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Evolution and Future Prospects of Sustainable Supply Chain Management

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Abstract: *Purpose – This paper aims to systematically review the literature on sustainable supply chain management (SSCM) published in leading logistics and supply chain management journals over the past 20 years. Design/methodology/approach – A systematic literature review methodology is employed to minimize researcher bias while enhancing reliability and replicability. The study further strengthens its empirical validity by demonstrating high levels of inter-coder reliability across coding categories. Findings – The evolution of SSCM research has progressed from isolated studies on social and environmental aspects to a corporate social responsibility perspective and, more recently, toward an integrated sustainability approach based on the triple bottom line. This shift has led to the emergence of SSCM as a distinct theoretical framework. While SSCM research has grown in theoretical depth and methodological rigor, significant opportunities remain for advancing theory, refining methodologies, and enhancing managerial relevance. Research limitations/implications – The identified trends and research gaps provide a structured agenda to shape future SSCM studies. Practical implications – The current SSCM perspectives offer valuable insights for managers, helping them allocate resources effectively toward initiatives that balance environmental, social, and economic performance. Originality/value – This study delivers a systematic, methodologically robust, and comprehensive review of the empirical evolution of SSCM research over a 20-year period.*

Keywords: *Supply chain management, Economic sustainability, social responsibility, Environmental management, Economic performance.*

1. INTRODUCTION

Sustainability has become a widely discussed and influential concept in both the business world and society at large. It is nearly impossible to pass a newsstand without encountering headlines about alternative energy sources, climate change, or the now-iconic image of a polar bear stranded on a melting ice sheet. Several factors contribute to the growing focus on sustainability, including shifts in energy supply and demand, an improved scientific understanding of climate change, and increased transparency regarding organizations' environmental and social impacts. For managers, these issues are particularly relevant as stakeholders including customers, regulatory bodies, non-governmental organizations, and employees are increasingly expecting businesses to take responsibility for their environmental and social footprints. Supply chain managers, in particular, play a critical role in influencing both positive and negative sustainability outcomes. Decisions related to supplier selection and development, transportation modes, carrier choices, routing, facility locations, and packaging all have significant environmental and social implications. This paper aims to systematically review the evolution of sustainable supply chain management (SSCM) over the past two decades, identifying key trends, emerging consensus in research findings and methodologies, and gaps that present opportunities for future exploration. Additionally, we offer our own perspectives on the current state of the field and suggest directions for further research. The paper is structured as follows: The next section examines the evolution of SSCM research and management practices. Following that, we outline the systematic literature review methodology and explain how it was applied in this study. We then present our findings and discuss the research opportunities and managerial implications associated with each set of results.

2. LITERATURE REVIEW

The understanding and management of social and environmental issues in supply chain management have progressed through three distinct stages: standalone initiatives, corporate social responsibility (CSR), and ultimately, sustainability. This section explores this evolution. Early research on CSR and sustainability in supply chain management often took a fragmented approach, addressing topics such as environmental impact, diversity, human rights, philanthropy, and workplace safety in isolation. These studies rarely acknowledged the interconnections between these issues or their role as components of a broader, more integrated CSR and sustainability framework (Carter & Jennings, 2002). Similarly, supply chain managers historically implemented projects on a case-by-case basis, lacking a strategic, holistic perspective on how these initiatives contributed to their organization's overall sustainability goals. This narrow approach also limited opportunities for cross-learning— where lessons from one area, such as environmental initiatives, could have informed improvements in other areas like diversity and workplace safety (Carter, 2005). Carter and Jennings (2002) and Murphy and Poist (2002) were among the first scholars to frame these fragmented activities within a more comprehensive CSR perspective. Carter and Jennings (2002) integrated social responsibility concepts from management literature and applied Carroll's (1979, 1991) hierarchy of economic, legal, ethical, and discretionary responsibilities to categorize standalone supply chain activities as discretionary components of social responsibility. Murphy and Poist (2002) similarly positioned these activities within the broader CSR framework, emphasizing the need to balance social benefits with economic performance. They highlighted the importance of organizations striving to "seek socially beneficial results along with economically beneficial ones" (p. 23). Both studies underscored the necessity of addressing environmental and social concerns—such as diversity, philanthropy, human rights, and workplace safety—within the larger context of corporate social responsibility. Despite the inclusion of economic responsibility in various studies adopting a social responsibility framework, much of the existing literature on "logistics social responsibility" has focused primarily on the environmental and social aspects of CSR, often without directly considering economic performance. In practice, many managers have historically perceived social responsibility as an obligation rather than a strategy that could generate financial benefits (Walley & Whitehead, 1994). While this perception may be speculative, potential reasons for it include the limited integration of economic performance into social responsibility models, the lack of transparency in corporate management—especially in the pre-internet or early internet era—and the way the term "responsibility" was framed and interpreted by both managers and academics. Carter and Rogers (2008) took a conceptual theory-building approach to synthesize existing literature and incorporate complementary theoretical perspectives, introducing a framework for sustainability within supply chain management—referred to as SSCM (Figure 1). At the core of this framework is Elkington's (1998) triple bottom line, which emphasizes the intersection of environmental, social, and economic performance. This model offers a clear and effective way to define sustainability within an organizational context. Rather than encouraging companies to engage in social and environmental initiatives with the hope that they will support, or at least not harm, economic performance, the triple bottom line explicitly guides managers to prioritize activities that enhance economic outcomes while avoiding social and environmental initiatives that do no Carter and Rogers (2008) emphasize that sustainability, particularly in the context of SSCM, is not optional but essential. SSCM is centered on the long-term enhancement of an organization's economic performance and prompts managers to consider, "What must we do not just to survive, but to thrive—not just over the next year or five years, but over the next decade, two decades, and beyond?" This perspective provides a clear and actionable framework for managers seeking to integrate sustainability into their business strategy. Activities that align with the triple bottom line include cost savings achieved through reduced packaging and optimized design for reuse and recycling; lower health and safety expenses, along with decreased turnover and recruitment costs due to improved working conditions in warehousing and transportation; increased employee motivation and productivity, along with lower absenteeism, resulting from enhanced workplace conditions; and reduced costs, shorter lead times, higher product quality, and lower disposal costs driven by the adoption of ISO 14000 standards and sustainable design practices. Additionally, organizations can strengthen their reputation, making them more attractive to both customers and suppliers (Carter & Rogers, 2008, pp. 370- 371).

Strategic Alignment: Ensuring that individual SSCM initiatives are intentionally selected and aligned with the organization's broader sustainability strategy.
Risk Management: Implementing contingency plans to mitigate risks across both upstream and downstream supply chain operations.
Organizational Culture: Embedding sustainability into corporate values by fostering ethical business practices, corporate citizenship, and a commitment to environmental and social responsibility.
Transparency: Actively engaging with key stakeholders and ensuring traceability and visibility throughout the supply chain.

Carter and Rogers (2008, p. 368) define sustainability as "the strategic, transparent integration and achievement of an organization's social, environmental, and economic goals in the systemic coordination of key

interorganizational business processes for improving the long-term economic performance of the individual company and its supply chains."

3. METHODOLOGY

This electronic search complemented the manual review, ensuring comprehensive coverage of relevant studies. The keywords were refined based on insights gained from the manual review and included terms such as "sustainable supply chain management," "corporate social responsibility," "environmental sustainability," "social responsibility in supply chains," and "economic sustainability in logistics." The search was conducted across academic databases to capture additional relevant articles that may not have been identified in the initial manual review. To ensure consistency and reliability in article selection, a set of inclusion and exclusion criteria was applied. Articles were included if they were published in one of the seven selected journals, were empirical in nature, and focused on sustainability within supply chain management. Exclusions were made for studies that primarily addressed supply chain security, technical aspects of life cycle analysis, regulatory policies, macroeconomic or policy-level discussions, consumer safety issues, and research where sustainability was only a minor aspect of the study. The final dataset consisted of 121 articles that met the inclusion criteria. These articles were then coded and analyzed systematically. To enhance the validity of the review, an inter-coder reliability assessment was conducted, ensuring consistency in categorization and interpretation. This rigorous methodological approach aimed to provide transparency and replicability, reducing potential researcher bias and increasing the reliability of the findings. These keywords were also informed by insights from four industry professionals who participated in a conference call in early June 2010. For the electronic literature search, we utilized the EBSCO Business Source Complete database. "Abstract" fields, while restricting results to the seven selected journal titles in the "Publication Name" field. This process yielded an additional 11 papers, bringing the total number of initially identified articles to 130. Applying the predefined inclusion and exclusion criteria, we eliminated 50 papers, resulting in a final dataset of 80 articles for analysis. The primary reasons for exclusion were: A predominant focus on macroeconomic or public policy issues (e.g., Saltzman and Belzer, 2002) rather than the management of supply chains. His use of modelling-based methodologies (e.g., Sheu, 2008) instead of empirical research. He paper being an editorial (e.g., Jayaraman et al., 2007) or largely descriptive in nature (e.g., Enarsson, 1998). Basic bibliographic information—including author names, article titles, journal names, publication years, volume and issue numbers, and page numbers—was systematically recorded in a Microsoft Excel database. To ensure reliability, the second author independently check-coded a subset of the articles. Inter-coder reliability was calculated based on the proportion of total pairwise agreements between coders. This method is straightforward, minimizes the likelihood of spurious agreement due to the large number of classification categories (Rust and Coil, 1994), and maintains high accuracy due to the sample size (Kraemer, 1979). Given the extensive classification categories, the initial inter-coder agreement rate was comparable to Cornbrash's (1951) coefficient alpha (Perrault and Leigh, 1989). Agreement rates across categories ranged from 93.64% to 100.00%, with an average of 97.27%, significantly exceeding the recommended minimum threshold of 0.70. These high agreement rates indicate strong reliability and ensure the reliability of our data coding.

4. EVOLUTION AND FUTURE DIRECTIONS

Subject Focus:

Over the past two decades, research on supply chain management has predominantly focused on environmental concerns (refer to Section a of Table III). Environmental sustainability is a crucial element of the triple bottom line and has been widely discussed due to pressing issues such as climate change and escalating energy costs. In the early stages of sustainability research, the terms "sustainability" and "environment" were often used interchangeably by both scholars and industry practitioners. This misinterpretation is common when a new paradigm is introduced. However, as understanding has matured, there is now a more consistent and structured application of sustainability as an integrated concept encompassing environmental, social, and economic performance. In recent years, research has shifted from isolated environmental concerns to a more comprehensive perspective that incorporates corporate social responsibility (CSR) (which bridges environmental and social performance) or full-scale sustainability (which encompasses the entire triple bottom line). While no studies from 1991 to 2000 explicitly used CSR or sustainability as their primary framework, 18.75% of studies from 2001 to 2010 employed CSR as a conceptual foundation, and 25% utilized sustainability as the overarching perspective for their investigations.

5. INDUSTRY TRENDS

Unlike the distinct shifts observed in research focus, industry selection has shown less dramatic variation over the two decades. However, there has been a strong concentration on consumer product industries and the transportation sector (see Section B of Table III). Consumer product firms have been a frequent subject of study due to their close connection to consumers and their role as early adopters of environmental and social initiatives (Carter and Carter, 1998). Similarly, transportation companies have been a focal point due to their significant carbon footprint and the increased scrutiny they receive from stakeholders regarding safety and emissions. The majority of studies have analysed multiple industries rather than focusing on a single sector. While multi-industry studies, particularly those involving both manufacturing and service industries, help researchers generate sufficient sample sizes and enhance the generalizability of findings, they also present an opportunity for future research. There is a growing need for industry- specific investigations that can identify sustainability practices unique to each sector and explore how existing theoretical frameworks apply or fail to apply in different contexts. One promising area for future research is the study of service supply chains, defined as the procurement and distribution of services across both manufacturing and service-based industries (Sampson and spring, 2011). The sustainability dynamics of service supply chains likely differ from those of traditional manufacturing supply chains, making them an important subject for further investigation.

6. THE ORETICAL LENSES

A key observation from Section C of Table III is the historically limited use of theoretical frameworks in sustainability research. Over the entire study period, approximately 55% of articles did not apply any formal theory. However, there has been a notable shift toward theory-driven research in sustainable supply chain management (SSCM). In the 1991–2000 period, over 87% of studies lacked a theoretical foundation, but this figure dropped significantly to just over 33% in the 2001–2010 timeframe. Among the theories that have been utilized, stakeholder theory (Freeman, 1984) is the most commonly applied framework. It is followed by the resource-based view and its closely related counterpart, the natural resource-based view (Hart, 1995). Beyond these, a range of diverse theoretical perspectives have been incorporated into SSCM research. For example, dynamic capabilities theory has been used to examine how organizations gain a competitive edge in sustainable global supplier management (Reuter et al., 2010), brand equity theory has been applied to understand how sustainability drives competitive advantage (Flint and Golicic, 2009), and self- efficacy theory has been employed to predict safe employee behavior (Brown et al., 2000). This growing trend toward theoretical integration is a positive development, as it strengthens the rigor and depth of SSCM research, providing a more structured foundation for future investigations.

7. METHODOLOGY AND ANALYSIS

Validity

Validity is regarded as the cornerstone of empirical research. Without a thorough evaluation of validity, the credibility of research findings is questionable. Alarmingly, more than 42% of the reviewed papers did not address validity, while an additional 11.7% only partially considered empirical validity throughout the 1991–2010 period (Section D of Table III). However, similar to other trends observed in this study, there has been significant improvement over time in the methodological rigor of validity assessments. In the 1991–2000 period, fewer than 19% of studies rigorously evaluated validity, whereas this figure rose to over 64% in the 2001–2010 period. Looking ahead, researchers must ensure that their studies not only demonstrate reliability but also thoroughly assess multiple dimensions of validity relevant to their methodologies. These include content validity (ensuring the research measures what it intends to measure), convergent validity (confirming that different measures of the same concept are related), and discriminant validity (establishing that constructs that should be unrelated are, in fact, distinct).

8. SOCIAL DESIRABILITY BIAS

Where applicable, studies were categorized based on whether they accounted for social desirability bias—the tendencies of respondents to provide answers they believe are socially acceptable or favourable to the researcher (Crowne and Marlowe, 1960). Across the full study period, only 15.4% of relevant articles addressed this bias (Section E of Table III). Encouragingly, there was notable progress in later years; the proportion of studies addressing social desirability bias increased from a mere 3.45% in the 1991–2000 periods to 25% in the 2001–2010 period. Despite this progress, a significant number of studies still fail to consider or discuss the limitations posed by social desirability bias. While practical constraints may limit the assessment of this bias in certain research designs—such as ethnographic studies or specific case study methodologies— future research, particularly those employing surveys or laboratory experiments, could incorporate abbreviated versions of the Crowne-Marlowe Social Desirability Scale (Carter and Jennings, 2004) to mitigate and measure its impact.

9. CONCLUSION

Many of the patterns observed in our analysis likely reflect a broader movement toward conducting more rigorous research within the field of supply chain management. However, these detailed analyses and the trends they reveal underscore numerous promising research opportunities in the area of Sustainable Supply Chain Management (SSCM). As emphasized in the introduction, SSCM is not merely a passing trend but a fundamental shift in the way businesses operate. The comprehensive nature of sustainability, along with its critical intersections with supply chain management, suggests that sustainability is now an essential requirement for conducting business in the twenty-first century. Supply chain management plays a central role in this transformation. Through this systematic review of the literature, combined with our own insights and experiences, we aim to provide meaningful direction for future research in this vital and strategic area of supply chain management.

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