EXAMINING INFLUENTIAL ELEMENTS IMPACTING PERFORMANCE IN SUSTAINABLE MANUFACTURING WITHIN MALAYSIAN ENTERPRISE: A CONCEPTUAL ANALYSIS.

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ABSTRACT

This study investigates the factors of sustainable manufacturing that affect the performance of Malaysian manufacturing enterprises. It focuses on sustainable innovation, quality, cost efficiency, delivery, and operational flexibility. By applying Dynamic Capabilities theory, the study aims to provide useful insights to Malaysian manufacturing companies. The major goal is to develop a conceptual framework for sustainable manufacturing that will improve organizational performance. It is important to emphasize that empirical validation is currently lacking in this study, necessitating additional research to examine the applicability of Dynamic Capabilities, sustainable innovation, and flexibility in predicting organizational performance. Future research should incorporate quantitative approaches and different samples to enhance the generalizability of the findings. This study emphasizes the critical roles of sustainable innovation and flexibility in influencing organizational performance, highlighting the importance of including these factors in sustainable manufacturing strategies. Furthermore, it provides stakeholders in manufacturing enterprises with insights to help them strengthen their strategic communication on the benefits of sustainable manufacturing. The study not only offers valuable information to policymakers, industry experts, and the academic community but also emphasizes the importance of conducting additional empirical research to examine and expand upon these conceptual insights**.**

Keyword: sustainable manufacturing factors, organizational performance, dynamic capabilities, Malaysian manufacturing enterprises.

INTRODUCTION

According to Bank Negara Malaysia (2023), Malaysia's manufacturing sector plays an essential role in the country's economic landscape, contributing the second-largest share to both GDP and Foreign Direct Investment (FDI). In 2016, this sector received RM58.49 billion in capital investment, with RM31.08 billion coming from domestic sources and RM27.42 billion from foreign investments (Economic Planning Unit, Prime Minister's Department, 2022).

This growing manufacturing industry has significantly contributed to Malaysia's GDP development, accounting for 22.78 percent, or RM253.9 billion, of the total domestic product value. Employment-wise, it has offered job opportunities to 1.05 million people, proving its importance in the labor market. The Twelfth Malaysia Plan (RMK-12) established high targets for the country, aiming for an annual GDP growth rate of 4 to 4.5 percent, with an emphasis on the services and manufacturing sectors (Ministry of Economy Malaysia, 2023). Malaysia's business establishments have grown drastically, reaching 920,624, with 98.5 percent being Small and Medium Enterprises (SMEs), comprising 907,065 establishments. This has led to a strong labor market, with 2.52 million people employed in the manufacturing sector, according to the Ministry of Economy in 2023. Overall, Malaysia's manufacturing industry remains a driving force in economic development, making major contributions to GDP, FDI, and job creation.

There has been a long discussion on organizational performance in strategic management research, primarily focusing on business organizations (Ahuja & Khamba, 2008; Lin & Wu, 2014; Brundage, Chang, Arinez & Xiao, 2016; Chan, Ngai & Moon, 2017). In the face of rising competition in the marketplace and technological advancements, organizations are compelled not only to continuously evaluate and improve their manufacturing operations but also to take the lead in developing new products and technologies, aiming for both financial gains and long-term competitive advantages (Walker, 2004; Dangelico, Pujari, & Pontrandolfo, 2017).

Recent years have seen a growing interest in understanding the intricate relationships between organizational performance (Ahuja & Khamba, 2008; Lin & Wu, 2014; Brundage, Chang, Arinez & Xiao, 2016; Chan, Ngai & Moon, 2017; Dangelico, Pujari & Pontrandolfo, 2017) and sustainable manufacturing factors (Hall, 2000; van Weenen, 2000; Amrina & Yusof, 2011; Hussin & Kunjuraman, 2015; Boron, Murray & Thomson, 2017). However, these areas of inquiry have frequently been investigated in isolation, yielding conflicting results.

To address this gap, this study examines the specific influence of sustainable manufacturing factors on organizational performance in Malaysian manufacturing enterprises. By investigating this relationship, the study aims to contribute to a more complete understanding of the dynamics of sustainable manufacturing factors and organizational performance in Malaysia's manufacturing sector. Despite government initiatives, there remains an important gap in understanding the critical factors that determine organizational performance in Malaysian manufacturing. The current body of research on sustainable manufacturing factors and organizational performance has produced conflicting results, leaving a gap in

understanding the specific influence of these factors on Malaysian manufacturing enterprises. While previous research has provided some insights, there is a need for a more in-depth analysis to identify the important variables of sustainable manufacturing that influence organizational success in this context.

To fill this gap, this study aims to answer the following research question: What factors of sustainable manufacturing contribute to organizational performance in Malaysian manufacturing companies? Identifying these factors is critical for both practitioners and policymakers, enabling them to develop effective measurements and standards for promoting sustainable manufacturing practices within organizations. This study examines the factors of sustainable manufacturing supported by the Dynamic Capabilities Theory. The paper is organized into four sections. The introduction provides an overview and comprehensively discusses the variables of sustainable innovation, quality, cost, delivery, and flexibility. The relationship between sustainable manufacturing factors and organizational performance is examined in depth, and this study summarizes the importance of understanding these factors in advancing sustainable manufacturing practices and overall organizational performance in Malaysia's manufacturing industry.

LITERATURE REVIEW

Underlying Theory

The concept of Dynamic Capabilities, also known as the Dynamic Capabilities View (DCV), is widely acknowledged as the capacity to develop, integrate, and reshape internal and external competencies, enabling organizations to adapt effectively and consistently to rapid environmental changes (Teece, 2007; Fang & Zou, 2009). DCV, described as a series of distinct organizational processes, is crucial for responding to dynamic market shifts (Eisenhardt & Martin, 2000). It elucidates how firms can navigate the dynamic landscape of resource and capability management within their business operations and production processes, adjusting to sustainable changes (Wu et al., 2012; Lin et al., 2016; Ramanathan et al., 2017). Furthermore, DCV conceptually and practically justifies sustainable changes in organizational business strategies, operations, and cost management, ultimately contributing to long-term economic viability and sustained competitive advantage (Wu et al., 2012).

This study specifically investigates the application of Dynamic Capabilities theory to sustainable manufacturing factors. Some literature suggests that sustainable manufacturing factors are dynamic entities capable of developing their own dynamic capabilities (Amrina & Vilsi, 2015; Winroth, Almstrom & Andersson, 2016). With increasing concerns about environmental regulations and societal needs, companies are increasingly compelled to integrate sustainability principles (environmental, social, and economic) into their business practices and objectives. This integration is deemed essential for attaining a sustainable competitive advantage across sectors and geographic regions. Scholars advocate for dynamic capabilities in this context as they have the potential to generate value for organizations and customers through efficient and timely production processes, ultimately leading to enhanced organizational performance and sustained competitive advantage (Wu et al., 2012; Lin et al., 2016; Ramanathan et al., 2017).

Organizational Performance

Abdel-Maksoud (2004) emphasizes that evaluating organizational performance requires a thorough analysis of both financial and non-financial aspects. Scholars such as Ittner and Larcker (2003), Pintelon, Pinjala, and Vereecke (2006), and Ahuja and Khamba (2008) all agree that including both financial and non-financial measures is critical for influencing customer satisfaction and increasing overall profitability. Non-financial factors are crucial in improving skills across multiple industrial processes, providing useful insights into specific capacities before committing to risky financial investments (Rosen & Kishawy, 2012; Lin & Wu, 2014). Hassan, Nordin, and Ashari (2015) emphasize the need to incorporate non-financial methods to address specific challenges in manufacturing production operations, which will ultimately lead to better outcomes, including enhanced monetary profits (Damanpour & Evan, 1984). As a result, this study employs a theoretical framework that includes both non-financial and financial aspects when examining organizational performance, recognizing their interconnectivity and impact on organizational profitability (Ittner & Larcker, 2003).

The influence of sustainable manufacturing factors on performance is supported by the dynamic implications of absorptive, adaptive, and innovative capabilities, as observed by Cabral (2000) and Wu et al. (2012). Researchers such as Yang et al. (2009), Amrina and Yusof (2011), and Jain and Ahuja (2012) have examined the contributions of sustainable manufacturing factors to organizational performance, highlighting significant relationships with innovation, quality, cost, delivery, flexibility, time, and employee factors. Millar and Russell (2011) discovered that manufacturing firms in the Caribbean prioritized the health, well-being, and safety of workers, engaged in community programs, and embraced social responsibility as a strategy for enhancing brand loyalty. Their initiatives included enhancing employee morale and retention, innovating with environmentally friendly alternatives, and aligning with environmental and social expectations, positioning them ahead of competitors (Millar & Russell, 2011). In essence, this synthesis underscores the intertwined nature of financial and non-financial perspectives in evaluating organizational performance and emphasizes the critical role of sustainable manufacturing factors in driving positive outcomes for companies.

Sustainable Manufacturing Factors

Sustainable manufacturing factors have evolved as important assets for organizations, receiving extensive recognition in contemporary literature (Montabon, Sroufe, & Narasimhan, 2007; Henri & Journeault, 2008; Mani, Lyons, & Sriram, 2010; Amrina & Yusof, 2011; Vinodh & Joy, 2012). These factors are fundamental to all manufacturing processes, enabling the development of skills, technology, and work practices within manufacturing enterprises (Amrina & Yusof, 2011; Vinodh & Joy, 2012). The conceptual frameworks of Dynamic Capabilities and Knowledge-based Organization theories provide influential foundations for understanding the creation and maintenance of competitive advantage, as well as why organizations perform differently (Neches et al., 1991; Makadok, 2001; Lin & Wu, 2014; Islam, Jasimuddin, & Hasan, 2017).

Sustainable manufacturing, as applied to organizations, is evident in modern manufacturing enterprises. These businesses must integrate processes for measuring, assessing, and improving manufacturing performance across operations while also developing new products and technologies that align with various social, environmental, and economic perspectives (Peet et al., 2011; Amrina & Yusof, 2011; Amrina & Vilsi, 2015). Sustainable manufacturing is defined as the integration of abilities that promote sustainability and mitigate various business risks into all qualifications within manufacturing processes and systems (Henri & Journeault, 2008; Mani et al., 2010). This approach ensures that manufacturing processes and products are created in a sustainable, knowledgeable, and competitive manner across all job activities (Tocan, 2012). This synthesis emphasizes the critical factors of sustainable manufacturing in improving organizational performance, increasing competitiveness, and aligning with current business imperatives for sustainability and innovation.

a. Sustainable Innovation

Sustainable innovation is defined as a process that renews or improves products, services, technology, or organizational systems, resulting in enhanced economic performance while also improving environmental and social elements (Cabral, 2010; Jorna, 2017). Tello and Yoon (2008) describe sustainable innovation as the creation of new goods, processes, services, and technology that meet human needs and improve well-being while respecting natural resources and regenerative capacity. Furthermore, Calik and Bardudeen (2016) define sustainable innovation as any new or substantial advance in organizational manufacturing processes that generates not only economic gains but also positive social and environmental implications.

The developing body of literature demonstrates the growing interest in sustainable innovation, emphasizing its importance as a focal point for organizations dedicated to the triple bottom line. The combination of economic, social, and environmental issues distinguishes sustainable innovation from traditional innovation methodologies (Cabral, 2010; Calik & Bardudeen, 2016). In a continuously changing environmental and business landscape, sustainable innovation has been highlighted as a key driver of long-term economic advantage (Adams et al., 2016). In today's global context, manufacturers and retailers prioritize sustainable innovation in their global sourcing and supply chain strategies to achieve operational excellence and cost-efficiency in their production systems (Ebrahimi, Moosavi, & Chirani, 2016). This synthesis emphasizes the multiple characteristics of sustainable innovation, which include economic, social, and environmental elements, as well as its critical role in gaining a competitive edge and operational efficiency in today's corporate landscape.

Few studies address the crucial link between sustainable innovation and organizational performance. According to Calik and Bardudeen's (2016) study, sustainable process innovation involves reusing, remanufacturing, and recycling materials in the manufacturing process to improve sustainability and organizational performance. Jorna (2017) also believes that sustainable innovation necessitates the use of adopters' knowledge and capacities to integrate, construct, and reconfigure their organization's manufacturing processes to decrease process failure rates and adapt to quickly changing environments. Ultimately, it would improve

operational excellence and cost-efficiency in their manufacturing systems (Ebrahimi, Moosavi, & Chirani, 2016).

b. Quality

Quality is described as a product or service's ability to meet and exceed customer expectations, with customer needs determining quality objectives (Reeves & Bednar, 1994). During the early 1970s, organizations valued cost and production over quality. However, a Japanese-led organization in the United States in the 1980s demonstrated the need to focus on all three dimensions simultaneously: quality, cost, and delivery (QCD) to gain an advantage over the competition (Tomaskovic-Devey & Lin, 2011). Quality has subsequently developed into a strategy to boost organizational profitability and maximize customer satisfaction by reducing mistakes (Agus & Hajinoor, 2012).

Malaysian manufacturing enterprises are under growing pressure to offer high-quality goods while also improving efficiency in their production processes (Shakir & Mohammed, 2013; Abdul-Rashid et al., 2017). Quality and performance improvement initiatives throughout operations are critical for these organizations' long-term competitive advantage and growth (Anuar, 2015; Anuar et al., 2016). A high-quality and dependable production system is considered crucial for competitiveness, and achieving excellence in production quality is seen as a strategic imperative for manufacturing organizations. This involves improvements in manufacturing quality, customer order compliance, process defect reduction, and minimizing customer warranty problems (Ahuja & Khamba, 2008; Agus & Hajinoor, 2012; Anuar, 2015; Anuar et al., 2016).

Marin and Ruiz-Olalla (2011) found a favorable association between manufacturing quality and overall organizational success. Other studies, such as those by Ahuja and Khamba (2008) and Jain and Ahuja (2012), emphasize that organizations seeking success through manufacturing quality must first identify their motivations, set targets, and develop implementation strategies. According to Anuar (2015), the implementation of manufacturing quality should be driven by internal motivations such as incremental improvements in customer order compliance, reducing total process defects, and minimizing customer warranty issues to yield internal benefits for the organization. This synthesis emphasizes the evolving view of quality as a strategic imperative, highlighting its critical significance in organizational success and competitiveness for Malaysian manufacturing enterprises.

c. Cost

Nordin and Adebambo (2016) differentiate the economic growth factor of sustainable manufacturing practices into two components: production costs and investment costs. The descriptive analysis from Nordin and Adebambo's (2016) study shows that manufacturing costs in Malaysia are being reduced effectively throughout the industry. Manufacturing costs, which are frequently used as a quantitative measure, include both direct cost reductions (labor, materials, and other product-specific costs) and overhead cost reductions (administrative costs, equipment costs, maintenance expenses, and plant depreciation expenses) (Sillanpaa & Kess, 2011; Beamon, 1999; Chan, 2003; Chan & Qi, 2003; Theeranuphattana & Tang, 2008).

Sustainable manufacturing factors have a major impact on an organization's production costs (Ahuja & Khamba, 2008). Identifying these factors enables optimization of production costs by avoiding unexpected downtime, equipment difficulties, and waste in the manufacturing system (Shagluf, Longstaff, & Fletcher, 2014; Paprocka, Kempa, Kalinowski, & Grabowik, 2015). Previous research shows that sustainable manufacturing reduces costs, increases sales, and improves financial performance (Kasbun, Teh, & Ong, 2016; Ameer & Othman, 2012). According to Kasbun et al. (2016), the cost of investment serves as a motivator to increase resource allocation flexibility and efficiency, improve R&D productivity, and build organizational competencies to capitalize on business opportunities in a competitive market.

The competitiveness of sustainable manufacturing, particularly in cost management, entails pursuing short-term cost-cutting activities (Christmann, 2000). Transforming practices into capabilities, focusing on cost efficiency, and incorporating cost management into the manufacturing process could have a more beneficial impact on profits than relying exclusively on short-term cost-cutting measures. González et al. (2012) emphasize the prospective integration of cost management into the manufacturing process to enhance organizational performance, thereby contributing to broader organizational benefits and long-term competitive advantage. This synthesis emphasizes the interdependence of sustainable manufacturing elements, cost management, and organizational performance, with a focus on cost management's role in ensuring long-term economic growth and competitiveness.

d. Delivery

Delivery plays a pivotal role in today's knowledge-based economy (Yahya & Goh, 2002; Wong, 2005; Khosravi & Ahmad, 2014). Organizations are increasingly investing in enhancing their delivery processes to swiftly target new customer segments and identify emerging opportunities (Toni & Tonchia, 2001; Christiansen et al., 2003; Abdel-Maksoud, 2004; Jain & Ahuja, 2012). They are adopting fast, responsive, and flexible production systems and customer services while integrating sustainable development practices (Jayal et al., 2010; Tseng, 2013; Varsei et al., 2014; Hřebíček et al., 2015). According to Tseng (2013), optimizing production systems involves a decentralized, results-oriented, and empowering approach. Additionally, organizations leverage information technologies to reengineer delivery processes, enhance services, improve efficiency, and reduce costs (Jain & Ahuja, 2012; Amrina et al., 2016).

Katayama and Bennett's (1999) study explores the relationship between agility, adaptability, and leanness among Japanese companies, categorizing delivery measures into operational, supply, order fulfillment, and product development processes. Sub-measures related to delivery include on-time delivery, delivery reliability, faster delivery times, delivery service, delivery frequencies, delivery synchronization, delivery speed, order fulfillment lead time, and supplier's delivery performance. While historically, delivery in production was confined to operative activities and not fully recognized as a competitive advantage, recent literature emphasizes its strategic role and significant positive impact on financial performance (Christiansen et al., 2003).

Delivery is deemed a crucial aspect of the firm's value chain and a strategic decision area leading to enhanced organizational performance (Christiansen et al., 2003). It is considered a fundamental pillar for developing distinctive capabilities in the production system (Tseng, 2013) and represents a vital internal factor contributing to operational capability (Jain & Ahuja, 2012). In summary, the synthesis underscores the evolving significance of delivery in production, acknowledging its strategic importance, positive influence on financial performance, and its role as a fundamental element of sustainable competitive advantage and operational capability.

Flexibility within manufacturing enterprises is commonly defined as the ability to swiftly respond to new customer demands, fluctuations in production volumes, and the introduction of novel products (Sharkie, 2003). It involves adapting to a dynamic or uncertain environment and effectively addressing challenges stemming from changes (Beamon, 1999; Theeranuphattana & Tang, 2008). Sharkie (2003) emphasizes the necessity for organizations to cultivate capabilities to manage change, focusing on attributes like agility, flexibility, and speed, and swiftly accessing knowledge and competence.

According to Bernardes and Hanna (2009), Chan et al. (2017), and Braunscheidel and Suresh (2018), the success of an organization relies on its ability to swiftly generate, capture, and disseminate knowledge. This capacity to create and continuously learn from knowledge can serve as a sustainable competitive advantage (Wu et al., 2012; Lin et al., 2016; Ramanathan et al., 2017).

Empirical studies investigating the relationship between flexibility and organizational performance have produced inconclusive findings. While some studies indicate a positive correlation, suggesting that factors such as process flexibility, delivery reliability, cost leadership, product or process innovation, and product quality act as critical intermediate performance indicators influencing overall performance (North & Kumta, 2018; Inkinen, 2015; Hung et al., 2015), others report a negative relationship (Ferdows et al., 2016; Jain & Ahuja, 2012; Golec & Taskin, 2007; Yurdakul, 2002). The synthesis underscores the complexity of establishing a definitive relationship between flexibility and organizational performance, highlighting the necessity for further research in this domain.

Conceptual Framework

The conceptual framework depicted in Figure 1 is built upon the Dynamic Capabilities Theory, serving as a robust theoretical basis for comprehending and forecasting organizational performance within Malaysian manufacturing companies. This framework amalgamates essential elements about sustainable manufacturing factors, including sustainable innovation, quality, cost management, delivery, and flexibility. These factors are recognized as pivotal components that contribute significantly to organizational performance in adapting to and leveraging these factors to achieve sustainable competitive advantage and long-term success.

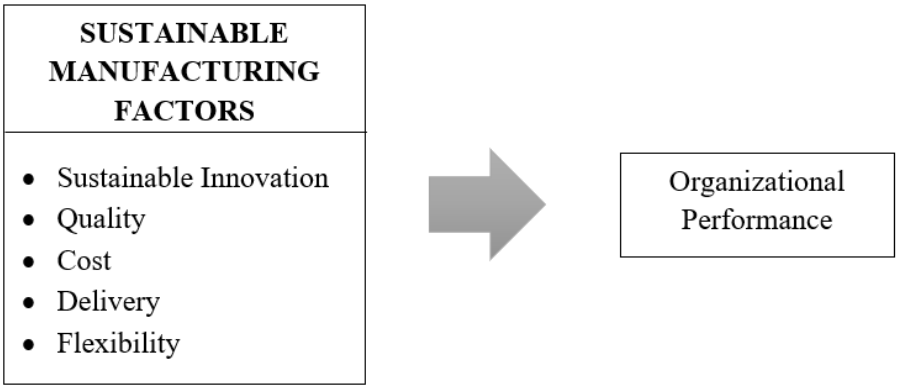

Figure 1. Conceptual Framework

Table 1 presents the proposed measurement items and their origins for the study, drawing upon prior research sources such as Ahuja and Khamba (2008), Vachon and Klassen (2008), Ramayah (2011), and Calik and Bardudeen (2021). The chosen measurement items encompass vital constructs, including organizational performance, sustainable innovation, quality, cost, delivery, and flexibility. A five-point Likert scale, ranging from 1 = "strongly disagree" to 5 = "strongly agree," is utilized for all variables.

Table 1. Measurement items and source

Code	Question	Source
Organizational Performance		
OP1	Number of complaints	Ramayah (2011)
OP2	Return on investment	
OP3	Financial performance	
OP4	Sales growth	
OP5	Productivity	
OP6	Customer Satisfaction	
OP7	Employee satisfaction	
Sustainable Innovation		
SI1	Over the past three years, my company has consistently increased expenditure for process innovations that provide environmental and social benefits.	Calik & Bardudeen (2021)
SI2	Over the past three years, my company has improved its manufacturing processes effectively to reduce the use of raw materials.	
SI3	Our manufacturing processes effectively reduce the emission of hazardous substances or waste more than those of our competitors.	
SI4	Over the past three years, my company has actively improved its manufacturing process capability to reuse and remanufacture components.	
SI5		

	Over the past three years, my company has actively designed and improved our production process to reduce rates of injury, occupational diseases, and work-related fatalities.	
Quality		
Q1	My company has improved manufacturing quality.	
Q2	My company has improved customer order compliance.	
Q3	My company has reduced in total process defects and rejections.	Ahuja & Khamba (2008)
Q4	My company has reduced in total process defects and rejections.	
Cost		
C1	My company has reduced in additional capital investments required.	
C2	My company has reduced operating costs.	Ahuja & Khamba (2008)
C3	My company has reduced energy consumption and overhead expenditure.	
Delivery		
D1	My company has promptness in solving customer complaints.	
D2	My company has ordered fulfillment speed.	Vachon & Klassen (2008)
D3	My company has manufactured throughout time.	
D4	My company has met delivery due time.	
Flexibility		
F1	My company can change the delivery date.	
F2	My company can change output volume.	Vachon & Klassen (2008)
F3	My company can change the product mix.	

CONCLUSION

This study investigates the influence of sustainable manufacturing factors, including sustainable innovation, quality, cost, delivery, and flexibility, on organizational performance within Malaysia's manufacturing sector. By providing a comprehensive set of measurement instruments, the research enables manufacturing companies in Malaysia to evaluate the effectiveness of their sustainable manufacturing practices and their impact on organizational performance. The conceptual framework proposed in the study advances the understanding of sustainable manufacturing in Malaysia and serves as a foundation for future research. It offers valuable insights for policymakers and manufacturing companies in Malaysia, guiding efforts to promote sustainable manufacturing practices and improve organizational performance. However, the study's limitation as primarily conceptual, lacking empirical validation, underscores the need for further research to confirm the relevance of these variables in predicting organizational performance. Future studies could explore additional factors and employ mixed-methods approaches to provide a more comprehensive understanding of sustainable manufacturing practices' impact on organizational performance.

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