

Sustainable Business Practices and Firm Competitiveness: A Conceptual Review of the Strategic Role of Green Compliance in Malaysia's Electrical and Electronics Industry

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ABSTRACT: The increasing adoption of Industry 4.0 technologies has transformed the way manufacturing organizations manage their supply chain operations, creating new opportunities for enhanced efficiency, collaboration, and competitiveness. In Malaysia, the metal industry serves as a critical contributor to industrial development and economic growth, yet it faces numerous challenges, including supply chain disruptions, rising operational costs, and intensified global competition. Digital Supply Chain Integration (DSCI) has emerged as a strategic approach that enables firms to improve information sharing, process coordination, and real-time decision-making across supply chain networks. However, despite substantial investments in digital technologies, the extent to which DSCI contributes to organizational performance remains a subject of ongoing debate in the literature. This conceptual review examines the relationship between DSCI and organizational performance, emphasizing the role of technological capability as a critical organizational mechanism. Drawing on the Resource-Based View (RBV) and Dynamic Capability Theory (DCT), the paper synthesizes existing studies to develop a conceptual framework that explains how technological capability facilitates the effective utilization of digital supply chain initiatives and enhances organizational outcomes. The review proposes that technological capability, encompassing technology infrastructure, digital competencies, technological knowledge, and innovation capability, mediates the relationship between DSCI and organizational performance. By focusing on the Malaysian metal industry, this paper contributes to the growing discourse on digital transformation in emerging economies and provides valuable insights for managers, policymakers, and researchers seeking to strengthen organizational competitiveness through digital supply chain integration. The paper concludes by identifying research gaps and proposing directions for future empirical investigations.

KEYWORDS : *Digital Transformation, Supply Chain Management, Manufacturing Industry, Malaysian Metal Industry*

I. INTRODUCTION

In the contemporary landscape of Malaysian metal industries, the digital supply chain's integration is paramount to enhancing organizational performance. This integration, influenced significantly by technological capability, facilitates improved communication and streamlined processes, allowing companies to respond adeptly to market demands. Building upon the framework established by recent studies, such as those examining Industry 4.0 applications, it becomes evident that harnessing digital technologies can bolster supply chain performance through better visibility and innovation processes (Khan T et al., 2025). Furthermore, as the challenges of digital transformation manifest, understanding the role of technological capabilities becomes essential for firms aiming to achieve competitive advantage (T Khan et al., 2025). This conceptual review aims to explore these phenomena further, emphasizing the multifaceted benefits that arise from integrating advanced technologies within supply chains. To contextualize these dynamics, the image depicting 'Industry 4.0' and its components offers a compelling visual representation of the technological landscape shaping these developments.

II. BACKGROUND AND SIGNIFICANCE OF DIGITAL SUPPLY CHAIN INTEGRATION IN MALAYSIAN METAL INDUSTRIES

The integration of digital technologies across supply chains in the Malaysian metal industries is quintessential to enhancing operational performance and ensuring sustainable growth. By adopting Industry 4.0 principles, metal manufacturers can achieve greater efficiency through real-time data sharing and streamlined

processes, which facilitates faster decision-making and reduced lead times. Research indicates that digital supply chain integration significantly enhances overall supply chain performance, fostering innovation and improving visibility, especially for small and medium-sized enterprises (SMEs) in the sector. These shifts not only improve responsiveness to market demands but also enhance competitiveness in a globalized economy (Khan T et al., 2025). Furthermore, the adoption of e-procurement technologies demonstrates the Malaysian government's commitment to leveraging digital capabilities to optimize manufacturing operations (Lee KL et al., 2024). Coupled with a comprehensive understanding of technological advancements and their applications in logistics, companies can navigate the complexities of the market more effectively, underscoring the critical role of digital supply chain integration.

III. DIGITAL SUPPLY CHAIN INTEGRATION IN MALAYSIAN METAL INDUSTRIES

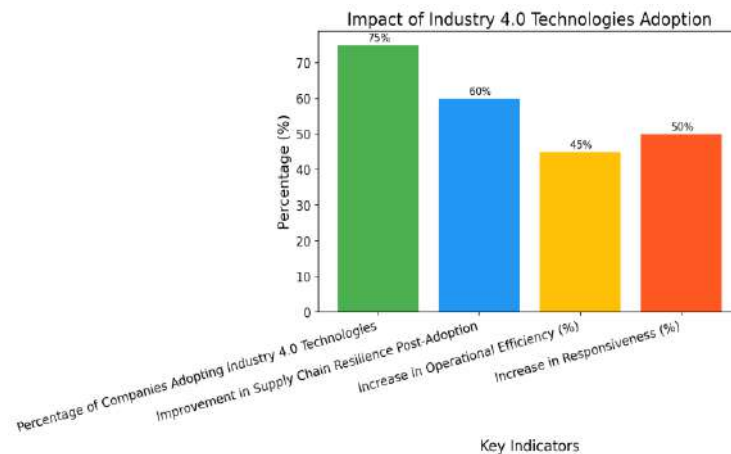
Digital supply chain integration in Malaysian metal industries is increasingly recognized as a crucial factor for enhancing operational efficiency and competitive advantage. The integration of digital technologies facilitates real-time communication and data sharing among supply chain partners, promoting transparency and responsiveness. This transformation aligns with findings indicating that Industry 4.0 significantly improves supply chain performance through enhanced digital supply chain integration, fostering innovation and visibility within the sector (Khan T et al., 2025). Moreover, the impact of digital capability on supply chain performance is especially pronounced in smaller enterprises, emphasizing the need for tailored technological solutions to capitalize on digital transformation (Jing H et al., 2024). Additionally, it has been observed that the Malaysian government's commitment to e-procurement systems further supports these integrations, as evidenced by the positive correlations between digital adoption and operational outcomes in manufacturing (Lee KL et al., 2024). The potential of digital supply chain integration is visually encapsulated in the concept of 'Industry 4.0' showcased in , illustrating the interconnections of these advancements.

The integration of digital technologies within supply chain management, particularly in the Malaysian metal industries, is significantly driven by key components such as the Internet of Things (IoT), big data analytics, and automation technologies. These advancements facilitate enhanced visibility and real-time communication across supply chains, thereby reducing inefficiencies and allowing for more informed decision-making. For instance, adopting Industry 4.0 technologies not only strengthens digital supply chain integration but also fosters innovation, as seen in the findings that highlight improved overall supply chain performance through these digital tools (Khan T et al., 2025), (T Khan et al., 2025). Furthermore, the role of digital capabilities in promoting supply chain innovation has been underscored, illustrating their critical function in transforming operational processes and enhancing competitiveness in emerging markets (Anggraeni LP et al., 2024), (Jing H et al., 2024). This transition is visually encapsulated in , which outlines the interconnected components of Industry 4.0 crucial for driving these advancements.

Technology	Impact on Supply Chain
Artificial Intelligence	Improves operational efficiency
Blockchain	Enhances transparency and traceability
Internet of Things (IoT)	Enables real-time tracking and inventory management
Automation	Reduces reliance on manual labor
Predictive Analytic	Optimizes demand forecasting

IV. TECHNOLOGICAL CAPABILITY AND ITS IMPACT ON ORGANIZATIONAL PERFORMANCE

Technological capability serves as a crucial determinant of organizational performance, particularly in the context of digital supply chain integration. The successful adoption of advanced technologies within supply chains can lead to significant enhancements in operational efficiency and responsiveness. For instance, the integration of Industry 4.0 technologies has been shown to improve digital supply chain integration by facilitating real-time communication and reducing process fragmentation, which ultimately contributes to superior supply chain performance (Khan T et al., 2025). Additionally, the role of digital transformation in influencing supply chain performance through enhanced supply chain integration highlights the importance of technological capability in contemporary manufacturing practices (Jing H et al., 2024). Moreover, as firms increasingly leverage digital innovation, the ability to effectively implement these technologies becomes a pivotal factor in driving innovation and competitive advantages (Anggraeni LP et al., 2024). Collectively, these findings underline the necessity for Malaysian metal industries to focus on developing robust technological capabilities to sustain organizational performance in a rapidly evolving digital landscape (Lee KL et al., 2024).

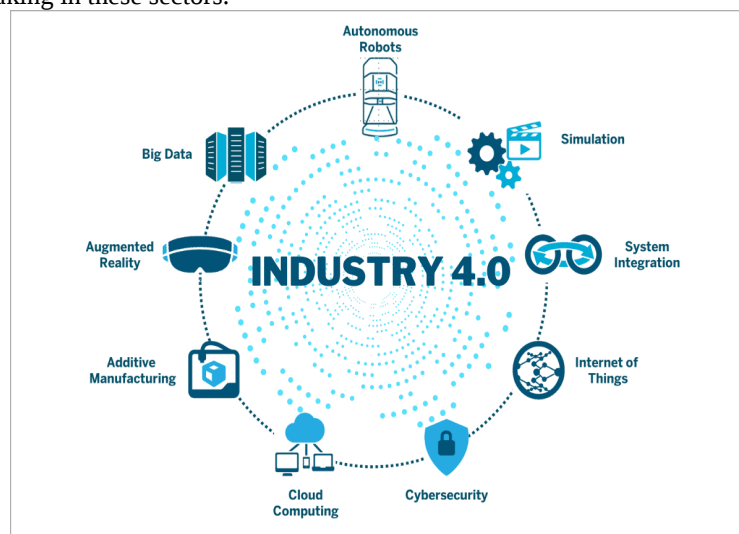


V. ROLE OF TECHNOLOGICAL CAPABILITY IN ENHANCING EFFICIENCY AND COMPETITIVENESS

Technological capability serves as a critical driver of efficiency and competitiveness within the context of supply chain integration. In environments characterized by rapid technological advancement, organizations that leverage these capabilities can enhance their operational performance significantly. For instance, businesses incorporating digital transformation are noted to improve supply chain efficiency through improved governance and competitive positioning (He J et al., 2024). This technological integration facilitates a more agile response to market demands, thereby enhancing overall competitiveness. Notably, small and medium-sized enterprises, in particular, benefit from this digital transformation, achieving greater efficiency than their larger counterparts (Jing H et al., 2024). Furthermore, the enhancement of supply chain innovation through digital capabilities supports operational excellence, ensuring that firms are better positioned in a competitive landscape (Anggraeni LP et al., 2024). The interconnected elements of Industry 4.0, highlighted in , further underscore the importance of embracing technological advancements to maintain market leadership.

VI. SUMMARY OF FINDINGS AND IMPLICATIONS FOR FUTURE RESEARCH AND INDUSTRY PRACTICE

The findings presented suggest that the integration of digital technologies within supply chains significantly enhances organizational performance, particularly in the Malaysian metal industries. Specifically, Industry 4.0 adoption has been shown to improve key mediating factors such as digital supply chain integration, supply chain innovation, and supply chain visibility, highlighting their collective impact on supply chain efficiency and responsiveness (T Khan et al., 2025) (Khan T et al., 2025). Future research should explore the implications of these findings by examining various contextual factors, such as firm size and industry type, as digital capabilities manifest differently across organizations (Jing H et al., 2024). Additionally, the potential of visual tools, exemplified by , can aid in comprehensively understanding these integrations and facilitating strategic decision-making in these sectors.



VII. CONCLUSION

In conclusion, the integration of digital supply chain practices markedly influences organizational performance within the Malaysian metal industries. This review highlights how technological capabilities facilitate enhanced efficiency and innovation, ultimately driving competitiveness in a challenging market. As seen in studies, such as those indicating that digital transformation can significantly improve supply chain results while emphasizing the roles of supply chain integration and agility, organizations that leverage these capabilities are better positioned for success (Jing H et al., 2024) (Zhou F et al., 2024). Furthermore, the evidence surrounding the role of e-procurement and digital technology reinforces the necessity for Malaysian firms to adapt their processes to remain viable (Lee KL et al., 2024). Consequently, embracing digital tools is no longer optional but imperative for sustaining operational excellence and achieving strategic objectives, as illustrated by , which encapsulates the transformative power of Industry 4.0.

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