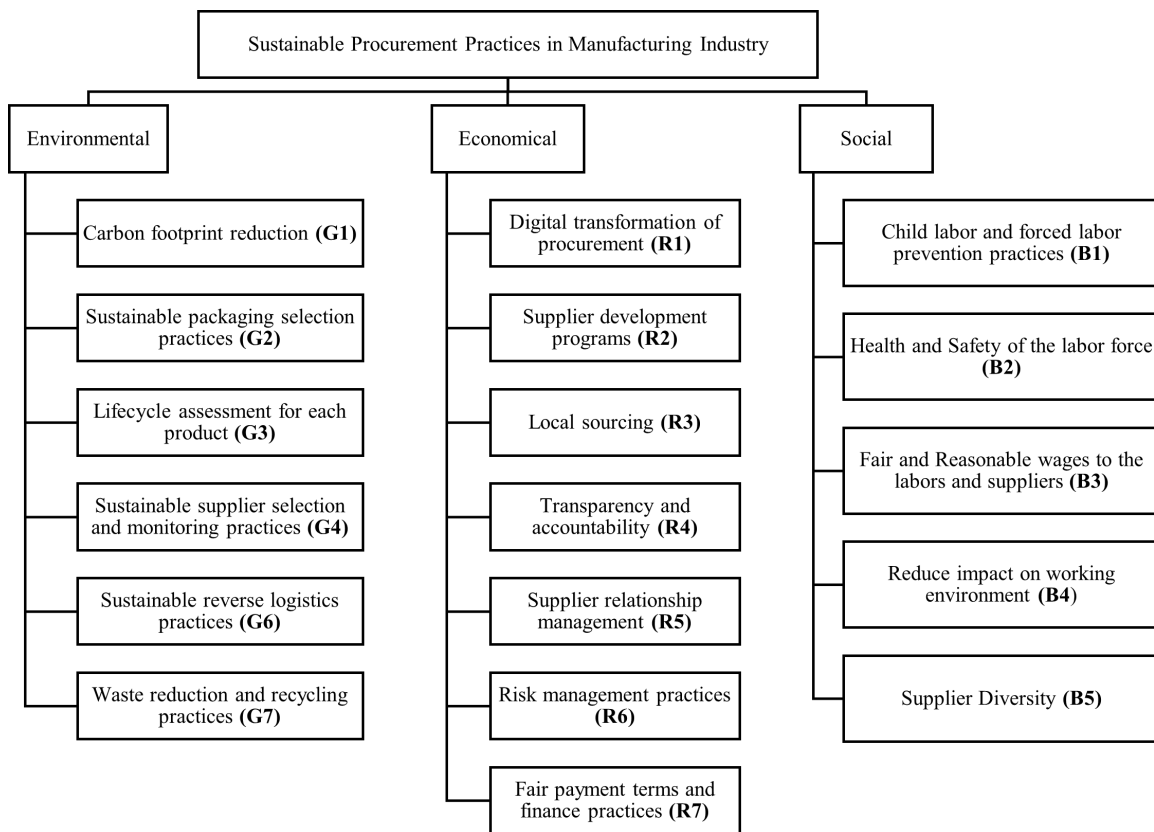


Figure 2: Sustainable procurement practices followed by manufacturing industry in emerging economies

Figure 2 illustrates the outcome of this comprehensive process, highlighting the identification of 18 key practices based on the Triple Bottom Line framework. These practices are categorized into three primary areas: economic, environmental, and social.

DEMATEL method allowed us to identify the causal relationships among the 18 practices within the framework, revealing how economic, environmental, and social factors influence one another. Figure 3

represents the complex causal relationships among sustainable procurement factors in the manufacturing industry. The horizontal axis shows "Prominence" $(r_i + c_i)$, indicating the overall impact of each factor, while the vertical axis represents "Relation" $(r_i - c_i)$, differentiating between influencers (net causes) and influenced (net effects). Factors like R1 and G3 are identified as strong net causes, meaning they significantly influence other factors. In contrast, factors such as B1 and B3 are strong net effects, being more influenced by others. The prominence of a factor, shown on the horizontal axis, reveals its overall importance in the system, with R1 being highly prominent and impactful, while G1 is less.

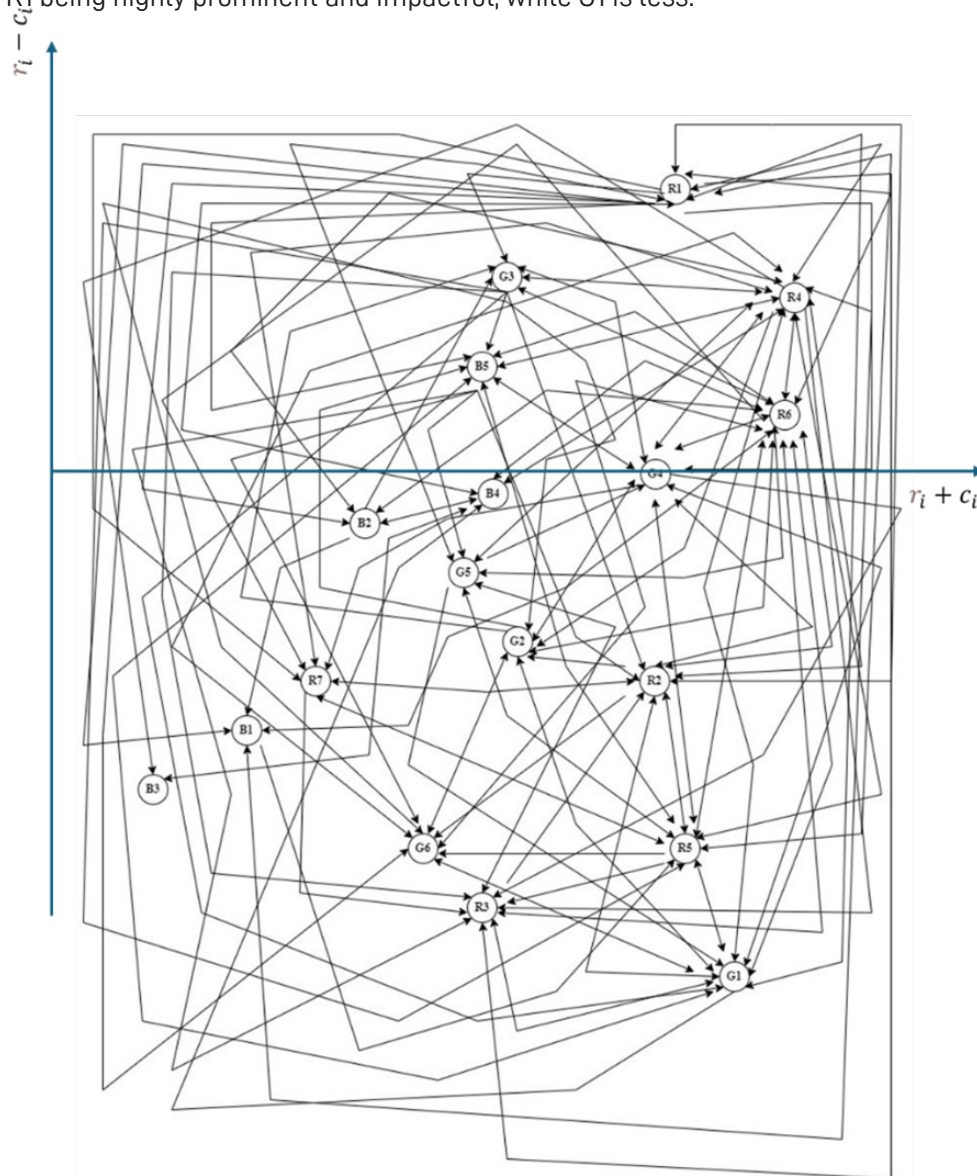


Figure 3: Interrelationships of sustainable procurement practices

The DEMATEL analysis provided valuable insights into the most influential sustainability practices, highlighting areas where efforts can be focused to achieve greater sustainability outcomes. By understanding these interdependencies, manufacturers can better prioritize actions to optimize procurement processes, ensuring a balanced approach to economic, environmental, and social objectives. By categorizing and understanding these practices, managers can make informed decisions, prioritize actions, and allocate resources more effectively. This comprehensive approach not only enhances organizational sustainability but also supports long-term success and resilience, demonstrating the vital role of sustainable procurement in contemporary manufacturing practices in emerging economies.

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