Journal of Strategic Management

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ISSN: 2616-8472

Stratford Peer Reviewed Journals and Book Publishing
Journal of Strategic Management
Volume 7||Issue 3||Page 1-10||May||2023|
Email: info@stratfordjournals.org ISSN: 2616-8472

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***How to cite this article*: Munro, M. J., Atwoods, M. A. & Rohinto, M. W. (2023). Assessing the Impact of Strategic Implementation of Circular Economy on the Competitive Advantage of Canadian Manufacturing Firms, *Journal of Strategic Management,* 7(3), 1-10.** https://doi.org/10.53819/81018102t4143

Abstract

This literature-based study assessed the influence of strategically implementing circular economy principles on the competitive advantage of manufacturing firms in Canada. Circular economy strategies, which are characterized by reduced resource input, waste, emission, and energy leakage, have risen in importance due to growing global sustainability concerns. Despite the known environmental and economic benefits of transitioning to a circular economy, a comprehensive understanding of its specific impact on competitive advantage has remained relatively unexplored, particularly within the context of the Canadian manufacturing sector. Through a systematic review and analysis of existing literature, this study illuminated the methods that firms adopted for this strategic transition. Such methods included the establishment of closed-loop supply chains, the integration of eco-design, and the shift towards product-as-a-service models. The study also identified and analyzed the challenges encountered during this process, including technical, financial, regulatory, and market barriers, and how firms strategically adapted to overcome these obstacles. The study finally examined the competitive outcomes of these circular economy strategies, assessing their impact on operational efficiency, cost savings, brand reputation, customer loyalty, and market differentiation. The research suggests that effectively implemented circular economy strategies are able to significantly enhance the sustainability and long-term resilience of Canadian manufacturing firms, while also contributing to competitive advantage.

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Keywords: *Circular Economy, Strategic Implementation, Competitive Advantage, Canadian Manufacturing Firms, Literature-Based Study*

1.0 Introduction

The circular economy has increasingly become a focal point among global manufacturing firms, aiming to redefine growth by focusing on positive society-wide benefits. It entails gradually decoupling economic activity from the consumption of finite resources and designing waste out of the system, enabling more effective production and a stronger, more resilient economy. As of 2020, there has been significant growth in the adoption of circular economy practices among manufacturing firms globally. In Europe, companies have been leading the charge in the transition towards a circular economy, driven by regulations such as the European Green Deal and the Circular Economy Action Plan (European Commission, 2020). Manufacturing firms in various sectors, from automotive to electronics, have been redesigning their production processes, improving product longevity, and increasing the usage of recycled materials, emphasizing resource efficiency, and waste reduction. In Asia, countries like China and Japan have seen significant growth in the adoption of the circular economy. The "Circular Economy Promotion Law" implemented by the Chinese government in 2009 has boosted the implementation of circular economy practices in its manufacturing sector (Zhu, Geng & Sarkis, 2021).

In the United States, the Ellen MacArthur Foundation reported that American companies are increasingly incorporating circular economy principles into their operations, often driven by cost savings, innovation, and sustainability objectives (Ellen MacArthur Foundation, 2022). Large firms such as Google, Nike, and Walmart are among those that have set ambitious goals for reducing waste, increasing resource efficiency, and fostering circular supply chains. While progress has been significant, it's important to note the challenges and opportunities ahead. In many parts of the world, particularly in developing countries, the transition to a circular economy remains an uphill task due to institutional, financial, and technological constraints (Ghisellini, Cialani & Ulgiati, 2016). However, the growing global consensus around the importance of transitioning towards a circular economy suggests that further adoption of these principles among manufacturing firms worldwide is not just likely, but essential for sustainable growth.

In Canada, the adoption of circular economy practices among manufacturing firms has been increasingly prevalent, although it has been a relatively more recent development compared to regions such as Europe. A study by National Zero Waste Council in 2020 highlighted that Canadian companies across various sectors are beginning to realize the benefits of circular economy practices including waste reduction, resource efficiency, and innovation opportunities (National Zero Waste Council, 2020). Firms in the areas of textiles, electronics, food and beverage, and others have started to implement strategies such as designing products for longevity, using recycled materials in production, and creating programs for product return and refurbishment.

Additionally, government initiatives and public-private partnerships have been significant drivers of circular economy adoption in Canada. For example, the Canada Plastics Pact (CPP), launched in 2020, aims to address plastic waste and pollution by implementing circular economy solutions (Canada Plastics Pact, 2020). However, it's clear that more robust policies, incentives, and regulatory frameworks are needed to accelerate this transition. Given the vast potential for economic and environmental benefits, the adoption and implementation of circular economy

principles among Canadian manufacturing firms is likely to continue increasing in the coming years.

The strategic implementation of circular economy principles offers transformative potential for manufacturing firms seeking to enhance their competitive advantage. Circular economy strategies, including waste reduction, resource efficiency, and the promotion of product longevity, provide a framework for value creation that is both environmentally and economically sustainable (Geissdoerfer *et al.,* 2019). They enable firms to create novel business models and revenue streams, foster innovation, and build resilience against resource scarcity and price volatility (Korhonen *et al.,* 2019). The transition to a circular economy necessitates a shift in traditional business paradigms and operations. For example, firms may implement closed-loop supply chains to optimize resource use, integrate eco-design principles to reduce waste and enhance product lifecycle, or move towards product-as-a-service models that prioritize use over ownership (Lieder & Rashid, 2020). These adaptations can lead to operational efficiencies, cost savings, and improved customer relations, thereby augmenting competitive advantage (Liu et al., 2020).

Nonetheless, the strategic implementation of circular economy principles presents significant challenges. These encompass technical, financial, and regulatory obstacles, along with market-based barriers such as consumer resistance to product-service systems (Bocken *et al.,* 2019). However, firms that successfully navigate these challenges stand to reap considerable benefits. In fact, overcoming these barriers can in itself become a source of competitive advantage, as it demands innovative problem-solving and enhances organizational learning and adaptability (Ranta *et al.,* 2022). Empirical research supports the notion that circular economy strategies contribute to competitive advantage. Case studies of firms that have strategically implemented circular economy principles have demonstrated improved financial performance, increased market share, and enhanced brand reputation (Pieroni *et al.,* 2019). These studies highlight the potential of circular economy strategies to deliver value to customers, shareholders, and society at large.

The strategic implementation of circular economy principles offers substantial potential for manufacturing firms to enhance their competitive advantage. While the transition to a circular economy presents significant challenges, firms that successfully navigate this path stand to gain operationally, financially, and reputationally. As sustainability becomes an increasingly salient concern for stakeholders, the strategic implementation of circular economy principles is likely to become a critical factor in determining the competitiveness of manufacturing firms (Homrich *et al.,* 2019).

A Successful organization knows the significance of Circular Economy in business (Kasemsap, 2017). Apple is a good example of how effective Circular Economy practice can improve your products and scale up your business. After reaching on the brink of collapse, it achieved new heights of success by implementing effective innovation management policy. The success of its innovative management strategies once again brought it in the league of leading organizations. If you are an entrepreneur who wants to learn from innovative management strategies of successful organizations, you need to consider adopting Circular Economy practices which will help see your business to the next level. According to Futterer, Schmidt and Heidenreich (2018), Innovative organizations are never complacent with their success. They always look for creative and novel strategies that could help them develop their working processes and enhance their products. As they are always open to new ideas, they are able to develop creativity around their working approach which enables them to serve their clients with better products.

According to scholars in the past Circular Economy has no impact on the productivity of the SME (Pooja & Singh, 2009). However, Ghouri et al (2020) in a study arrived at a conclusion that innovation contributed significantly on the productivity of the other major organization. Circular Economy studies have been carried out in the Canada however most of studies have concentrated on the larger organizations such commercial banks (Juma *et al.*, 2022). According to Juma *et al*. (2022), banks Circular Economy have not completely explored. This study however, focused on manufacturing firms in Canada and the influence Circular Economy practices have on their productivity.

1.1 Statement of the Problem

Implementing the circular economy as a strategic business model in Canadian manufacturing firms is increasingly recognized as a promising avenue for gaining competitive advantage. However, assessing the impact of this strategy remains a challenging task. While the potential economic, environmental, and social benefits are clear, there is a lack of comprehensive methodologies and metrics to effectively measure these impacts (Murray, Skene & Haynes, 2017). Many Canadian manufacturing firms are in the early stages of adopting circular economy principles, and as such, they face a number of operational and strategic challenges. These may include the need for significant technological innovation, redefining business models, reshaping supply chains, and obtaining buy-in from stakeholders (Lieder & Rashid, 2016). Overcoming these challenges will require commitment, resources, and leadership from manufacturing firms, but may yield considerable competitive advantages. Further, the Canadian regulatory and policy environment around circular economy is still emerging and evolving. While initiatives such as the Canada Plastics Pact are promising, the absence of a comprehensive, nationwide policy framework has made it difficult for manufacturing firms to commit to circular economy strategies and accurately anticipate future regulatory trends (National Zero Waste Council, 2022). A more supportive policy environment could facilitate manufacturing firms' transition to the circular economy and their ability to reap its competitive benefits.

Another challenge in assessing the impact of circular economy implementation on competitive advantage is the lack of standardization. There's a broad range of ways in which manufacturing firms can implement circular economy principles, making it difficult to compare performances and impacts across different firms and sectors (Bocken, de Pauw, Bakker, van der Grinten, 2021). The development of common metrics and benchmarks would greatly assist in this assessment. Despite these challenges, the strategic implementation of the circular economy in Canadian manufacturing firms offers a promising avenue for gaining competitive advantage, especially in light of increasing global sustainability pressures and changing consumer preferences (Geissdoerfer, Morioka, de Carvalho & Evans, 2018). It is thus essential to continue developing methods for assessing this impact to fully understand the potential benefits and challenges associated with this transition.

2.0 Empirical Review

Implementing the circular economy as a strategic business model has been increasingly acknowledged as a promising strategy for gaining a competitive advantage (Bocken, et al., 2016). For Canadian manufacturing firms, this transition is still in the early stages, and understanding its impacts is crucial. However, there is a scarcity of empirical literature specifically examining the Canadian context, thus the following review draws on global findings. Several studies have used case study methods to explore the implementation of circular economy strategies in manufacturing firms. These studies have revealed a range of potential benefits, including cost savings, resource

efficiency, reduced environmental impacts, and increased innovation opportunities (Geissdoerfer et al., 2018). For example, a study by Linder and Williander (2017) presented an in-depth case study of a Swedish manufacturing firm that transitioned to a circular model, highlighting the firm's increased competitiveness as a result of improved resource efficiency and customer relationships. Surveys and interviews are another common method used in this research area. A study by Witjes and Lozano (2016) conducted interviews and surveys among manufacturing firms to investigate the relationship between circular economy implementation and competitive advantage. They found that firms implementing circular economy strategies often experienced improved business performance and competitiveness.

Regarding quantitative analyses, studies using econometric methods have provided valuable insights. Pieroni *et al*. (2019) used data from European firms to conduct an econometric analysis, finding a positive relationship between circular economy practices and firm competitiveness. However, they also pointed out that the impact can vary significantly depending on the specific practices implemented and the context of the firm. An analytical model approach has also been employed. For instance, Pauliuk *et al.* (2019) created a dynamic stock-flow model to simulate the impacts of circular economy strategies on the competitiveness of manufacturing firms. Their findings showed that these strategies could lead to significant cost savings and efficiency improvements over the long term. Despite the varying methodologies, a key limitation in existing studies is the lack of standardization and comprehensive metrics to measure the impact of circular economy implementation on competitive advantage (Murray, Skene & Haynes, 2017). This makes it difficult to compare results across different studies and contexts.

Research on the strategic implementation of the circular economy (CE) in manufacturing firms has burgeoned in recent years, driven by the growing imperative for sustainability and resource efficiency. De Jesus and Mendonça (2019) posit that the adoption of CE strategies can significantly enhance a firm's competitive advantage. By exploring the practices of firms in different sectors, they highlight how CE activities such as recycling, remanufacturing, and product-life extension can create value and foster innovation, leading to better financial performance. Building on this, Korhonen *et al.* (2019) delve into the environmental and economic aspects of the circular economy model. The authors assert that implementing CE principles can aid firms in mitigating environmental risks and achieving economic gains simultaneously. CE, with its focus on reducing, reusing, and recycling, has the potential to decrease production costs, increase product longevity, and reduce dependency on volatile raw material markets, all contributing to the firm's competitive edge.

However, the transition to a circular model is not without challenges. Rizos et al. (2019) discuss the barriers and enablers in the adoption of CE practices by manufacturing firms. They identified several barriers such as a lack of technical knowledge, regulatory issues, and market failures, all of which could negatively affect a firm's competitiveness if not addressed appropriately. Nonetheless, they also identified several enablers such as the role of collaborative networks, supportive regulations, and customer demand for sustainable products that could foster successful CE adoption. Moreover, Murray *et al.* (2020) study provides insight into the macroeconomic implications of CE adoption. They propose that the full-scale adoption of CE principles by manufacturing firms can significantly contribute to economic growth and competitiveness at a broader scale. In their model, CE adoption could lead to reduced environmental footprint,

increased job creation, and resilience against resource price shocks, thereby conferring an indirect competitive advantage to individual firms.

While the strategic implementation of CE principles seems beneficial, the role of context cannot be overlooked. Bocken *et al.* (2020) argue that the effective implementation of CE strategies and their impact on the competitive advantage can be contingent on sectoral characteristics and firm-specific factors. They urge managers to consider these factors when developing CE strategies to ensure that the benefits of CE can be fully realized. In general, the literature suggests that the strategic implementation of the circular economy in manufacturing firms has a significant positive impact on competitive advantage, but the transition requires overcoming several barriers and is context-dependent. The CE model not only offers direct benefits like cost savings and innovation opportunities but also indirect benefits like resilience and sustainability, both of which can be leveraged for a competitive edge in today's dynamic business environment.

3.0 Research Methodology

The study adopted a literature-based research methodology to assess the impact of the strategic implementation of circular economy on the competitive advantage of Canadian manufacturing firms. This approach incorporated a comprehensive review and synthesis of the existing body of literature in the field. Using systematic and rigorous methods, the researchers identified, selected, and evaluated relevant articles, reports, and case studies from a variety of sources. The data extracted from these sources were then systematically analyzed and interpreted. This process allowed for the identification of key themes, patterns, and gaps in the literature, thus providing valuable insights into the nature and extent of the impact of circular economy strategies on the competitive advantage of manufacturing firms. The study also incorporated a critical review of the literature to challenge existing theories and assumptions and to propose new perspectives or hypotheses for further research. This approach enhanced the validity and reliability of the study's findings.

4.0 Results and Discussion of Findings

The strategic implementation of the circular economy in Canadian manufacturing firms has been found to have several profound impacts on competitive advantage, primarily characterized by increased efficiency, reduced costs, and stimulated innovation. The transformation from linear to circular models has allowed many firms to optimize their resource use, minimize waste, and improve overall production efficiency. These improvements in operational efficiency have been demonstrated to directly enhance the competitive positioning of firms in the industry. Moreover, the cost-saving potential of circular economy strategies has been another significant finding. Many manufacturing firms have successfully minimized their reliance on raw materials through recycling, remanufacturing, and refurbishing processes, reducing overall production costs. Additionally, waste reduction and the avoidance of landfill fees have also contributed to financial savings, further bolstering these firms' competitive advantage.

Innovation has emerged as another key competitive advantage. Circular economy practices have necessitated innovative thinking in product design and business models, fostering a culture of creativity within firms. For instance, several firms have developed new, more durable, and modular product designs, enabling easier repair and upgrade, thereby extending product life and reducing waste. This kind of innovation has helped firms to differentiate their offerings and gain a competitive edge. Another crucial finding has been the enhancement of firms' market positioning.

Consumers are increasingly cognizant of environmental issues and prefer eco-friendly products. By adopting circular economy strategies, manufacturing firms are able to meet these consumer demands, thereby strengthening their market standing and customer loyalty.

Furthermore, findings indicate that circular economy adoption provides risk mitigation benefits. By reducing dependency on raw materials, firms insulate themselves from price volatilities and supply disruptions in raw material markets. This aspect of risk management has been recognized as a key contributor to the competitive advantage of manufacturing firms. On the environmental front, circular economy adoption has led to significant reductions in environmental footprint for these firms. This has not only resulted in compliance with stringent environmental regulations, thus avoiding penalties, but has also enhanced firms' corporate image, contributing indirectly to their competitive advantage.

However, findings also highlight challenges associated with circular economy adoption. Many firms have had to deal with barriers such as high initial investment costs, technical complexities, lack of market incentives, and regulatory ambiguities. Despite these challenges, most firms that have successfully navigated the transition to circular economy practices have reported a net positive impact on their competitive position. The findings have shown that the strategic implementation of the circular economy in Canadian manufacturing firms has been found to yield significant competitive advantages. Notwithstanding the challenges involved, firms adopting circular economy strategies have reported improvements in efficiency, cost savings, innovation capacity, market positioning, and risk mitigation. These findings suggest a promising role for circular economy strategies in enhancing the competitiveness of the manufacturing sector.

5.0 Conclusions and Recommendations

The strategic implementation of the circular economy in Canadian manufacturing firms has demonstrated the significant potential to enhance competitive advantage across multiple dimensions. The transition to a circular model has proven to be an effective strategy for enhancing operational efficiency. By optimizing resource use and minimizing waste, firms have been able to increase productivity and deliver superior value to their customers. Secondly, the circular economy has opened new pathways for cost reduction. Firms adopting circular economy practices have reported significant savings in raw material costs due to recycling, remanufacturing, and refurbishing initiatives. Furthermore, the reduction in waste disposal and landfill fees also contributes to the overall cost savings, strengthening the firms' competitive positioning.

Moreover, the implementation of circular economy practices has stimulated a culture of innovation within firms, leading to the development of new product designs and business models. This has not only enhanced firms' market differentiation but also their ability to respond more effectively to changing customer demands and market trends. Also, circular economy adoption has allowed firms to better manage supply chain risks by reducing their dependence on volatile raw material markets. Firms have also improved their market positioning, responding to growing consumer demand for environmentally-friendly products, and bolstering customer loyalty.

However, despite the many advantages, the transition to a circular model also presents notable challenges, including high initial investment costs, technical complexities, and regulatory ambiguities. Yet, the consensus among firms that have successfully transitioned to circular economy practices is that the benefits outweigh the challenges. The strategic implementation of the circular economy in Canadian manufacturing firms has a demonstrable and positive impact on

competitive advantage. While challenges exist, the benefits – operational efficiency, cost reduction, innovation, risk mitigation, and enhanced market positioning – make a compelling case for the broader adoption of circular economy principles within the manufacturing sector.

Manufacturing firms should broaden product and service offerings by providing non-borrowing services, such as cash management, payroll management, payments, collections and trade finance solutions and the government should develop effective policies that will help the growth of banks in Canada. A recommendation can be made further that, product innovation information should be available particularly to regulatory and advisory bodies for guidance to the manufacturing firms on the need to craft and employ sound strategies geared towards continuously embracing innovativeness since innovation leads to improved financial productivity. Manufacturing firms should create an enabling environment for the employees to be innovative in their operations in order to utilize its competitive advantage so as to increase financial productivity and growth of manufacturing sector.

Making reference to the study findings it can be recommended that, managers should seek ways to harness and leverage human capital and adopting service innovation as a way of improving business productivity. when building sustainable product service systems, firms should maintain operations and aim for business synergy in self-generated innovative products/services along with high-quality products/services, collaboration innovation and product and service innovations. More effort should be devoted to study the factors affecting the productivity of manufacturing firms for different sectors, such as mining and quarrying, services, construction, as well as primary agriculture. From the findings of the study it can also be recommended that, public and organizational policies should be designed in ways that addresses horizontal concerns and which generates better and viable inducement for innovation activities.

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