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# Towards Sustainable Practices: a literature review on SMEs in the Supply Chain

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**ABSTRACT**

This paper conducts a bibliometric and systematic literature review of 173 papers on SMEs, supply chains (SCs) and sustainability to understand how SMEs strategies and practices can contribute to more sustainable SCs. Key findings suggest that innovative technologies and stakeholder engagement can enhance the sustainability and resilience of SMEs and SCs. In addition, SMEs could benefit from participating in networks or partnering with MNEs to access resources, adopt sustainable practices and unleash entrepreneurial sustainable innovation. Integrating sustainability into the SC of SMEs can improve their performance, in addition to the benefits of sustainability for the overall economic system. However, these topics are not fully integrated, leaving room for further research. Moreover, many circumstances are context-specific and show significant differences between developed and developing countries, making it unrealistic to propose a universal strategy. Clarifying these issues would improve understanding of the enabling factors and consequences of SME sustainability in SC.

Questo articolo conduce una revisione bibliometrica e sistematica della letteratura di 173 articoli sulle PMI, le supply chain (SC) e la sostenibilità, per comprendere in che modo le strategie e le pratiche delle PMI possano contribuire a SC più sostenibili. I risultati principali suggeriscono che le tecnologie innovative e il coinvolgimento degli stakeholder possono migliorare la sostenibilità e la resilienza delle PMI e delle SC. Inoltre, le PMI potrebbero trarre vantaggio dalla partecipazione a reti o dalla collaborazione con le imprese multinazionali per accedere alle risorse, adottare pratiche sostenibili e liberare l'innovazione imprenditoriale sostenibile. L'integrazione della sostenibilità nella SC delle PMI può migliorare le loro performance, oltre ai benefici della sostenibilità, per il sistema economico nel suo complesso. Tuttavia, questi argomenti non sono completamente integrati, lasciando spazio a ulteriori ricerche. Inoltre, molte evidenze sono specifiche del contesto e mostrano differenze significative tra paesi sviluppati e paesi in via di sviluppo, rendendo irrealistico proporre una strategia universale. Chiarire tali questioni

migliorerebbe la comprensione dei fattori abilitanti e delle conseguenze della sostenibilità delle PMI nella SC.

**Keywords:** SMEs, supply chain, sustainability, environmental performance, bibliometric review.
PMI, supply chain, sostenibilità, performance ambientale, review bibliometrica.

## 1 – Introduction

The Corporate Sustainability Reporting Directive (CSRD) issued by the European Union became effective in January 2023. The CSRD is the last regulatory innovation that improves and strengthens the guidelines for companies to disclose information on their social and environmental performance. A wider range of large companies and listed SMEs are henceforth required to produce a sustainability report. In addition, certain non-EU companies will have to produce a report if their turnover in the EU market exceeds €150 million.

This regulatory innovation will have a tremendous impact on SMEs and will also affect supply chains. Indeed, firms should disclose details about the entire value chain of the organisation, encompassing its operations, products, services, business partnerships, and supply chain. For instance, energy consumption is considered not only at firm level, but also at the entire supply chain (Directive (EU) 2022/2464); moreover, supply chains are also involved in the human rights due diligence that is likely to be required, in line with UN guidelines (UN, 2011) and OECD indications (OECD, 2020; 2018).

The advancements on sustainability reporting in the regulatory framework testify the increased importance of sustainability and good environmental, social and governance practices in the market, not only by large listed companies or financial intermediaries, but also by SMEs. As underlined recently by the OECD, there is no possibility to have a net zero economy without the involvement of all the companies, irrespective of their size (OECD, 2023). This is also true because SMEs represent in many instances the vast majority of companies and contribute hugely to value added and employment (Tanda and Uselli, 2019).

The literature on sustainability within the domain of supply chains is rich but has often concentrated on sustainability-oriented innovations in large firms. Nevertheless, there has been a growing focus on small and medium-sized enterprises (SMEs) due to their increasingly recognised role as central actors to promote sustainable development (Klewitz and Hansen, 2014). However, this body of knowledge is dispersed across different academic disciplines, research communities, and journals.

The study of SMEs is pertinent as the sustainable strategic plans that can be adopted by SMEs differ from those of multinational companies (Moore and Manring, 2009). It is evident that multinationals possess greater investment power and are more diversified than small companies. Consequently, large firms are better placed to mitigate the risks associated with unsuccessful strategic plans or product introductions by relying on a global market presence. Furthermore, they have a higher return potential on R&D investments due to their established presence in global markets.

In contrast, the constraints and advantages of smaller firms are widely discussed in the relevant literature. Contrary to large companies, smaller firms are comparatively less able to

effectively constrain competitive forces or to protect themselves from external pressures. However, the processes of developing strategic plans and organisational change in smaller enterprises may benefit from their greater agility, focus on niche markets and, on occasion, from a greater entrepreneurial orientation. In summary, SMEs can also be an intrinsic driving force in addressing the challenges of innovation and sustainable, even disruptive, change, especially when they manage to overcome the major limitations associated with their size (e.g., by networking with other SMEs and other stakeholders or by partnering with larger companies in exchange for financial support).

Moreover, despite the growing recognition of the importance of social sustainability in supply chain management, the focus of past literature has primarily been on environmental and economic aspects, with social sustainability receiving less attention (Mani *et al*., 2020). Evidence suggests that the characteristics of supply chain social sustainability can vary significantly between emerging and developed economies. For example, issues such as slavery, a lack of clean drinking water and restroom facilities, corruption and the use of child labour are relatively uncommon in developed economies but remain significant concerns in emerging economies. Therefore, scholars have called for studies that advance new models incorporating different social issues and contribute to the development of theory in this area taking in consideration that the temporal, contextual and dynamic nature of social issues makes it challenging to develop generalised models and theories. The extant literature on supply chain social sustainability presents conflicting findings regarding its adoption and its potential impact on firms. Indeed, scholars and practitioners have recently identified the necessity for a more thorough examination of numerous aspects of supply chain social sustainability, in order to comprehend how it can affect organisational performance.

To better understand the state of the art in the role of SMEs in supply chains for sustainability, this paper performs a bibliometric and systematic literature review to highlight past trends in the literature, the most relevant authors and countries investigating these issues and to discuss the founding contributions on the topic. This analysis will allow us to pinpoint the main gaps in the literature and formulate some hints for further research.

To the best of knowledge, no previous literature review takes such an approach and integrates contributions from different fields that investigate the issue of sustainability for SMEs in supply chains.

The paper is structured as follows: *Section 2* presents the methodology and the data; *Section 3* presents the results provided by the bibliometric analyses and discusses the main papers in the field through a comprehensive systematic literature review of the top cited papers by total citations and average total citations; *Section 4* suggests potential future research questions and areas worth of being investigated; the last section concludes.

## 2 – Methodology and data

We conduct a bibliometric and systematic literature review to examine the existing research on sustainability for SMEs in supply chains. Since the introduction by Price (1965), this methodology has been extensively employed in the literature, also within the realms of management, business and finance (De Giuli *et al*., 2024; Khan *et al*., 2022). This paper employs the widely used tools of Bibliometrix and Biblioshiny (Aria & Cuccurullo, 2017; Moral-Muñoz

*et al*., 2020) developed for the software R and the graphical tools of VosViewer (e.g., Dubyna *et al*., 2022; Yu *et al*., 2020).

To build our sample, we perform a keyword search in Scopus to include relevant papers using the following string:

> TITLE-ABS-KEY(("Supply chain*") AND ("SME" OR "Small*med*") AND ("ESG" OR "Environment*, Social and Governance" OR "sustainability")) AND (LIMIT-TO(LANGUAGE,"English")).

Scopus has a broader coverage than Web of Science and is more accurate than Google Scholar. For a discussion of the sources in bibliometric analyses see, e.g. De Giuli *et al*. (2024). We limit search results to documents published in English (that nevertheless represent almost the totality of results). After performing the search, we manually verify consistency with the topic and exclude non relevant papers. The final sample as at the end of April 2024 is made of 172 documents published in 120 different sources by 499 different authors. Most of these documents (111) are academic articles in journals and they are all published starting from the year 2005.

The temporal trend of publication shows an increasing rate of growth. This suggests an increased interest in the topic in the last years, consistent with the higher interest on sustainability by the academic environment, by policymakers and market actors (Figure 1).

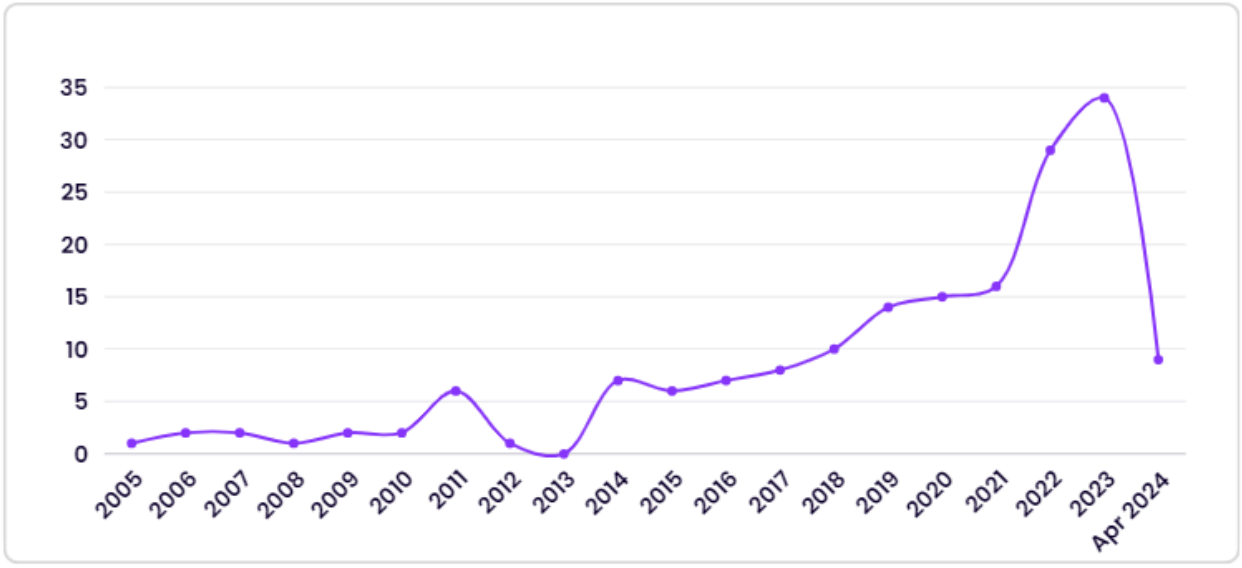


**Fig. 1 – Annual production of documents**

## 3 – Results

### 3.1 – *Bibliometric analysis*

The most relevant source in the sample is the journal Sustainability published by MDPI with 13 articles. Annals of Operations Research, Journal of Cleaner Production and Lecture Notes in Mechanical Engineering follow with 7 documents each. Considering the overall number of

papers, documents are not concentrated on a few sources, but spread in many different journals or volumes (Figure 2).


**Fig. 2 – Most relevant sources.**
**The figure shows the journals with at least 3 documents on the topic.**

The most productive author is Dey, with 7 papers. Thirteen authors have 3 papers each and the remaining 2 or less papers. Dey is also the most cited, with an H-Index of 4 (within the sample) and 192 total citations (TC) (Figure 3).

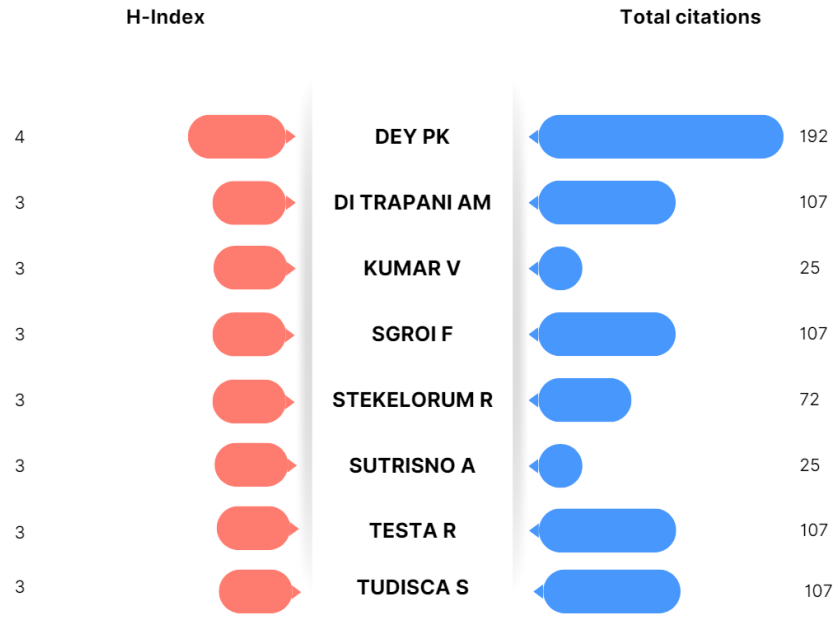


**Fig. 3 – Most relevant authors by H-index and total citations in the sample.**
**The figure shows authors with at least 3 documents in the sample**

The most relevant keywords are represented in Figure 4, while Figure 5 shows keywords' co-occurrences. To improve understanding of the keywords and avoid duplications, we have amended the list of keywords using synonyms and variations as detailed in the **APPENDIX**.

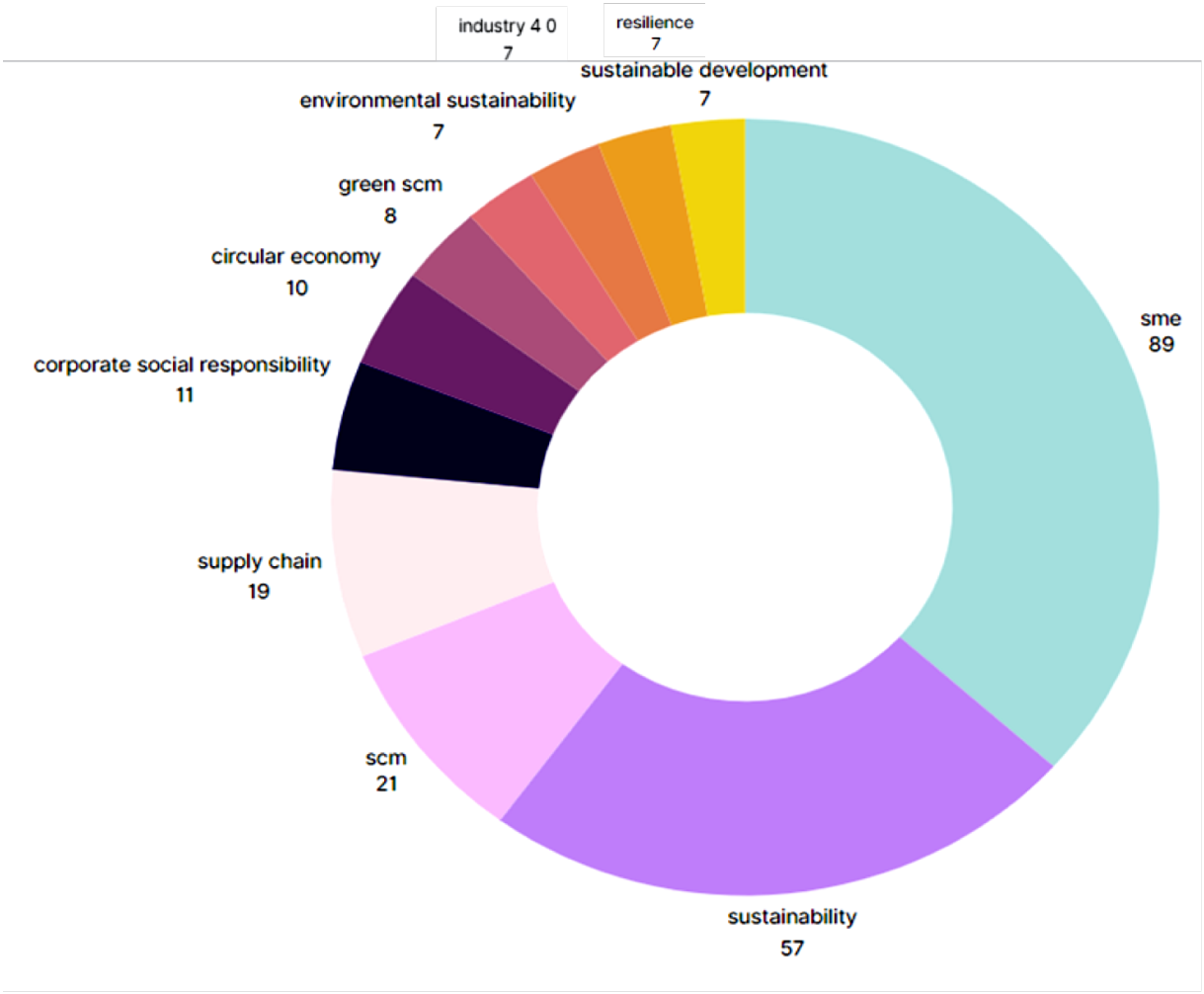


**Fig. 4 – Most relevant keywords**

The main keywords that appear at least 5 times in the sample are selected and their co-occurrences are computed through VOSviewer software. Each keyword is connected to the others through a link. The link is represented by a positive numerical value, which is indicative of its strength. The higher this value, the stronger the link. This can be interpreted by the number of publications in which two keywords occur together. The main clusters are the green cluster containing keywords such as SME, Supply chain management (SCM in Figure 5) and sustainability.

Overall, the first cluster is well connected to the second cluster (red) containing, for instance, "supply chain" and "sustainable development". Nevertheless, the links are not particularly strong (as observed by the width of the connecting curve). The other keywords are marginal. A strong bulk of academic papers on the three topics together would show stronger connections. This result, hence, suggests that although these topics are investigated in conjunction with each other, there is no complete integration between the studies on sustainability and supply chain on the one side (red cluster) and the role of SMEs in this field, on the other (green cluster). In other words, the number of studies on SMEs, SC, and sustainability are large (large circle), but their contemporaneous presence is rarer than what is expected given the importance of the topic (links are weak).

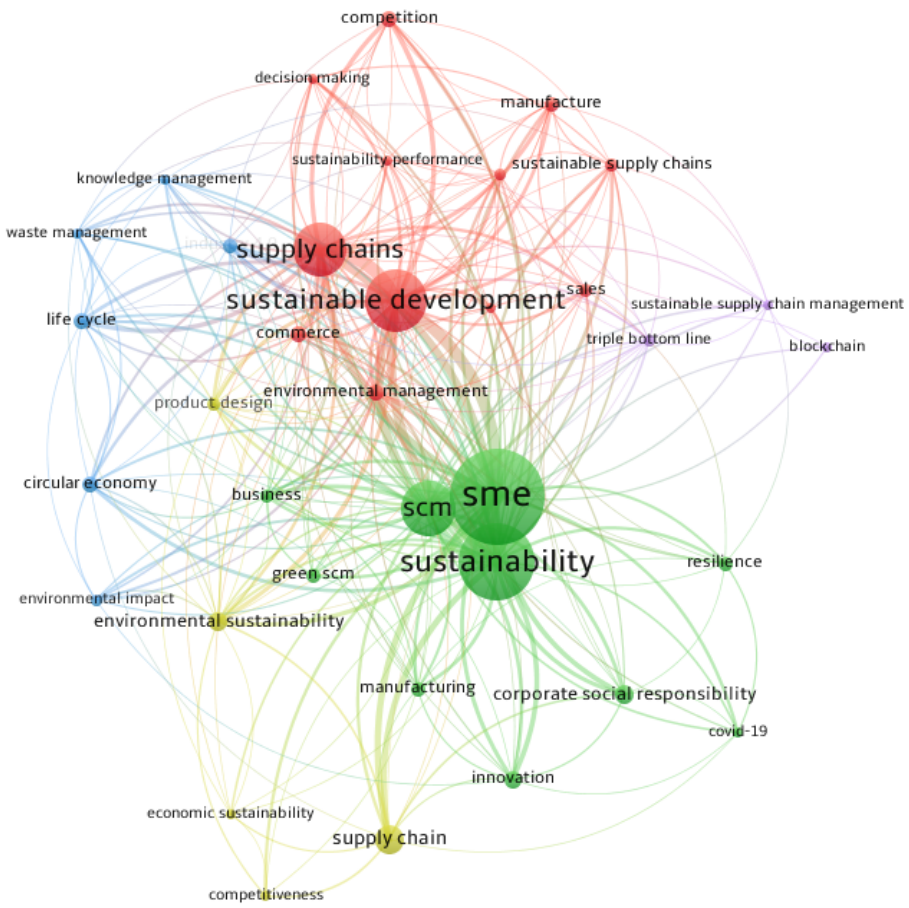


**Fig. 5: Keywords co-occurrences**

## 3.2 – *A systematic review of the Most cited papers by total citations*

We now provide a discussion of the most relevant studies dealing with the supply chain, SMEs and ESG. We therefore rank the papers in our sample according to the total number of citations (Table 1). This selection can be considered a first glance into the topic by a researcher investigating the issues cited above and therefore, the papers are likely to influence future literature.

The three-top papers according to total citations are Klewitz and Hansen (2014), Moore and Manring (2009), Khan *et al*. (2021).

### 3.2.1 – *Most cited papers*: Klewitz and Hansen, 2014

The first paper (Klewitz and Hansen, 2014) is devoted to the topic of eco-innovation, which encompasses concepts such as eco-design and cleaner production. The authors note that although previous research has often focused on large firms, there is an increasing focus on SMEs as contributors to sustainable development through their distinctive strategies to sustainability-oriented innovation (SOI). However, this knowledge is scattered and mainly focuses on the barriers and incentives to eco-innovation in SMEs.

The authors aim to review research findings on SMEs from 1987 to 2010, including different forms of sustainable innovation (product, process and organisational) and strategic sustainability behaviours and practices.

**Table 1 – Top documents by total citations. Papers marked with an * are also reported in Table 2.**

| N | Paper | Source | DOI | TC |
|---|---|---|---|---|
| 1* | KLEWITZ J., HANSEN E.G., 2014 | Journal of cleaner production | 10.1016/j.jclepro.2013.07.017 | 853 |
| 2* | MOORE S.B., MANRING S.L., 2009 | Journal of cleaner production | 10.1016/j.jclepro.2008.06.004 | 328 |
| 3* | KHAN S.A.R., GODIL D.I., JABBOUR C.J.C., SHUJAAT S., RAZZAQ A., YU Z., 2021 | Annals of operations research | 10.1007/s10479-021-04275-x | 139 |
| 4* | MANI V., JABBOUR C.J.C., MANI K.T.N., 2020 | International journal of production economics | 10.1016/j.ijpe.2020.107656 | 134 |
| 5* | ZHOU F., WANG X., LIM M.K., HE Y., LI L., 2018 | Journal of cleaner production | 10.1016/j.jclepro.2018.05.247 | 128 |
| 6 | JORGENSEN A.L., KNUDSEN J.S., 2006 | Corporate governance | 10.1108/14720700610689568 | 104 |
| 7 | ASHBY A., 2016 | Operations management research | 10.1007/s12063-016-0117-9 | 102 |
| 8* | NAMAGEMBE S., RYAN S., SRIDHARAN R., 2019 | Management of environmental quality: an international journal | 10.1108/MEQ-10-2017-0119 | 100 |
| 9* | ÜNAL E., URBINATI A., CHIARONI D., MANZINI R., 2019 | Resources, conservation and recycling | 10.1016/j.resconrec.2018.12.034 | 99 |
| 10* | DE D., CHOWDHURY S., DEY P.K., GHOSH S.K., 2020 | International journal of production economics | 10.1016/j.ijpe.2018.07.003 | 99 |

The findings suggest that SMEs' strategic sustainability behaviour encompasses a spectrum of approaches, including resistance, reactivity, anticipation and innovation-based initiatives. The authors identify specific innovation practices at the product, process and organisational levels. Finally, research on eco-innovation is found to be more prevalent than research on innovation from a triple bottom line perspective.

The main theoretical contribution is an integrated framework that describes how different strategic sustainability behaviours can explain contingencies in types of innovation practices, through iteration between deliberate strategy and emergent strategic behaviour. The more proactive behaviours of SMEs have higher capabilities for more radical SOI, where the innovation process itself is dynamic. Finally, engagement with external stakeholders can enhance the ability of SMEs to develop SOI.

The paper suggests several avenues for future research related to SOI in SMEs. These include studying learning processes and capacity building at the firm and management level, simplifying complex methodologies such as life cycle analysis, investigating the benefits of supporting SOI for SMEs, exploring sustainable entrepreneurship and business model

innovation for radical SOI in SMEs, investigating how threats drive radical sustainable innovation in family firms, enriching theoretical lenses to better understand SOI, exploring the interplay between SMEs and other actors such as large firms and supply chains in sustainability transformations, and taking a differentiated research approach for micro/SMEs and B2B/B2C markets given their inherent differences.

### 3.2.2 – *Most cited papers*: Moore and Manring, 2009

According to Moore and Manring (2009) in the second most cited paper, incorporating a sustainability lens into the competitive strategy of SMEs facilitates a balanced approach to resilience, growth and their rate of sustainable change. Many factors therefore point to a potentially more active role for SMEs, such as the accelerating cycles of technological innovation, the globalisation of networked communications, and the extension and interconnectedness of supply chains. It is widely recognised that MNEs benefit from a larger asset base, enabling them to invest and spread the costs and risks of product development across a diverse global market. However, it is also recognised that SMEs, with their agility and capacity for entrepreneurial innovation and organisational change, can act quickly and effectively to fill local or niche market and technology gaps. There are two ways in which SMEs can fulfil their desire to grow larger, when the need to expand exceeds their ability to finance it, or when their technology or market segment becomes attractive to investors. SMEs that want to grow but lack adequate financial capacity can raise capital on public markets or be acquired by larger companies, combining the entrepreneurial spirit of the founders with the greater financial capacity of large companies to mutual benefit. The acceleration of 'creative destruction' due to the rapid evolution of technology is a factor supporting SME growth around the world. In addition, IT supports SME networks, an organisational form that can facilitate market penetration through the synchronised development of competencies.

The authors then highlight two main general strategies for corporate social and environmental responsibility: a minimalist approach that incorporates environmental and social compliance criteria into supplier evaluation, and an approach that goes beyond mere compliance and requires the definition and implementation of life-cycle-based standards for the environmental and social performance of products throughout the supply chain. The authors acknowledge the challenges faced by SMEs in implementing the latter strategy, particularly in developing countries. However, they emphasise the need to recognise SMEs not only as suppliers but also as purchasers capable of exerting pressure for sustainable SCM.

In summary, Moore and Manring (2009) examine a number of possible scenarios for SMEs: being acquired by an MNE, being networked with other SMEs, and playing a more active role in sustainable SCM. MNEs would provide the necessary infrastructure and capital, while SMEs would provide the engine of sustainable innovation and entrepreneurship that MNEs desire.

The paper is theoretical in nature and the possible scenarios can be seen as suggestions for further research.

### 3.2.3 – *Most cited papers*: Khan *et al.*, 2021

Khan *et al*. (2021) is the third most cited paper, which focuses on the increasing use of blockchain technology (BCT) in the context of the circular economy, especially by large organisations. The

paper aims to demonstrate how the implementation of BCT, together with trust among supply chain partners, can facilitate the development of green information systems (GIS) and promote improvements in environmental, operational and economic performance. Secondly, the paper aims to demonstrate how this can improve organisational performance in SMEs. Empirical data was collected from 364 middle and senior managers of SME manufacturing companies in China and Pakistan and processed using PLS-SEM. The main findings suggest that BCT and GIS have a positive impact on sustainable supply chain practices and organisational performance. BCT has the potential to act as a catalyst for SMEs to achieve sustainable supply chain practices. Nevertheless, SMEs, particularly in developing economies such as Pakistan, encounter numerous challenges in fully leveraging the potential of BCT. This is due to the fact that they have unskilled and less educated workers, as well as difficulties in accessing financial resources to build the necessary infrastructure for BCT. In addition to training, the authors propose that government support and regulatory bodies (e.g. for subsidised loans and tax exemptions for IT investments) could also be beneficial, through the establishment of dedicated SME banks. Finally, the establishment of industrial districts comprising companies from different countries can facilitate technology transfer and human resource development through collaboration, as evidenced by the effective case of the China-Pakistan Economic Corridor.

With regard to future research directions, the authors propose examining specific green supply chain strategies and practices that can benefit from BCT in order to assess their effectiveness within the broader BCT environment. Further study is required on how effective blockchain information management can assist policymakers in making long-term strategic decisions about natural resources. It is also necessary to investigate inter-organisational and inter-industry BCT relationships in order to understand how BCT can reduce costs, improve efficiency and organisational performance, and promote environmental sustainability. Furthermore, research should examine the individual behavioural barriers to BCT and their impact on overall success, as well as identify institutional and financial bottlenecks in BCT adoption by firms and governments.

### 3.2.4 – *Most cited papers*: Mani *et al.*, 2020

The fourth most cited paper (Mani *et al.*, 2020) highlights the fact that, although there has been an exploration of sustainability in supply chains in the context of large companies in Western countries, there is a research gap in the case of manufacturing SMEs in emerging economies in Asia. Furthermore, attention has mainly focused on environmental and economic aspects, to the detriment of social sustainability. The authors emphasise the significance of companies' endeavours to address aspects of SCM that impact the safety, health and well-being of the individuals involved. They posit that companies with a robust social orientation tend to outperform their competitors in both the short and long term, whereas those that neglect social sustainability may suffer reputational losses. Moreover, issues such as slavery, lack of clean drinking water and sanitation facilities, corruption and child labour are relatively rare in developed economies but remain significant concerns in emerging economies. Therefore, scholars have called for studies that take these differences into account.

The authors present an investigation into the relationship between supply chain social sustainability practices and supply chain performance in Indian SMEs. The authors use a mixed methods approach that encompasses semi-structured interviews with supply chain managers

and practitioners, with the objective of elucidating the dimensions of social sustainability. This is complemented by a mail survey. The model is subsequently tested using covariance-based structural equation modelling, based on a final sample of 327 SMEs.

In conclusion, the findings demonstrate a positive correlation between social sustainability initiatives within SME supply chain networks and overall supply chain performance. Subsequently, cost reductions are highlighted, which are achieved through methods such as waste minimisation, inventory optimisation and customer satisfaction. These indirect influences on financial performance are accompanied by improved supplier performance, which is evidenced by reduced lead times, enhanced quality through the promotion of high levels of employee motivation and reliability in operations without disruption. Finally, the dissemination of social sustainability practices throughout the supply chain produces a ripple effect, influencing customer performance and, subsequently, the supply chain performance of the focal company.

### 3.2.5 – *Most cited papers*: Zhou *et al.*, 2018

The fifth paper by total citations is Zhou *et al*. (2018). The authors argue that companies are now effectively obliged to pursue sustainability through a sustainable supply chain management strategy, leveraging green and sustainable practices. Given the dearth of studies on the sustainability aspects of post-sales activities, this paper focuses on the business of scrapping and recycling end-of-life materials and products. While existing recycling companies tend to be MNEs that can easily identify collaborative recycling partners for their large product volumes and market shares, SMEs also require recycling practices. Consequently, there is an urgent need to develop an analytical framework to facilitate the selection of appropriate recycling partners for the disposal of SME scrap.

The selection of recycling partners can be regarded as a hybrid multi-criteria decision-making (MCDM) problem that incorporates qualitative and vague information. In order to develop an analytical framework feasible for use in the selection of recycling partners with vague, uncertain, and qualitative information, a novel approach combining fuzzy set theory with the MCDM method of the Fuzzy DEMATEL-AEW-FVIKOR has been developed. The results indicate that the optimal partner alternative adheres closely to the methodologies of Shemshadi *et al*. (2011) and Chaghooshi *et al*. (2016). Furthermore, the developed hybrid approach demonstrates an advantage in terms of flexibility in responding to the preferences of decision-makers.

The research contributes to the development of sustainable supply chain practices in the evaluation of recycling partners through the construction of a comprehensive and inclusive list of sustainable criteria derived from the economic, environmental, and social framework. This is followed by the development of an integrated decision-making framework that enables the selection of the most optimal alternative based on the consideration of multiple and conflicting attributes. Finally, the research offers the assistance of SMEs in the implementation of sustainable practices, facilitated through the identification of an optimal recycling partner.

Although the developed approach offers certain advantages in identifying the most suitable recycling partner in terms of sustainability criteria, there are some limitations and indications for future studies. In order to address the limitations of the current approach, it is necessary to extend the influential criteria with increasing sustainability awareness and to explore more

objective weight calculation methods through the use of big data. The objective is to reduce the subjectivity of the decision-making process by developing more powerful weighting techniques. The integration of additional ranking techniques, such as TOPSIS, AHP, and GP, is proposed as a means of facilitating the implementation of sustainable recycling practices. The development of an intelligent decision-support system is suggested to facilitate the resolution of MCDM problems and the implementation of user-friendly interfaces for dynamic decision-making. Finally, the integration of computer-based intelligent techniques into the ranking method can facilitate the development of a more intelligent and robust version, in an intelligent decision-making setting.

### 3.2.6 – *Most cited papers*: Jorgensen *et al.*, 2006

The research by Jorgensen *et al*. (2006) aims to investigate the role of SMEs with respect to sustainable supply chain management (SSCM) within global value chains (GVCs).

Despite the growing integration of SMEs into GVCs, discussions on SSCM have thus far concentrated on the strategies of MNEs. There is a paucity of knowledge regarding the strategies of numerous SMEs in developed countries that are relocating their sourcing and production to low-wage countries in Eastern Europe and Asia. Consequently, SMEs are also increasingly required to adopt global business strategies in line with social and environmental standards through global production networks and the expectations of multinational buyers. Nevertheless, SMEs frequently lack the resources typically available to MNEs, which impedes their ability to implement such strategies in their entirety.

This article employs the framework developed by Kaplinsky and Morris (2000) who argue, in essence, that the SSCM can be conceptualised as consisting of two distinct but interconnected main functions: rule-making and rule-compliance. While SMEs are not the primary actors responsible for establishing sustainability standards, they could play a pivotal role as "rule keepers" by acting as change agents on behalf of leading companies to enforce standards among their suppliers. However, SMEs are likely to lack the resources and bargaining power to implement and enforce sustainability requirements among their suppliers effectively, thereby hindering the diffusion of standards along the supply chain.

To further investigate these issues, an analysis is conducted to determine the extent to which Danish SMEs are subject to regulatory and compliance practices imposed by buyers. This analysis specifically considers the extent to which buyers impose social and environmental requirements and the manner in which these requirements are enforced. Secondly, an investigation is conducted to ascertain the extent to which Danish SMEs act as change agents by enforcing these requirements on their suppliers. The data collection uses a survey of SSCM practices among 300 Danish SMEs.

The results indicate that SMEs are more often subject to buyer requirements than they apply such requirements to their suppliers. A significant proportion of buyer requirements in the value chain appear to be implicit, lacking contractual status and verification procedures. The authors hypothesise that this indicates a mismatch between the formulation of rules and their implementation in the context of SSCM.

Furthermore, research suggests that SMEs are less likely than their larger corporate counterparts to take on the role of change agents to promote sustainable production practices along GVCs. The increasing prevalence of SMEs in GVCs is likely to lead to a less rigorous

application of sustainability requirements at subsequent levels of the value chain. This phenomenon has two main implications for companies and policy makers.

Firstly, large companies at the top of the supply chain may be exposed to increasing risks of non-compliance and failure at lower levels. Conversely, if SMEs are unable to fulfil the regulatory functions related to the SSCM, they may face increasing barriers to entry into GVCs over time.

Secondly, from a policy perspective, it is important to support initiatives for SMEs to act as effective change agents to facilitate the widespread adoption of sustainability standards.

One potential avenue for further investigation could be the strategic development of compliance partnerships between large buyers, small suppliers, industry organisations, NGOs and government agencies. Moreover, further research is necessary to gain insight into the impact of sustainable development standards on the competitive advantage of SMEs in more developed countries and emerging ones such as China and India.

### 3.2.7 – *Most cited papers*: Ashby, 2016

The seventh article by Ashby (2016) examines the strategy of reshoring in the context of the UK's clothing industry, which is experiencing a resurgence among numerous major retailers. The author highlights the fact that the globalisation of economic activity and the associated economic factors have led to highly complex global supply networks (GSNs), with a significant number of companies deciding to outsource their production activities to developing countries in order to exploit lower costs and resource availability. However, the management of sustainable practices and the assurance of supplier responsibility within these complex GSNs has become a significant issue. Despite the widespread offshoring trend, there is limited research on the driving factors and decision-making process behind reshoring. The objective of this study is to deepen the understanding of reshoring by leveraging a longitudinal case study of a UK clothing company, specialising in surf wear and lifestyle products, adhering to strong sustainability principles.

The author emphasises the necessity of adopting a sociological perspective and the study employs Social Network Theory to gain a more profound comprehension of the social dynamics and relationships that occur within supply networks. This, in turn, informs and improves the implementation and effectiveness of SCM practices.

The study's objectives are twofold: firstly, to identify the factors influencing re-shoring strategies, as well as the challenges and benefits; and secondly, to investigate the influence of a local supply chain on SCM and sustainability performance.

The case presented is notable for its divergence from the typical offshoring to developing countries with low-cost labour. Instead, the company is re-shoring activities that were originally offshored to global suppliers in developed countries. Moreover, rather than merely responding to economic fluctuations or supply chain challenges, reshoring is implemented in a highly creative and innovative manner. This case provides a foundation for further research in new multidisciplinary directions. It offers insights into the coordination of resources, relationships, and responsibilities across the supply network, with the aim of improving sustainability performance. For those engaged in the practice of re-shoring, the case study offers insights into the decision-making process surrounding the sourcing of materials, including considerations related to supplier proximity and sustainability. Finally, the case study illustrates the necessity

for a shift in offshoring strategies from a sole focus on cost reduction and profit enhancement to the selection of the most suitable and potentially more local supplier, from a short-term to a long-term perspective, and from transactional to collaborative and cooperative relationships. For policymakers, the case study demonstrates the positive impacts of a considered and coordinated implementation of reshoring. These include the re-integration/re-use of skills within the UK, the creation of 'new' industries, support for local communities and economic growth. At the same time, the case study highlights the need for policy and government support to bolster a domestic or nearshore supply chain.

### 3.2.8 – *Most cited papers*: Namagembe *et al.*, 2019

The eighth paper by total citations is Namagembe *et al*. (2019), which focuses on Green Supply Chain Practices (GSCPs). These include investment recovery, eco-design, green purchasing, cooperation with customers, and internal environmental management. The authors posit that while a substantial body of research has examined the reasons for adopting GSCPs, such as achieving competitive advantage and improving economic and environmental performance, there is a paucity of studies that use the adoption of GSCPs as an independent variable and examine its impact on performance, even in terms of combinations of multiple green practices and combinations of environmental and economic outcomes. Furthermore, the least developed countries are notably absent from the literature.

The primary objective of this study is to investigate the influence of five GSCPs (green purchasing, eco-design, investment recovery, internal environmental management, and cooperation with customers) on environmental performance. Additionally, this study aims to examine their impact on financial gains and costs. Furthermore, the authors examine the relationship between each green practice and the aforementioned performances, both in aggregate and stratified by industry.

The data collection uses a cross-sectional survey among owners or managers of 200 Ugandan SMEs, employing traditional quantitative analysis models.

The study reveals a surprisingly high level of adoption of GSCPs among Ugandan SMEs, despite the country's relatively early stage of industrialisation, weak environmental regulations, lack of trust in buyer-supplier relationships, and limited geographic markets. The GSCPs yield favourable outcomes with respect to environmental performance. However, the economic benefits are generally limited, even falling below the associated economic costs. The industries that exhibit both the highest levels of environmental performance and economic benefits are also the most expensive from the perspective of economic impact. However, they are associated with greater numbers of international customers. These preliminary findings suggest that international markets play an important role in encouraging the adoption of GSCPs for greater economic benefits, although this may come at a higher cost. In contrast to different contexts, such as the Chinese case, Ugandan owners and managers express a more favourable view of government environmental policy.

The authors propose further research, including an examination of the effects of perceived regulatory compulsion, the impact of firm experience with GSCPs over time, and the conduct of cross-national comparative studies with the aim of controlling for methodological differences. This is to gain a deeper understanding of the roles of industry characteristics, national context, and cultural factors in shaping GSCP performance outcomes. Longitudinal and qualitative

approaches are recommended to establish causality and gain greater insights into the motivations and perceptions of owners and managers.

### 3.2.9 – *Most cited papers*: Ünal *et al*., 2019

Ünal *et al*. (2019) are positioned in the 9th rank by total citations. Previous research on circular business models and strategies has primarily focused on understanding value creation in terms of individual managerial practices, or in isolation from other factors. As a result, there is a paucity of knowledge regarding the combination of managerial practices that creates value.

Accordingly, the authors have developed a theoretical framework which comprises a series of managerial practices in relation to a range of internal and external contextual factors, designed for value creation within a circular business model.

The internal factors are as follows: strategic orientation; industrial capabilities; learning and training mechanisms; company age and size. The external factors are as follows: geography (local and cultural settings); regulatory framework; level of market competition. The managerial practices are those oriented towards energy efficiency, the use of environmentally-friendly materials, design practices (such as recycling, remanufacturing and reuse, disassembly, and the environment), and the development of awareness and new skills among all supply chain partners, with the objective of rendering the business model more circular. Furthermore, effective communication with suppliers, retailers and end-of-life materials managers (such as the waste industry), and the other actors in the supply chain is essential. Finally, managerial commitment is a crucial factor.

The framework is applied to a case study, a US SME ("Bark House") in the building sector. In 2017, it was the first and only Cradle-to-Cradle Platinum-certified product holder, and it can be used as a set of best practices that can be adapted to different sectors. Despite being one of the most resource-consuming sectors in the world, the building sector is relatively unexplored in circular business models. Furthermore, as 98% of companies in the US are SMEs, they are key players in the transition towards circularity. Unfortunately, research on circular business models tends to focus on large companies.

The main findings show that the major issues are the adaptation of the business model to specific internal and external contextual factors, the valorisation of local waste through the harmonisation of managerial practices and the socio-cultural and economic environment, and the sustainable behaviour of actors in the supply chain. The study also provides managers with a roadmap for creating value in a given context by increasing the level of circularity. However, it should be noted that the study is limited in its exclusive focus on biological materials. Technological materials, while important, remain a gap to be filled in studies. Further research should generalise the proposed framework to larger samples. Geographical location and cultural setting are also a promising avenue for contextualised future research.

### 3.2.10 – *Most cited papers*: De *et al*., 2020

The latest contribution is that of De *et al*. (2020). The authors initially highlight that although SMEs play a pivotal role in economic development, including in India, they collectively bear responsibility for up to 70% of global pollution, with over 50% of industrial pollution in the Asia-Pacific region. In order to survive, competitive pressures from both the demand and

supply side often force SMEs to strategically prioritise economic considerations over environmental and social aspects. Nevertheless, environmental sustainability is also becoming a business imperative for survival. The authors posit that the integration of lean practices, which prioritise efficiency, and sustainable innovation, which integrates social, economic and environmental considerations, can enhance the competitiveness of SMEs. However, there is a paucity of knowledge regarding the combination of lean practices and sustainability-oriented innovation (SOI) on the sustainability of SME supply chains, as lean and SOI have been studied in isolation. Consequently, the objective of this article is to address this gap by proposing a framework based on DEA (Data Envelopment Analysis) (Charnes *et al*., 1978) and implementing it on a group of 35 manufacturing SMEs in the eastern region of India. The input criteria of the proposed framework are lean and SOI, while the output criteria are economic, operational, environmental and social aspects. DEA is capable of identifying inefficient SMEs and proposing at least one more efficient SME as a benchmark. Subsequently, a case study is conducted through semi-structured interviews with the aforementioned group of SMEs over the course of 2016 and 2017. The authors posit that the results demonstrate that SMEs can be sustained through the optimal combination of lean and sustainable innovation practices. The DEA framework is therefore a potential tool that can assist policy makers to identify and support those SMEs which have the potential to become highly efficient. It is argued that this framework enables individual SMEs to assess their specific sustainability status and, if inefficient, identify improvement actions through benchmarking against their peers. Moreover, it is contended that this framework enables individual SMEs to assess their specific sustainability status (e.g. by using SWOT analysis) and, if inefficient, identify improvement actions through benchmarking against their peers. Further research could examine the differences across various economic regions and observe the influence of policies, funding and legislation on lean and SOI for the purpose of supply chain sustainability. Further research could be conducted to examine the impact of CSR in conjunction with lean and SOI on the sustainability of supply chains in SMEs.

To address the potential influence of document age on citation counts, as older publications tend to accumulate more citations over time, we have compiled a list of the top 10 most-cited papers based on their average annual citation rate (Paltrinieri *et al*., 2019; De Giuli *et al*., 2023). This approach aims to mitigate the potential bias introduced by document age on the overall citation count (Table 2). Papers marked with an asterisk appear in both the overall top-cited list and the average annual citation rate list, and are discussed only once to avoid redundancy.

## 3.3 – *A systematic review of the Most cited papers by total citations per year*

### 3.3.1 – *Most cited papers:* **Chatterjee et al., 2022**

Chatterjee *et al*. (2022) posit that the use of big data-driven innovation facilitates the efficient management of resources, customer relationships and partner relationships. For SMEs, the strengthening of innovative technological capabilities, R&D capabilities, CRM technologies, and flexible working systems can enhance their resilience even in the post-pandemic era.

This study aims to investigate how big data-driven innovation and technological capabilities affect the supply chain systems of SMEs, with a particular focus on the moderating role of SMEs' technology leadership on their performance.

The researchers selected four major Indian cities with a high concentration of SMEs. Subsequently, a sample of SMEs is identified and a structured questionnaire is administered to 716 managers involved in the supply chain processes. The data from 327 complete and usable responses are analysed using PLS-SEM.

The findings suggest that the capabilities of SMEs, including technological, innovation potential, operational flexibility and relationship management, can significantly enhance their supply chain resilience. The role of technology leadership in facilitating the adoption and implementation of big data-driven applications, cloud computing optimisation strategies, IoT-enabled technologies and similar initiatives cannot be overstated.

**Table 2 – Top documents by total citations per year. Papers marked with an * are also reported in Table 1.**

| N | Paper | Source | DOI | TC | TC /Y |
|---|---|---|---|---|---|
| 1* | KLEWITZ J., HANSEN E.G., 2014 | Journal of cleaner production | 10.1016/j.jclepro.2013.07.017 | 853 | 77.6 |
| 2* | KHAN S.A.R., GODIL D.I., JABBOUR C.J.C., SHUJAAT S., RAZZAQ A., YU Z., 2021 | Annals of operations research | 10.1007/s10479-021-04275-x | 139 | 34.8 |
| 3* | MANI V., JABBOUR C.J.C., MANI K.T.N., 2020 | International journal of production economics | 10.1016/j.ijpe.2020.107656 | 134 | 26.8 |
| 4 | CHATTERJEE S, 2022 | Computers & industrial engineering | 10.1016/j.cie.2022.108058 | 69 | 23 |
| 5* | MOORE S.B., MANRING S.L., 2009 | Journal of cleaner production | 10.1016/j.jclepro.2008.06.004 | 328 | 20.5 |
| 6 | ULLAH H, 2022 | Environmental science and pollution research | 10.1007/s11356-021-15919-7 | 60 | 20 |
| 7* | DE D., CHOWDHURY S., DEY P.K., GHOSH S.K., 2020 | International journal of production economics | 10.1016/j.ijpe.2018.07.003 | 99 | 19.8 |
| 8* | ZHOU F., WANG X., LIM M.K., HE Y., LI L., 2018 | Journal of cleaner production | 10.1016/j.jclepro.2018.05.247 | 128 | 18.3 |
| 9* | NAMAGEMBE S., RYAN S., SRIDHARAN R., 2019 | Management of environmental quality: an international journal | 10.1108/MEQ-10-2017-0119 | 100 | 16.7 |
| 10* | ÜNAL E., URBINATI A., CHIARONI D., MANZINI R., 2019 | Resources, conservation and recycling | 10.1016/j.resconrec.2018.12.034 | 99 | 16.5 |

Moreover, results show that digitalised supply chain management should be adopted as an enduring and long-term strategic approach to ensure the resilience and high performance of supply chain operations SMEs. Future research could more accurately verify the causal linkages between the constructs through longitudinal studies and econometric analyses. It is recommended that data be collected from a range of geographical locations, with particular attention paid to the role of moderating variables such as technology turbulence, government policies and environmental dynamism. Finally, further technological capabilities, such as the

integration of blockchain in supply chain management processes, the application of artificial intelligence and neural networking technology, should be studied.

### 3.3.2 – *Most cited papers:* Ullah et al. (2022)

Ullah *et al*. (2021) use the concept of green intellectual capital (green human capital and green structural capital) as the integration of a range of factors, encompassing employee awareness, intellectual material, knowledge, experience, intellectual property, and information, which collectively facilitate long-term value creation. The objective of this study is to investigate the moderating role of green innovation among green intellectual capital on the sustainability of Pakistani manufacturing companies. A survey of 800 participants representing the Pakistani SME sector's supply chain is conducted, and a comprehensive quantitative approach is adopted based on the SEM model using Smart-PLS and Stata analysis.

The findings of this study demonstrate that the variables under investigation, including green human capital and green structural capital, significantly impact the sustainability of businesses. Consequently, businesses must prioritise investment in their green intellectual capital through training, skill enhancement, and career advancement.

## 4 – Future research questions

By analysing the past literature on the topic, we can formulate future research questions worth being investigated. Answering these questions will help the understanding on how SMEs can successfully contribute to the transition to a more sustainable economic system and how they can integrate into supply chains the sustainability objectives and strategies.

We divide the proposed research questions into subgroups in Table 3. SMEs in supply chains have the potential advantage to access MNEs resources to improve their sustainable performance, but it is undeniable that SMEs generally face constraints in accessing financial and human resources to implement a radical innovation. Additionally, many SMEs are family businesses and this makes a business model innovation even more complicated.

Relationships with MNEs, governments and other involved stakeholders can be important in helping SMEs to implement sustainable supply chain management systems, but regulation shall take into account proportionality, i.e., SMEs have less resources to perform a transition to a sustainable business model and might face hurdles in communicating their sustainable performance, even within the supply chain organisational flow.

SMEs represent the majority of enterprises and contribute significantly to the creation of value. SMEs are distributed across both developed and emerging countries and are integrated into local and global supply chains. Nevertheless, the circumstances prevailing in developed and emerging countries are strikingly disparate. It is evident that geographical, industrial, institutional characteristics and the possibility of access to facilities and financing by SMEs can, in turn, influence the speed or feasibility of the transition to sustainable supply chains in a cascading process. This aspect must be investigated with particular interest, since sustainable growth is only possible when all parties cooperate and no country is left behind.

In light of the financial challenges faced by many SMEs, it is crucial to examine the financial and economic implications of sustainable supply chains for SMEs. It is also essential to ascertain whether SMEs can derive economic advantages from this transition. While green technologies

and sustainable innovation have the potential to reduce costs, improve economic efficiency, enhance organisational performance, and significantly promote environmental sustainability, it remains unclear whether they can consistently deliver on these promises.

**Table 3 – Future research topics**

| Topic | Research questions examples |
|---|---|
| **Resources and capabilities** | • How can SMEs implement sustainable supply chains?<br>• How can SMEs attract financial and human resources to deal with sustainability?<br>• Can SMEs in supply chain benefit from resources deriving from MNEs to drive sustainable change?<br>• Can SMEs and supply chain promote green intellectual capital through training, skill enhancement, and career advancement? |
| **Innovation** | • What is the role of radical innovation for sustainable SMEs in supply chains?<br>• How do SMEs implement business model innovation and sustainable entrepreneurship?<br>• Can new technologies (e.g. blockchain) enable more sustainable innovation for SMEs? |
| **Third parties** | • Can SMEs benefit from their relationship with MNEs to access funds, innovation or strategies for a sustainable supply chain management?<br>• What incentives could be implemented by policymakers to favour SMEs innovation in sustainability?<br>• Would regulation be helpful or detrimental to sustainable innovation and implementation of sustainable strategies and solutions for SMEs in supply chains?<br>• Can SMEs specialise in sustainable driven innovation for supply chains?<br>• Are networks and partnerships with MNEs, governments, or non-profit organisations a viable strategy of improving SMEs performance in environmental and sustainable issues? |
| **Geography, industry and data** | • What are cross-country differences in the approaches taken by SMEs in supply chains to address sustainability issues?<br>• What institutional factors can affect the ability of SMEs to revert to more sustainable supply chain management systems?<br>• Are there industry specific characteristics that can affect the transition to sustainable supply chains for SMEs?<br>• What information is currently available on the level of sustainability of SMEs participating in supply chains and global supply chains? |
| **Outcomes** | • What are the advantages of supporting SMEs' sustainable organisational innovation?<br>• Can green technologies and sustainable innovation reduce costs, enhance efficiencies, improve organisational performance, and promote environmental sustainability for SMEs? |

## 5. Conclusions

This paper presented a bibliometric review on the literature investigating SMEs, supply chains and sustainability. The objective is to understand whether the role of SMEs involved in supply chains in delivering a more sustainable economic system is sufficiently understood.

The evidence suggests that the topic is becoming increasingly studied, but so far the literature is still scant, especially if compared with the three main topics (SMEs, supply chains and sustainability) that have produced each a large stream of studies.

As it becomes clear that the integration of sustainability in supply chains is a necessary strategy to improve the overall sustainability of manufacturing systems and the overall economy, SMEs should be put in the position to contribute effectively, overcoming their financial and resource constraints that might impede them to participate in innovation or to pursue a successful transition.

The analysis of the top-cited papers reflects this relatively low specialisation of the literature, that investigates the three aspects together, but rarely actually integrating them. SMEs are studied in their differences with respect to larger companies in supply chain, but future studies should clarify how can SMEs implement sustainable supply chains, how they can interact with external third parties (e.g., within SMEs' networks, MNEs, policymakers) to contribute to the transition and how industry and institutional settings can affect the success of sustainable strategies. Additionally, robust evidence should be provided on the advantages for SMEs in supply chains that invest in innovation to make their business model sustainable.

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# Appendix
## Synonyms used to analyze the keywords

| Keyword | Synonyms |
|---|---|
| **agriculture** | agriculture, agriculture sector |
| **agrifood products** | agrifood products, agro-food products |
| **analytic hierarchy process** | analytic hierarchy process, analytic hierarchy process (ahp) |
| **automotive** | automotive, automotive industry |
| **best–worst method** | best–worst method, best worse method |
| **blockchain** | blockchain, blockchain technology |
| **building sector** | building sector, buildings |
| **circular economy** | circular economy, circular economy concept |
| **corporate social responsibility** | corporate social responsibility, csr, corporate social responsibility (csr) |
| **covid-19** | covid-19, covid |
| **cyber-physical production system (cpps)** | cyber-physical production system (cpps), cyber-physical systems (cpss) |
| **dairy** | dairy, dairy products |
| **developing country** | developing country, developing economy |
| **eco-innovation** | eco-innovation, ecoinnovation |
| **firm performance** | firm performance, firm's performance |
| **food supply chain** | food supply chain, food supply chains |
| **green scm** | green scm, green supply chain management (gscm), green supply chain management practices, gscm, gscm practices |
| **india** | india, indian |
| **information system** | information system, information systems |
| **internet-of-things** | internet-of-things, internet of things, iot |
| **interpretive structural modeling** | interpretive structural modeling, ism |
| **multi-criteria decision-making** | multi-criteria decision-making, multicriteria decision making (mcdm) |
| **preference selection index** | preference selection index, preference selection index (psi) |
| **resilience** | resilience, résilience |
| **scm** | scm, supply chain management (scm), supply chain management |
| **sscm** | sscm |
| **sme** | sme, smes, small and medium enterprises, small medium enterprises, small medium firms, small and medium enterprises, small and medium enterprises (smes), small- and medium-sized enterprises, small-and medium-sized enterprise, small-to medium-sized enterprise, small and medium-sized enterprise (sme), small and medium-sized enterprises, small and medium businesses, small and medium enterprise, small and medium enterprise (sme), small and medium enterprises (sme), small and medium sized enterprise (sme), small and medium enterprises (smes), small and medium sized enterprises (smes), small to medium-sized enterprises |
| **structural equation modeling** | structural equation modeling, structural equation modeling (sem) |