Analysis of Sustainable Supply Chain Research: Future Research and Themes

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Abstract

A sampling of literature reviews from the last three years (2019-through present) representing over 3700 articles on Sustainable Supply Chain Management, is presented and discussed. General groupings in this area include: General Sustainable Supply Chain Management and Evolution; Global and Emerging Economies; Corporate Sustainability, Governance and Performance Metrics; Social Sustainable Supply Chains; Operations and Supply Chains; Technology (Industry 4.0) & Big Data; and Accounting. This review highlights key scholarly results, gaps and future research, particularly with respect to the social sustainability, multi-tier integration, performance measures, development of a grand theory and the need to involve practitioners.

Keywords: Sustainable Supply Chain Management, Literature Review, Future Research
Introduction

Every supply chain member must consider its sustainable practices (Touboulic & Walker, 2015). Sustainability integration is one of the most relevant topics in operations management as it is not limited to just a single member, but it occurs across the entire supply chain and involves all stakeholders (Jabbour & de Sousa Jabbour, 2016). However, as recently as 2019, researchers reported that there was very little discussion on how to implement sustainability principles as there is little guidance available in the extant literature on utilizing results (Bhanot et al., 2019). Where does sustainable supply chain management research ‘stand’ today? What do we, as academics, need to put our efforts into so we can assist businesses?

To begin, several researchers analyzed the progression of definitions of Sustainable Supply Chain Management (SSCM) (Ahi & Searcy, 2013; Bhanot et al., 2019; Panigrahi, Bahinipati & Jain, 2019; Sanchez-Flores et al., 2020). Two of the more commonly cited definitions are as follows:

SSCM is “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 (Carter & Rogers, 2008).”

SSCM is “the creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, compet-
Both definitions include the Triple Bottom Line (economic, social and environmental) as critical elements in SSCM. Balancing all three elements is complex and difficult. From an academic perspective, the different definitions for SSCM prove that there is a range of various constructs that have been adopted by researchers in this field as it evolves (Panigrahi et al., 2019).

While SSCM is an evolving field, SSCM research continues to evolve in terms of theory and methodological rigor (Carter et al., 2020). Literature reviews provide academic insight into existing knowledge as well as to specify research questions to develop new knowledge (Tranfield et al., 2003). Methods to develop literature reviews include traditional, systematic and structured literature reviews. Traditional literature reviews rely on the expertise of the authors. By definition, a systematic literature review is reproducible, transparent and systematic, and as a result, it identifies relevant research areas and analyzes key research gaps for future research (Tranfield et al., 2003). A systematic review is a process that minimizes research bias and as a result provides different defensible outcomes via defined rules (Tranfield, et al., 2003). While several different procedures have been reported (Dumay et al., 2015; Massaro et al., 2016; Tranfield et al., 2003), in general, a systematic literature review has four main stages: planning, conducting, analysis and reporting (Tranfield et al., 2003). Regardless of the specific process steps, a systematic review follows a logical structure and precise plan with specific steps, while ensuring validity and reliability to limit researcher bias. A systematic literature review typically involves screening for particular words or methods. Additional methods used in systematic literature reviews include snowballing and extraction. Snowballing involves identifying and selecting other papers that were cited in the articles selected through the databases. Extraction involves using a specific detailed outline of the existing body of literature to assist in analysis of recent research.
trends (Tranfield et al., 2003). A structured literature review involves a structured content analysis that systematically evaluates the themes of publications (Koberg & Longoni, 2019). Structured literature reviews produce comprehensive literature reviews as the publications are analyzed through a rule-governed method, which enhances its reproducibility (Koberg & Longoni, 2019). Bibliometrics is a process that can objectively and systematically identify the number of various characteristics in literature, explore literature distribution patterns, and as a result, describe and evaluate the current scientific research status and developments in the particular research field (Zhang et al., 2021). Bibliometrics analyzes the relationship between keywords and paper citations, and as a result, provides researchers with scientific and reliable research information (Feng et al., 2017). Bibliometrics evaluates the influence of a particular dimension in the research field, and typically it involves five steps: determining search conditions, preliminary search results, improved search results, preliminary data statistics and data analysis (Fahimnia et al., 2015).

Literature reviews form the background for ‘good’ research. In introducing the various types, our purpose in this article is not to analyze the advantages or disadvantages of one method over another, but rather to give context to the rigor and thoroughness of the research on which this article is built. SSCM is a growing operations field that is significantly important to businesses around the world. Scholars have been researching this area for over thirty years. With this in mind, our objective in this article is to summarize the current recommendations for future research in SSCM based upon the thorough, systematic, structured work of others.

**Method**

To analyze the current state of SSCM research and future research requirements, the following method was used. First, an online library search using ProQuest, with the keywords of ‘sustainable supply chain management’ and ‘literature review’ in the Abstract for the last 3 years
(2019-present) was performed. Then, the list was reduced to seventeen usable articles based on verification of these terms and timing. These papers were then reviewed, noting the critical aspects to the literature review – author, year published, title, journal, context of article, literature review method (systematic, structured, general or bibliometric), databases (and key journals noted), years literature review covered, number of articles reviewed, key research questions and/or objective, search keywords, and content groupings. Information specific to the literature review is summarized in Appendix Table 1. Additionally, the key results, gaps and future research areas to each of these articles were recorded. A thorough reading and review of the key concepts of each article as summarized in Appendix Table 1 led to grouping the research into several areas. By grouping in this manner, it led to uncovering several themes in SSCM. As a result, this paper represents the summation of over 3700 articles.

Two key points to note regarding the literature reviews performed and analyzed. First, researchers reported that 65% of the papers (for the systematic, structured, and general literature reviews) did not employ any theoretical lens in their studies (Carter et al., 2020), which was also noted in prior literature reviews (Zorzini et al., 2015). Typical theories used include stakeholder theory, institutional theory, resource-based view, resource dependency theory, transaction cost theory, supply chain sustainability theory, utility theory, organizational theory, social capital theory and agency theory (Carter et al., 2020). Some believe that when researchers do not use a theoretical lens, it reduces the authority and knowledge in that area. Using a lens may lead to more robust solutions. A second item to note is in their descriptive statistical analysis, some researchers used analysis tools, such as ‘Vosviewer’ or ‘Voyant Tools’. Vosviewer is an analysis tool that assists in creating scientific knowledge maps to clarify the relationships between knowledge units (Zhang et al., 2021). Voyant Tools develop patterns between value concepts in papers (Miller, 2018). This paper did not utilize a lens or software to analyze the research that is presented.
Future Research in SSCM: A Review

While focused on SSCM and literature reviews, the analysis was grouped by key concept into several areas: General SSCM and Evolution; Global & Emerging Economies; Corporate Sustainability, Governance and Performance Metrics; Social Sustainable Supply Chains; Operations and Supply Chains; Technology (Industry 4.0) and Big Data; and Accounting. We continue with research summaries and highlight gaps and future recommendations in each of these groups.

General SSCM & Evolution.
One recent literature review was very general (Khan et al., 2021), while the other continued to study the evolution of SSCM over 20 years (Carter et al., 2020). SSCM is moving beyond single supplier-buyer relationships toward the entire system (Khan et al., 2021). There is a strong acceptance of sustainability ideas in developed nations, while emerging nations are just starting to realize the importance and benefits of sustainable practices (Khan et al., 2021). Historically, substantial changes in industries SSCM did not occur between early years (2000-2010) and more recent years (2010-2018) (Carter et al., 2020). The historical review noted the continued need to research group-level phenomena within and across different functions (Carter et al., 2020). Most SSCM initiatives involve multiple functions (Carter et al., 2007; Wichmann et al., 2016).

While both of these general studies concentrated on developing the current status of research on SSCM, their recommendations for future research were very different. One group of researchers recommended further studies in:

- Analyzing SSCM in developing countries (Khan et al., 2021).
- Conducting systematic literature reviews on the macro-level (Khan et al., 2021).
- Conducting systematic literature reviews emphasizing the social context of sustainability (Khan et al., 2021).
While the other researchers recommended:

- Studying diversity, human rights, and working conditions in conjunction with other sustainability topics (Carter et al., 2020). For example, one could study the trade-offs between improving one pillar at the expense of another.

- Continuing to develop and refine ‘middle-range theory’ that will ultimately result in a grand theory of SSCM, or develop a taxonomy and typology (ex: taxonomy of interorganizational governance forms and their relationships with efficiency) (Carter et al., 2020).

- Creating a better understanding of how managers can make effective decisions surrounding SSCM (including comparison and contrast of initial theory development efforts) (Carter et al., 2020).

- Developing metrics to measure SSCM particularly across two or more organizations are at an early stage of development (Goldsby & Zinn, 2018). Researchers need to develop metrics for accumulated longitudinal data relating to the plant, firm and or supply chain levels (Carter et al., 2020).

Interestingly, other research, that is discussed below and that was published at a similar time, address many of these recommendations for future research, such as macro-level (Bhano et al., 2019; Gerner, 2019), social sustainability (Chiesa & Pzychodezen, 2020; Gagkang & Hendry, 2021; Govidan et al., 2021), trade-offs within SSCM (Matos et al., 2020), decision-making (Matos et al., 2020) and performance metrics (Bhanot et al., 2019; Panigrahi et al., 2019). Some researchers noted the need to differentiate between developing and emerging economies in SSCM (Sanchez-Flores et al., 2020). Our review did not uncover a ‘middle-range theory’ leading to a grand theory of SSCM or a taxonomy or typology. The literature review on trade-offs did not necessarily address diversity, human rights and working conditions highlighted by the evolution literature review (Carter et al., 2020). While previous research (Carter & Easton, 2011) recommended that researchers focus on specific industries to develop industry-specific measures and testing, this does not appear to have occurred (Carter et al., 2020). There are few studies that evaluate the
cross-functional interactions, particularly at the multi-level perspective and point to the need for future conceptual and methodological studies on macro studies (groups within firms within supply chains). These studies may look to answer such questions as (Carter et al., 2020): “How does group decision-making differ from individual decisions making for SSCM phenomena? Are there differences in group decision-making between SSCM and non-SSCM phenomena?”

Global and Emerging Economies
At a strategic, global level, two literature reviews focused on the complex issues associated with globalization and networks located in emerging economies. Specifically, one literature review focused on global supply chains and SSCM with an emphasis on focal firms or buyer-supplier dyads rather than multi-tier supply chains (Koberg & Longoni, 2019), and another focused on emerging economies and SSCM (Sanchez-Flores et al., 2020). With respect to the global review, two crucial elements of SSCM in global supply chains were uncovered: SSCM configurations and SSCM governance mechanisms (Koberg & Longoni, 2019). Studies focused on SSCM configurations investigate the network that comprises the global supply chain and the links between these members to manage sustainability (Parmigiani et al., 2011; Vurro et al., 2009). SSCM governance studies investigate the practices and initiatives used by focal firms to manage relationships with supply chain members and stakeholders with the objective of implementing and improving SSCM (Formentini & Taticchi, 2016; Sancha et al., 2016). Managers should consider SSCM more broadly, and not just as composed of assessment, but a strategic weapon that involves collaboration with suppliers (Koberg & Longoni, 2019). While noting an increase in the number of articles focused on the social aspects in emerging economies, research highlighted the need to focus on social issues in SSCM in developing countries (Sarkis et al., 2011). While practitioners and researchers are becoming increasingly aware of SSCM in emerging economies and while developing countries play a key role in global markets, SSCM is still ‘new’ to many members (Nayak et
al., 2019). Gaps in literature for emerging economies and SSCM include the need to investigate specific topics within SSCM, limited research on environmental aspects, and a lack of integration of the triple bottom line for emerging economies (Sanchez-Flores et al., 2020). Traditional SSCM practices used in developed countries cannot be directly used in emerging countries (Bendul et al., 2017).

These studies concentrated on searching for global, emerging and cultural aspects associated with SSCM, their recommendations for future research in this area specific to supplier collaborative initiatives, governance mechanisms and sustainability outcomes, and emerging countries. Specifically, the recommendations include:

Supplier Collaboration Initiatives:

- Considering other non-traditional members, such as government institutions, producer associations, chambers of commerce, social enterprises or non-profit financial organizations, and the impact on supplier collaboration initiatives due to SSCM configurations, opportunities and challenges (Koberg & Longoni, 2019).
- Exploring the implications of closed configurations on buyer and supplier sustainability outcomes (Koberg & Longoni, 2019).
- Exploring when and why focal firms engage in multi-stakeholder initiatives to manage supply chain sustainability, and the mechanisms through which participation in such initiatives facilitates collaboration (Koberg & Longoni, 2019).
- Investigating if indirect SSCM governance mechanisms can complement direct SSCM governance mechanisms (Koberg & Longoni, 2019).

Governance Mechanisms & Sustainability Outcomes:

- Researching buyer firm participation in multi-stakeholder initiatives (Koberg & Longoni, 2019).
- Investigating more complex supply chain approaches to governance mechanisms and sustainability (Koberg & Longoni, 2019).
Emerging Countries:

- Developing organizational performance metrics (Tseng et al., 2015).
- In-depth study of other processes, such as logistics, distribution and transportation in SSCM (Sanchez-Flores et al., 2020).
- In-depth study of customer service (Sanchez-Flores et al., 2020).
- Examining other emerging markets to eliminate the potential effect of country-level variance, such as market size, economic development and legal systems (Gomez-Luciano et al., 2018).
- Industry-specific empirical studies within the context of SSCM in emerging markets (Rajeev et al., 2017).
- Studying the social dimension of sustainability and its relationship with the economic and environmental dimensions in empirical studies and case studies is a new venue for future investigations in emerging economies (Sanchez-Flores et al., 2020).
- Segregating empirical research for emerging economies and developing countries due to intrinsic differences that may result in distinctive findings (Sanchez-Flores et al., 2020).
- Developing the perspectives of other supply chain members besides focal firm (Sanchez-Flores et al., 2020).

Interestingly, while these studies concentrate on two different aspects – global and emerging – in SSCM, both highlight the need for future research to address other processes and members in the supply chains. With respect to supplier collaboration, future studies can build on the work of Rodriguez et al. (2016), which suggests that achieving inter-organizational fit in third party configurations is key to the creation of social and economic value in the supply chain (Koberg & Longoni, 2019). Studies that were published at the same time, and noted below, address the governance issues highlighted in one literature review (Koberg & Longoni, 2019). Several researchers noted that SSCM studies on organizational performance metrics are needed (Carter et al., 2020; Sanchez-Flores et al., 2020). The emerging countries research highlights the need to study other functions in SSCM, such as logistics, distribution...
and transportation, and customer service in greater depth. In recent years, research that these researchers were unaware of researched these specific areas and the results are discussed below (Baliga et al., 2020; Bhanot et al., 2019; Mosteanu et al., 2020). The emerging countries research notes specific future research relative to ‘emerging countries’, such as industry-specific and segregation of developing versus emerging country research, is needed. Two literature reviews noted that future research to address the social aspects in SSCM is needed (Gugkang & Hendry, 2021; Sanchez-Flores et al., 2020).

**Corporate Sustainability, Governance and Performance Metrics**

One structured literature review highlighted the critical elements of government and performance metrics to SSCM (Panigrahi et al., 2019). Sustainable supply chain governance (SSCG) is a set of various practices, initiatives and activities implemented to strengthen relationships with the inter-organizational functions and departments and their supply chain members and stakeholders with due consideration to their sustainability goals (Formentini & Taticchi, 2016). A systematic literature review analyzed SSCM with performance measurement, corporate performance, logistics and human issues as content groupings (Bhanot et al., 2019). The ‘sustainable scenario’ can be strengthened through (1) innovating policy implementation issues in logistics leading to sustainable transportation systems, (2) devising suitable policies and practices that enabled the production systems to perform efficiently with respect to the triple bottom line, (3) developing approaches and aggregating measures within and across each of the dimensions towards an industry-wide framework, and (4) an emphasis on the role of social and behavioral sciences toward identifying conditions for ensuring policy effectiveness and achieving desired objectives (Bhanot et al., 2019). Researchers concluded that social sustainability can be the mainstay of a theoretical framework, and if properly governed, social sustainability can lead to proper utilization of available resources, resulting in financial and environmental
sustainability (Bhanot et al., 2019). Other researchers developed a life-cycle assessment (LCA) framework through the literature review to strengthen corporate sustainability through embracing cultural aspects of different organizations towards a framework that included this critical aspect, culture, as a fourth pillar for SSCM implementation and provided guidelines for implementation at the operational level (Gerner, 2019). Integrating culture into corporate sustainability should be centered on supply chains, include other functions, such as logistics and distribution in global sourcing, and address cultural heterogeneity particularly with respect to international sales and operations planning (Gerner, 2019). The LCA with culture framework highlights the need to develop a strategic management approach that includes the value-added business segments and relevant sustainability drivers for business success (Gerner, 2019).

Interestingly, the LCA framework with culture (Gerner, 2019) and the systematic literature review (Bhanot et al., 2019) noted the critical aspects associated with ‘people’ in their reviews.

With respect to corporate sustainability, governance and performance measurement, researchers recommended the following future research areas:

- Integration of social issues into the environmental and economic aspects of SSCM (Panigrahi et al., 2019).
- Using Lifecycle analysis and the concept of closed-loop supply chains for a connected view of sustainability in supply chains (Panigrahi et al., 2019).
- Addressing the issues of inventory management within sustainable supply chains (as in inventory models to focus on economic aspects) (Panigrahi et al., 2019).
- Developing collaborative relationships between suppliers and customers for better understanding and implementation of Sustainable Supply Chain initiatives and practices (Panigrahi et al., 2019).
• Analyzing the linkage between sustainability initiatives and managerial practices for success or failure of Sustainable Supply Chain practices (Panigrahi et al., 2019).

• Developing guidelines, evaluation tools and techniques for Small Medium Enterprises (SME) and large enterprises to justify investment for Sustainable Supply Chain practices (Panigrahi et al., 2019).

• Performing industry-specific research specific to SSCM (Panigrahi et al., 2019).

• Applying theories from organizational research and applying them to social and human aspects of sustainability (Panigrahi et al., 2019).

• Developing research toward theory testing and implementing conceptual frameworks in organizations (Panigrahi et al., 2019).

• Developing suitable policies and tools to assess the current state of sustainability and enhancing it further (Bhanot et al., 2019).

• Exploring different performance measurement approaches for SSCM that include corporate performance and human issues (Bhanot et al., 2019).

Interestingly, the LCA with cultural aspects model (Gerner, 2019) addresses some aspects of the LCA and closed-loop supply chain research noted in another review (Panigrahi et al., 2019). Additionally, another literature review developed research into collaborative relationships in greater detail, and specific future research specific to these relationships was proposed (Koberg & Longoni, 2019). Yet another researcher noted the need for industry-specific research (similar to Rajeev et al., 2017) as well as organizational research and performance measurement (similar to Carter et al., 2020).

Social Sustainable Supply Chains
At least three literature review of social aspects in SSCM occurred in the last three years. Many multi-national companies use global standards (such as Fairtrade) and private regulations (such as Codes of Conduct) to encourage social aspects in their supply chains (Chiesa & Pzychodezen,
Multi-region collaborations on social aspects illustrates the worldwide interest in embedding the western perspectives on social aspects into developing countries; however, a single, one-size fits all solution for all supply chains does not appear to be realistic (Chiesa & Pzychodezen, 2020). A thorough systematic literature review highlights the barriers and challenges, collaboration, motivations, drivers and enablers of sustainability, organizational culture, relationship between practices and performance, risk management strategy and transparency with respect to the social aspect in SSCM (Gugkang & Hendry, 2021). Yet another literature review focused on theories and governance mechanisms of social sustainability in multi-tier supply chains (Govindan et al., 2021). Researchers noted the distinct lack of multi-tier perspectives devoted to emerging economies and need for further explorations into conceptual frameworks and theories to explain the dynamics of member interactions (Govindan et al., 2021). Other important social aspects uncovered through the literature reviews include that training and education by buyers assists in social sustainability implementation, buyers tend to rely on audit and compliance, while some suppliers hide facts and demonstrate fake compliance (Govindan et al., 2021). Barriers to social sustainable implementation include economic, skill and knowledge and behavioral (Govindan et al., 2021). Additionally, and related to the previous global and emerging discussion, social sustainability performance measurement is still emerging (Beske-Janssen et al., 2015), and is complex and difficult due to global supply chains with varying environmental, social and legal standards (Taticchi et al., 2013).

Based upon their thorough literature reviews, future research areas in social sustainability in SSCM include:

- Researching SME’s, particularly for companies located in other regions of the world, in lower tiers of supply chains or in other sectors as little is known (Chiesa & Pzychodezen, 2020).
- Researching developing economies further (Gugkang & Hendry 2021; Nakamba et al., 2017; Zorzini et al., 2015).
• Researching service sectors (for example, waste disposal, tourism), which are also exposed to serious social issues and receive scant attention (Chiesa & Pzychodezen, 2020).

• Involving practitioners in research (Chiesa & Pzychodezen, 2020).

• Analyzing ‘best-in-class’ (Chiesa & Pzychodezen, 2020).

• Analyzing by industry (Chiesa & Pzychodezen, 2020). Exploring how regulatory enforcement, the type of industry (commercial or non-commercial) and the type of sectors (private or public) could differ in emerging economies as compared to developed countries (Gugkang & Hendry, 2021).

• Developing generic and industry-specific conceptual frameworks and models for the adoption of social sustainability in multi-tier supply chains (Govidanan et al., 2021).

• Analyzing the need to manage supply chain tiers (Govidanan et al., 2021; Gugkang & Hendry, 2021; Mena et al., 2013; Tachizawa & Wong, 2014) and the different levels of the production network (Chiesa & Pzychodezen, 2020) beyond 2 tiers (Gugkang & Hendry 2021). Several studies suggest there is a lack of studies focusing on the role of supply chain members (Wilhelm et al., 2016). The role of Industry 4.0 as a driver of social sustainability in multi-tier supply chains also promises to be a fruitful topic (Govidanan et al., 2021).

• Testing the driving power of regulatory pressure in socially SSCM (Chiesa & Pzychodezen, 2020). Enhancing the understanding of how different regulatory frameworks from developing countries in comparison to developed countries have influenced the way social sustainability is implemented (Gugkang & Hendry, 2021).

• Develop new theories or implementing changes to the existing ones (Govidanan et al., 2021).

• Measuring social sustainability, which is challenging and is still evolving (Govidanan et al., 2021).

While the literature reviews specifically address the need for future research on global or emerging research on SSCM, other researchers were addressing this specific need (Khan et al., 2021; Panigrahi et al., 2019). Similarly, the need for industry-specific research was again proposed as
an area for future research (similar to Rajeev et al., 2017, and Panigrahi et al., 2019). As noted previously, another researcher (Gugkang & Hendry, 2021) noted the need to address the differences between developing and emerging countries in SSCM. The need for research on regulation to drive social sustainability is expected, and in this vein, the reviews of state of governmental research were simultaneously published (Panigrahi et al., 2019). Multi-tier evaluation continues to be a theme as studies highlight the need for research on the role of supply chain members (similar to Carter et al., 2020) and technology (as Birkel & Muller, 2021). Within the context of social SSCM, research on service industries and ‘best-in-class’ were also raised as areas ripe for research. In summary of social SSCM reviews, many researchers recommended similar future research, which in some cases was research already being performed by other researchers.

**Operations and Supply Chains**

Four literature reviews highlighted the operations and supply chain issues surrounding SSCM. Researchers addressed the critical integration of literature between SSCM and logistics (Mosteanu et al., 2020), and noted the critical challenge to incorporate logistics into social sustainability as one function of an organization often did not know critical information from another (Ahi & Searcy, 2013). They noted that changes in corporate hierarchical frameworks are allowing firms to continuously update their knowledge related to environmental and social consequences (Dey et al., 2011; Pagell & Schevchenko, 2014). Other researchers utilized their systematic literature review from the fields of business ethics and corporate social responsibility to relate moral, instrumental and relational factors to driving sustainability within organizations and SCM (Baliga et al., 2020). From the literature review, the “integrated lean/supply management with sustainability motivators, practices, and performance (ILSSMPP) model”, which uses motivators, lean management, and supply management leading to environmental and social practices in SCM that impact on SSCM, was developed (Baliga et al., 2020). Other research specifically included operations in their literature review and developed
the unanticipated outcomes, trade-offs and tensions in sustainable operations and SCM (Matos et al., 2020). They specifically addressed the triple bottom line trade-offs that occur in SSCM. Since value is created through the operations and supply chain processes, we included the literature review on it in our review here. A holistic framework that structures sustainable value concepts, integrates value destroyed from a negative perspective of value and implements an activity-based analysis is developed through the systematic literature review focused on ‘sustainable value’ and SSCM business models (Mendez-Leon et al., 2022). Sustainable value, a relative construct, applies to any business model as it does not classify it as sustainable or not.

Future research areas developed within this vein of research include:

• Analyzing retailers’ sustainability with a focus on logistics (Mosteanu et al., 2020) and analyzing decision-making to develop more efficient transportation ways and enhancing utilization of multi-purpose transport arrangements (Bjorklund & Forslund, 2018).

• Studying reverse logistics decision-making (Mosteanu et al., 2020).

• Studying methodological issues to address the greater complexity, need for better triangulation/data verification, control over social desirability bias, attention to causal imputation, short-term trade-offs and tensions (Matos et al., 2020). The lack of tools to assess the social dimensions of SCM that requires instruments with measurement scales for constructs highlights the need for more robust models (Baliga et al., 2020). Another suggested methodology area addresses how sustainable value’s influence sustainability awareness and individual’s influence on business models (Aagaard & Ritzén, 2020) as well as the possible correlation between the value perception component and environmental values (Sánchez-Medina & Díaz Pichardo, 2017) adopted by supply chain members (Mendez-Leon et al., 2022). The need for more methods to integrate the various stakeholders as well as map the complex, systemic relations of sustainable business models into sustainable value are also recommended (Mendez-Leon et al., 2022).
• Studying contextual factors, such as differences between emerging versus developed countries, varying sustainability capabilities among organizations, horizontal complexity on each supply chain stage, supply chain position, conflict stakeholder demands (ambiguity), regulator factors, governance structures and institutional environments; organizational and decision processes, and individual behavior (Matos et al., 2020).

• Analyzing risks, such as pandemics and other global disasters, the impact of climate change and geo-political shifts, and emerging technologies (Matos et al., 2020).

• Extending the focus to service and other sectors (Baliga et al., 2020).

• Developing more integrative studies in SSCM (Baliga et al., 2020).

• Developing quantitative indicators to assess the sustainable value (Mendez-Leon et al., 2022).

Transportation is considered to be one of the most significant environmental challenges in SCM, but in spite of efforts joining environmental sustainability into logistics, efforts so far are inadequate (Weise et al., 2012). Therefore, the proposed research into retailers’ efforts is expected (Mosteanu et al., 2020). Interestingly, one researcher notes the significant complexity in methods to address SSCM (Matos et al., 2020). Several factors that other researchers noted as needing future research include: emerging versus developed countries (Sanchez-Flores et al., 2020), supply chain position and stage (Chiesa & Pzychodezen, 2020; Govindan et al., 2021; Gugkang & Hendry 2021), regulatory factors (Gugkang & Hendry, 2021), governance structures (Koberg & Longoni, 2019), and individual behavior (Bhanot et al., 2019; Carter et al., 2020). With respect to the call for research on risk management, other researchers were addressing the current status through their own review (Gugkang & Hendry, 2021). As noted previously, a call for more research into service and other sectors was made (similar to Chiesa & Pzychodezen, 2020). Intriguingly, this group of reviews calls for deeper analysis and development of methods in sustainability.
Technology (Industry 4.0) and Big Data
Researchers highlighted the need to assess the role of Industry 4.0 as a driver of social sustainability in multi-tier supply chains (Govindan et al., 2021). The German government launched Industry 4.0 to address German competitiveness (Birkel & Muller, 2021). Industry 4.0 addresses new technological developments, real-time data exchange across the supply chain, among products, customers and production facilities enabled by the Internet of Things. It involves the vertical and horizontal integration of information and communication technologies with end-to-end engineering for the entire product life cycle (Birkel & Muller, 2021). Simultaneously to the call for research, other researchers performed a systematic literature review on the potential for Industry 4.0 in the context of both the triple bottom line and SCM (Birkel & Muller, 2021). Through a literature review and bibliometric analysis of SSCM, using ‘R’, researchers analyzed SSCM under big data (Zhang et al., 2021). Through their analysis, they noted that supply chain design and innovation cannot be separated from data analysis technology, and big data analysis can assist in the rapid response of all aspects of the supply chain to incorporate sustainable development goals more efficiently.

Researchers into Industry 4.0 found gaps and recommendations for future research which include:

- Analyzing the role of SME within Industry 4.0 (Birkel & Muller, 2020).
- Studying developing economies (Birkel & Muller, 2020).
- Studying multi-tier supply chain management (Birkel & Muller, 2020).
- Analyzing information sharing across the supply chain (Birkel & Muller, 2020).
- Examining the interplay of ecological and social dimensions with economic benefits as reflected in new forms of business models (Birkel & Muller, 2020).
Investigating governmental, macroeconomic and public perspectives on the potential of Industry 4.0 (Birkel & Muller, 2020).

Exploring Industry 4.0 from the perspective of different countries and cultural backgrounds (Birkel & Muller, 2020).

Measuring, quantifying and controlling the ecological and social value generated (Birkel & Muller, 2020).

Many of these gaps have also been raised as issues by other researchers, but not specific to Industry 4.0 and the technology aspects that it represents.

**Accounting**

Cost analysis is a critical aspect to evaluating the triple bottom line and decision-making that occurs in SSCM. With this in mind, a relatively recent literature review analyzed research on managerial accounting practices and SSCM (Atik & Kovacevic, 2020). While this study highlights the critical role that accounting plays in SSCM studies, research was scarce and ‘older’ – and needed. Researchers highlighted the need for future research on accounting and SSCM to address:

- Understanding the roles of management accountants in companies that have sustainability in supply chains (Atik & Kovacevic, 2020).
- Developing the relationships between SME and accounting SSCM practices (Atik & Kovacevic, 2020).
- Comparing sustainability performance of firms from developed and developing countries (Atik & Kovacevic, 2020).
- Developing measures for social sustainability performance evaluation (Atik & Kovacevic, 2020).
- Budgeting for sustainability (Atik & Kovacevic, 2020).

Similar to the review of other functional areas, most of these research areas were already highlighted as needing research.
**Discussion:** Common Themes

Our review highlighted the fact that many future research areas recommended by others were already being analyzed by other researchers. This fact is not unusual, and it is one that is difficult to overcome due to timing and publication requirements. Similarly, given the structured and systematic literature research methods, it was not unusual to find that ‘good’ research led to many common results as the discussion highlighted.

In the development of this paper, by not limiting the literature review to a particular lens or defining more key words in our search, we were able to highlight the multi-dimensionality of SSCM. The end result is that this research supports the concept that SSCM is a multi-dimensional construct involving all functions and supply chain levels. As a result, researchers should take a multi-dimensional approach for future studies.

While researchers limited their views, there were several themes - social sustainability, multi-tier integration, performance measures, development of a grand theory and the need to involve practitioners, that were common across their research. We continue our discussion by reviewing the critical themes that this literature review uncovered in greater detail.

**Practitioners**

Many business people do not know the results from existing SSCM studies as there is little to no connection between theory and practice (Zhang et al., 2021). The systemic literature reviews revealed that for the majority of scholarly research papers available on green supply chains and sustainable practices (Govindan et al., 2015; Khan et al., 2016; Wolf & Seuring, 2010; Raut et al., 2019), only a few help practitioners to understand the development of SSCM as many articles tend to generate misunderstandings between the practitioners and academics (Khan et al., 2021). If practitioners co-authored articles with academics, the articles could become more relevant and insightful to both (Dumay et al., 2015). Practitioners are encouraged to contribute to the scholars-dominated research field by offering insights and perspectives (Chiesa
& Psychodezen, 2020). Many literature reviews examined in this article noted the requirement to take a more practical perspective and include practitioners in developing SSCM. The conclusion is simple: Involve practitioners in developing theories and recommendations to make research more relevant.

**Performance Measures**
Several researchers noted the need for metrics to evaluate SSCM across multi-tier supply chains (Carter et al., 2020; Koberg & Longoni, 2019; Sanchez-Flores et al., 2020). This review also noted the need for metrics to address social sustainability performance evaluation (Atik & Kovacevic, 2020), to measure, quantify and control ecological and social value generated (Birkel & Muller, 2020), and to assess sustainable value (Mendez-Leon et al., 2022). Without a doubt, measuring social sustainability is challenging and is still progressing. In measuring social sustainability, there is a need for industry-specific frameworks, quantitative models and indices for holistic and objective assessment for multi-tier supply chains, and ethical and financial frameworks to address social sustainability for multi-tier supply chains (Govindan et al., 2021). The end result is the need for metrics to drive supply chain performance – particularly socially sustainable metrics.

**Multi-tier Integration**
Researchers noted the distinct lack of multi-tier perspectives, particularly with respect to emerging economies (Govindan et al., 2021; Chiesa & Psychodezen, 2020; Gugkang & Hendry 2021) or technology integration (Birkel & Muller, 2020) or integrative studies across supply chain members (Baliga et al., 2020). Potential research is needed to explore supply chains’ multiple tiers in the context of other stakeholders (such as government and non-governmental organizations) as well as studying how far external pressures go into the tiers of the supply chain (Gugkang & Hendry, 2021). Organizational employees and multi-tiers, how employees commit behavioral issues – positive and negative – to the organization, and the
lack of employee empowerment with respect to multi-tiers are all ripe for investigation (Gugkang & Hendry, 2021). Researchers also noted the need to evaluate social sustainability practices and performance and their correlation at various tiers in the multiple supply chain (Govindan et al., 2021). Sustainability in multi-tier supply chains is an emerging field, which may lead to research focused on higher tiers of suppliers, cross-cultural evaluation and evaluation of different supply chains (Govindan et al., 2021).

**Social Sustainability**

Researchers emphasized the wealth of ecological and environmental research, but noted the lack of research into supply chain social aspects (Ashby et al., 2012, Hoejmose et al., 2013; Khan et al., 2021, Mani et al., 2018; Rajeev et al., 2017; Seuring, 2013; Seuring & Muller, 2008; Sodhi & Tang, 2018). However, literature reviews analysis by year demonstrates the growing number of published papers towards social sustainability in recent years (Chiesa & Pzychodezen, 2020; Sanchez-Flores et al., 2020). Attention to social issues is growing as it is fostered by media coverage, responsible finance, ethical consumerism, non-government organizations and institutional pressures (Chiesa & Pzychodezen, 2020). Recent SSCM studies on global supply chains tend to focus more on social aspects than the environmental one (Koberg & Longoni, 2019). Traditionally, the business economic dimension is its main focus; however, environmental and social aspects are gaining importance even as its extremely difficult to measure them (Panigrahi et al., 2019). Social sustainability addresses three broad areas: well-being of human beings (skill development, labor rights, child labor, force labor, alleviation of poverty and narrowing inequality, respecting human rights, health and safety, welfare, non-discrimination, and legitimate wages), society (social values, preserving culture, local community engagement, philanthropy, charity and hiring local people) and safety of the consumer (due to product failure) (Govindan et al., 2021). Social SSCM studies typically fail to take into account the full extent of supply chain management, all industries' practices or the development of
literature and its concepts (Chiesa & Pzychodezen, 2020). In general, most literature reviews indicate the need for research into the social dimension as research is lacking; however, this research needs to be specific and focused, such as research into social and developing countries, or social and developed countries, or social and Industry 4.0.

**Grand Theory**

Several researchers noted the objective to develop and refine theories leading to a conceptual ‘grand theory’ of SSCM that provided a unified structure combining best practices, performance metrics, people and processes (Carter et al., 2020; So et al., 2012). The objective of a ‘grand theory’ is the integration of sustainability issues effectively across the supply chain to achieve organizational goals (Bhanot et al., 2019). Researchers indicate that such a model is needed to extend the scope of sustainability across other domains, such as environmental management, human issues, and behavioral aspects, towards providing a consolidated SSCM framework (Bhanot et al., 2019). While several conceptual models were developed based upon the literature reviews and noted here, due to the complexities of supply chains and the trade-offs involved with sustainability, it’s unlikely that a ‘one-size’ fits all model can adjust optimally to every situation – particularly as these models are conceptual and theoretical (Chiesa & Pzychodezen, 2020). However, business models developed to analyze SSCM may be fruitful in providing practical advice to business people about the ‘real world’.

**Conclusion**

This review highlights the future recommendations from various general, structural and systematic literature reviews that address SSCM. Many researchers advocated for similar future research areas as we discussed above. Commonality demonstrates a degree of validity to these structured literature reviews as similar recommendations resulted. Different search words, journals, and databases led to similar – and yet some different –
recommendations for future research. Additionally, as noted previously, many future research areas highlighted were already being addressed by other researchers; however, timing issues did not reveal this research to the other researchers. By taking a broad view and summarizing the various literature reviews results as we did here – and by not limiting the lens or adding additional key search words, several common themes were highlighted. These themes included social sustainability, multi-tier integration, performance measures, development of a grand theory and the need to involve practitioners. Interestingly, these common themes also support the concept that SSCM is a multi-dimensional construct, and favors the idea that researchers should take a multidimensional approach in future studies. In conclusion, while much work has been done in the complex area of SSCM, much work remains in this maturing field. Future research recommendations highlight the need to continue to analyze the complex, integrated issues in SSCM.

References


Birkel, H. & Muller, J.M. (2021). Potentials of industry 4.0 for supply chain management within the triple bottom line of sustainability – A systematic literature review. *Journal of Cleaner Production*, 289, 125612.


**Web Appendix**

A web appendix for this paper is available at https://dx.doi.org/10.15239/j.brcacadjb.2023.13.01.wa01