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The unravelled role of soft skills in the logistics and supply chain management field

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ABSTRACT

The progression of logistics and supply chain management (LSCM) has been significantly influenced by various factors, such as structural changes, increased customer awareness, digitalization, resilience requirements, and a growing emphasis on sustainability. This intricacy emphasizes the need for a comprehensive reevaluation of essential professional competencies. This study aims to provide a thorough and comprehensive examination of the existing academic literature to identify the critical skills that are crucial to the current LSCM environment.

The paper is a systematic analysis based on bibliographic methods. Descriptive, bibliographic coupling, and conceptual analyses will be carried out using two distinct software applications: Biblioshiny for Bibliometrix (employed for descriptive and conceptual analyses) and VOSViewer (utilized for bibliographic coupling). A systematic examination of the clusters derived from bibliographic analyses will then be undertaken to derive more nuanced insights.

The analysis of academic literature indicates that much of the attention in the LSCM field has been directed toward technical proficiencies, quantitative abilities, and operational expertise. The overemphasis on hard skills suggests a potential oversight in recognizing the full spectrum of competencies required for success in the evolving landscape of LSCM. Our research reveals a discernible trend towards emphasizing soft skills, as evidenced by the presence of two out of the four clusters focusing on competencies of this nature.

The practical application of this research involves assisting professionals in creating personalized training plans, aiding logistics associations in developing a broader range of skills in response to significant changes and helping universities in designing specialized courses on soft skills for logistics. The theoretical aspect delves into the intricate relationship between soft skills and technical proficiency in logistics, yielding critical insights into how Human Resources can effectively contribute to enhancing a company's overall value.

Introduction

In recent decades, logistics and supply chain management (LSCM) has undergone profound changes at an unprecedented pace (Saebi et al., 2017). Notably, disruptive events such as the global COVID-19 pandemic, conflicts in the Russian–Ukrainian and Middle Eastern regions, climate-induced disasters, and digital disruption have significantly reshaped its perception. Supply chains have expanded both in scope and globally, incorporating emerging nearshoring options alongside established offshoring practices. Furthermore, technological advancements, combined with escalating concerns about sustainability, have significantly transformed the operational landscape of businesses (Li et al., 2023; Pynadath et al., 2023).

This evolving scenario requires a deep reflection on the skills required for effective engagement in LSCM.

Existing literature reviews including works by Gammelgaard and Larson (2001), Marasco (2008), Thai et al. (2011), and Derwik and Hellström (2017), while foundational, do not reflect the latest developments and trends in the field. Over the past decade, significant advancements have been made in understanding and defining the skills required in various industries, driven by technological progress, globalization, and changing workforce dynamics.

In reviewing the existing literature on skills, it becomes apparent that much of the work is either partial, localized, or relies heavily on

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systematic literature reviews. For instance, the literature on soft skills, such as the study by Marin-Zapata et al. (2022), primarily employs a systematic review approach, which, while comprehensive, may not capture the full practical application and variation across different contexts. Similarly, studies that address both hard and soft skills, such as those by Lamri and Lubart (2023), Enginoğlu and Arikan (2016), and González-Salamanca et al. (2020), also depend on systematic literature reviews. This method often limits the scope to existing documented research, potentially overlooking emergent trends and contextual nuances.

Furthermore, the exploration of soft skills across various fields, as evidenced by works like Asefer and Abidin (2021) and Iriarte and Bayona Orè (2018), predominantly presents findings within specific industries or regions. Localized studies, such as Babić and Slavković's (2011) research on Serbian companies, provide valuable insights but may not be generalizable to broader or different geographical and professional contexts. Pazil and Razak (2019) conducted a systematic review on the perspectives of Asian employers regarding graduates' soft skills. Similarly, Widad and Abdellah (2022) used a scoping review to examine strategies for teaching soft skills in undergraduate nursing education.

These examples underscore a broader trend in the literature: the reliance on systematic reviews and localized/sectorial studies. While such methodologies are valuable for synthesizing existing knowledge, they often fall short in addressing the full spectrum of practical applications and contextual variations. This limitation is particularly evident in the logistics sector, a critical component of the global economy, which has not experienced the same level of progress in the development and definition of skills. Therefore, the necessity of this study lies in its unique approach to comprehensively mapping the skill requirements in the LSCM field through bibliometric analysis.

By bridging this gap, the research offers a comprehensive view of the competencies required, thereby contributing original insights that address both historical and contemporary needs. Updating the literature on skills in LSCM will not only connect past and current knowledge but also provide a robust foundation for future research and practical applications in education, human resource management, professional development, and organizational advancement.

Thus, this study aims to thoroughly examine the current academic literature to understand the essential skills recognized by scholarly works in the field of LSCM. Furthermore, it seeks to identify skills that have not received much scholarly attention, opening possibilities for future research directions. It is guided by two overarching research questions:

RQa: What skills does the literature currently recognize as essential in the field of logistics?
RQb: What skills are currently understudied?

The primary inquiry, framed as RQa, embarks on a comprehensive exploration of existing literature to discern and synthesize the skills acknowledged as indispensable within the logistics domain. Complementarily, RQb directs our focus toward skills that currently reside in the realm of understudied facets. By systematically probing the existing research landscape, our study aspires to identify and delineate areas where further investigation is warranted.

In the pursuit of these objectives, bibliometric analyses are conducted on a sample of articles extracted from the Clarivate Analytics Web of Science (WoS) Core Collection. Specifically, descriptive, bibliographic coupling, and conceptual analyses will be carried out using two distinct software applications: Biblioshiny for Bibliometrix (employed for descriptive and conceptual analyses) and VOSViewer (utilized for bibliographic coupling). A systematic examination of the papers' part of the clusters derived from the bibliometric analyses will be conducted to gain further insights on the content of each cluster.

Bibliometric analyses uncover focal articles and objectively illustrate the linkages between and among articles about a certain research topic or field (Zamore et al., 2018), providing useful insights on the extant body of literature and/or the future pathways of the research. However, a systematic content analysis of the paper can help in providing further insights on the results of bibliographic analyses.

This study aspires to fundamentally transform our comprehension of LSCM skills through an exhaustive bibliometric analysis of contemporary academic literature. By rigorously deconstructing and synthesizing extant research trends, this investigation seeks to elucidate both entrenched skills and frequently neglected competencies that are paramount in the modern logistics field.

This investigation makes significant contributions to both theory and practice in LSCM. It systematizes existing scholarship on essential skills, enhancing contemporary understanding and identifying research gaps for future exploration. Practically, it benefits enterprises and logistics professionals by pinpointing the skills necessary to navigate modern challenges. Additionally, it guides academic institutions in incorporating these skills into curricula, ensuring comprehensive training for future professionals. The study provides a detailed framework, highlighting the importance of both technical and soft skills, and offers actionable insights for industry practitioners, educators, and researchers to develop effective training and educational programmes.

The remainder of this paper is structured as follows. Following this introduction, Section 1 delineates the literature review. Section 2 provides a detailed exposition of the research methodology employed, elucidating the chosen research design, data collection techniques, and analytical tools utilized. Section 3 presents a thorough analysis of the study's findings, elucidating not only the prominent patterns and trends revealed during the investigation but also providing an understanding of the fundamental research objectives and inquiries that have guided the purpose of this endeavour. Implications of the study are addressed in the subsequent Section 4. Conclusions are drawn in Section 5 while Section 6 synthesizes the findings and implications thereof, providing insight into the practical and theoretical ramifications of the research outcomes. Additionally, avenues for further inquiry and limitations are highlighted.

Literature review

Recent challenges and global disruptions, such as digitalization and the aftershocks of a pandemic and of continuous socio-political changes, really impacted on the environment in which firms operate (Li et al., 2018; Saebi et al., 2017). LSCM is one of the main impacted areas as, in this dynamic landscape, it is transforming from a historically encompassed auxiliary functions of organizations to a considerably more expansive and intricate conceptualization both in theory and practice (McKinnon et al., 2017).

LSCM plays the pivotal role as the linchpin facilitating the efficient transportation and distribution of goods, addressing the intricate challenges inherent in the timely and reliable movement of products across a global marketplace. LSCM's significance extends far beyond the conventional view of a mere facilitator; it is an essential enabler for businesses to meet the ever-evolving demands of their customers, adapt to rapidly changing market conditions, and optimize their supply chain operations for enhanced competitiveness. As such, LSCM's functions and responsibilities have become increasingly central to the overarching success of contemporary enterprises.

This paradigm shift has been highlighted in the works of scholars such as Ayres (2010), Bozarth and Handfield (2016), and Krajewski et al. (2016), spanning across academic literature and scholarly contributions. Modern LSCM is now comprehended in a dual capacity, encompassing a system/network that manages physical, informational, and financial flows linking a plurality of enterprises participating in a single supply chain, and simultaneously a *process of strategically managing the procurement, movement and storage of materials, parts and finished inventory (and the related information flows) through the organization and its*

marketing channels in such a way that current and future profitability are maximized through the cost effective fulfilment of orders. (Christopher, 2005, p. 4)

Conceived in this manner, LSCM assumes a pivotal role in orchestrating the harmonious interaction among various nodes, necessitating the establishment of resilient structures and the cultivation of adaptability and responsiveness in individuals to withstand both external and internal perturbations. In this regard, the capacity to seamlessly integrate LSCM with other business functions is a notable attribute incumbent upon an adept logistics and supply chain manager. This imperative is emphasized by scholars such as Lambert et al. (2008), Sabet et al. (2017), Willis et al. (2016), and Zhu et al. (2017). Moreover, in addition to this intra-organizational acumen, a proficient logistics and supply chain manager must also be proficient in engaging with diverse entities operating within the same supply chain, including suppliers, customers, and logistics operators, among others.

Furthermore, the ongoing digital transformation and the escalating concern for sustainability, encompassing economic, social, and environmental dimensions, are driving a recalibration of the equilibrium between internal and external exigencies (Geissdoerfer et al., 2018). This challenge is compounded by the inherent uncertainty characterizing the future of LSCM. Multiple concurrent trends and ongoing alterations render forecasting less precise, and the stability of optimal supply chain configurations over an extended period increasingly rare.

Hence, the exigency arises to identify a sustainable balance between the two prevailing perspectives – company-centric and customer-centric – which, despite appearing as divergent, necessitate simultaneous management. This balance seeks to offer customers a more personalized and gratifying purchasing experience while concurrently capitalizing on conventional logistics parameters like product availability and expeditious delivery times, a strategy extensively employed on a global scale by major e-commerce enterprises. This trend has culminated in a contemporary landscape where consumers are not only well-informed but also harbour heightened expectations for exceptional logistics services from even the smaller players in the market. In essence, the standards set forth by industry giants are now incumbent upon minor players, should they aspire to endure in this fiercely competitive arena.

In summary, the evolving role and structure of LSCM, heightened customer awareness (Pynadath et al., 2023), the ongoing process of digitalization, the increasing emphasis on resilience (Ambulkar et al., 2015; Hohenstein et al., 2015; Melnyk et al., 2014) and sustainability (Kalenyuk et al., 2019) all inevitably lead to shifts in the requirements for professionalism.

This study engages in a comprehensive examination of the extant scholarly literature to delineate the skills recognized as indispensable within the purview of logistics. Through an exhaustive review methodology, our objective is to contribute significantly to the synthesis and categorization of acknowledged skills within this field. Additionally, our research endeavours to identify and scrutinize skills that presently occupy a niche in the scholarly discourse, remaining understudied. This dual-pronged approach, encompassing both recognized and overlooked skill domains, is undertaken to provide a holistic understanding of the complex and dynamic landscape of logistics.

This dual-pronged approach, that drove the identification of this study's goals and research questions (see introduction), not only seeks to enrich our understanding of recognized skills but also strives to uncover and illuminate aspects deserving of heightened scholarly attention within the multifaceted realm of logistics.

Methodology

In order to achieve our research objectives, we opted for a combination of bibliometric and content analysis techniques (Bargoni et al., 2023; Christofi et al., 2021; Shamsollahi et al., 2021; Vrontis & Christofi, 2021). This methodological choice was driven by two principal considerations. Prevailing reviews on the subject predominantly adhere to a systematic approach, leaving a noticeable gap in the domain of bibliometric studies. As outlined by Budler et al. (2021), although subjective literature reviews are fundamental for theory building and conceptualization, they are insufficient to encompass the dynamics of research in a given field or to understand which publications had more influence on a specific topic (Backhaus et al., 2011; Maucuer & Renaud, 2019). Conversely, bibliometric analysis provides the opportunity to analyse citation patterns comprehensively and to systematize sub-streams and future research opportunity (Vallaster et al., 2019).

Moreover, bibliometric reviews are suitable for tracing the development of fragmented fields (Budler et al., 2021; Ramos-Rodriguez & Ruiz-Navarro, 2004) and unexplored fields (Obreja et al., 2024) as the topic of interest, detecting gaps and future avenues for research.

Following the example offered by previous studies (e.g. Obreja et al., 2024), this paper follows the five-step methodology proposed by Fahimnia et al. (2015) for comprehensive data collection and analysis within a specific field: mentioning the database used as a source; screening the initial results; refining the obtained results; developing particular data statistics; and examining the data set with some bibliometric techniques. Fig. 1 offers a comprehensive visualization of our research process.

Data sampling

This bibliometric review is builtupon a sample of 179 articles extracted from Clarivate Analytics Web of Science Core Collection (WoS) in November 2023. Articles were extracted using the Boolean OR and operators to combine the following string of keywords used to conduct the search (Bretas & Alon, 2021): "(TS=(logistic* AND "skill*") OR TS=("supply chain" AND "skill*") OR TS=(logistic* AND competence*) OR TS=("supply chain" AND competence*))". These were searched in the "Topic" area of WoS, meaning that papers that present those words in the title, abstract, or among keywords would be extracted. Then, some filters were adopted to ensure that the papers included in the final sample would be coherent with the analysed topic. First, papers were exclusively searched in the Social Science Citation Index, which is the WoS repository that includes papers related to social science studies. This choice stems from the willingness to include papers that would be adherent to the goal of this study, excluding those whose research areas' results are beyond those of this study. Second, only academic papers were included, excluding press articles and books or book chapters. Indeed, our goal was to analyse the current situation of research on this topic and those articles published in peer-reviewed journals. Third, a filter for area of interest was applied to include those articles exclusively related to business, management, economics, and industrial, manufacturing, and multidisciplinary engineering. This choice was pursued to overcome the possibility of the inclusion of papers that are in completely different areas compared to those that are the objects of this study. Indeed, it frequently happens that works that do not have any relation to the topic of interest are included in a sample of articles by mistake (e.g. homonymy of keywords). To immediately select those articles that are openly related to the correct research area is a way to increase the accuracy of the final sample. Only papers in English were eligible to be part of the final sample.

After filtering, the number of extracted articles was reduced from the initial 11,971 papers to a final group of 877. Finally, to obtain the definitive sample used to perform the bibliographic analyses, a final two-steps control was performed. The abstracts of each article were read independently by the authors with the aim of detecting and removing those papers that were not consistent with the topic of the study. Results of the independent screenings were then compared and discussed to remove inconsistencies, obtaining a final list of 179 papers. Therefore, these were the base for all the bibliographic analyses. The final sample is not only more accurate than the initial one, but also more manageable in bringing to more reliable results.

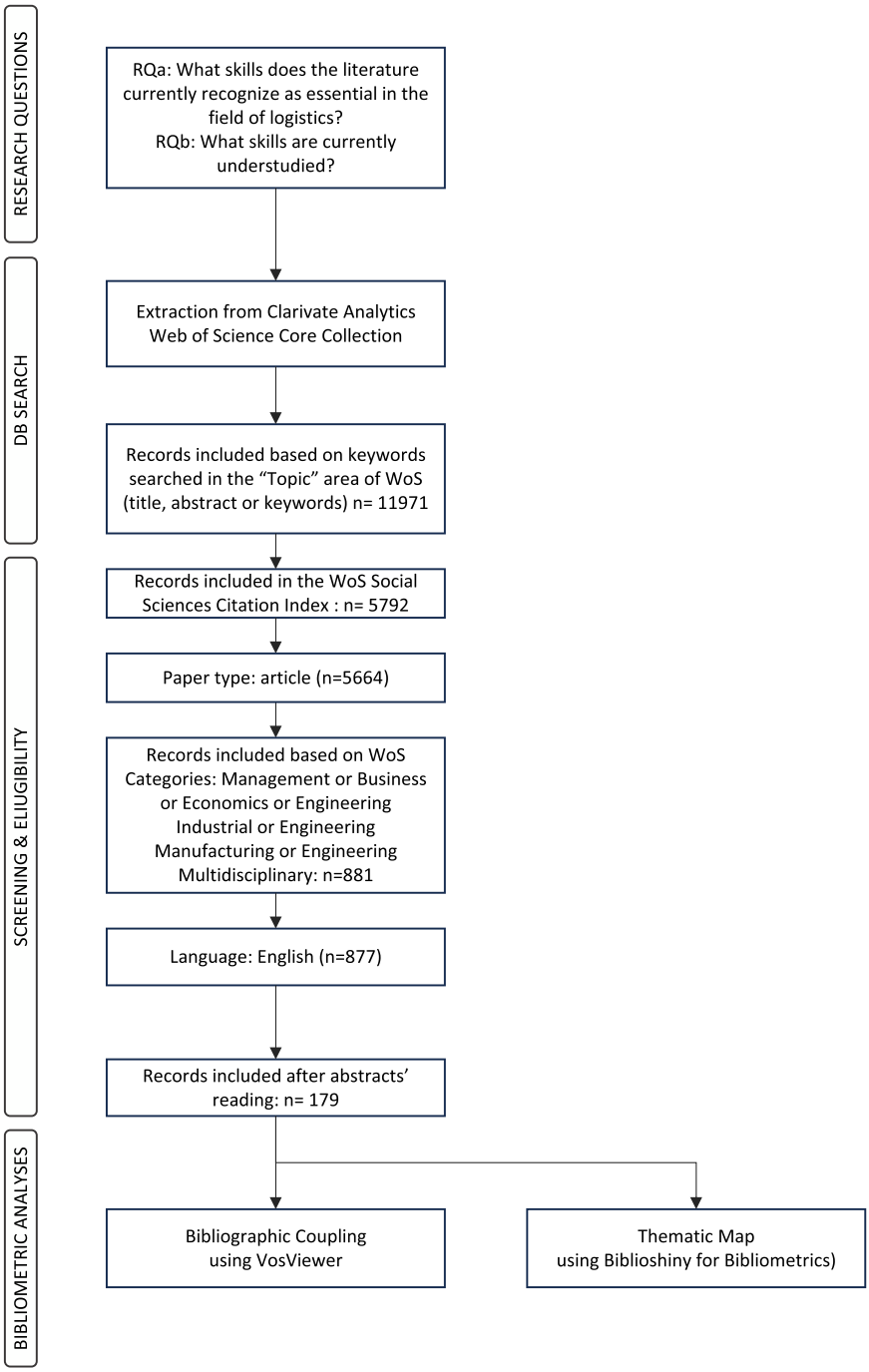

Fig. 1. Research process flowchart (authors' elaboration)

Data analysis

Once the final sample was established, the analytical and bibliometric part was performed in three steps.

First, the descriptive analysis was conducted with the support of Biblioshiny for Bibliometrix. This data analysis software developed in 2017 by Aria and Cuccurullo allows the main bibliometric analysis, and it is particularly suitable for scientific mapping. Indeed, through mathematical and statistical techniques and the elaboration of the data contained in the data set specifically selected, *Bibliometrix* investigates the distribution patterns of the publications and the impact they have. Specifically, by providing a structured analysis information, the software allows the deduction of the trends and themes of research over time, the identification, for instance, of the states most relevant for scientific production, the most cited articles and authors, and the determination of the academic institutions to which they are affiliated, with the aim of systematizing the existing theoretical content (Bargoni et al., 2023).

Second, data were further analysed employing the bibliographic coupling technique. This technique allows the structure of the existing literature to be mapped by analysing and grouping papers based on common themes derived from the analysis of the relationship between the cited references. The concept of bibliographic coupling was proposed by Kessler (1963), who found that the more similar the subject or content of papers, the more similar the references contained in them. Therefore, two papers that simultaneously cite a third paper are referred to as coupled papers, and the relationship between them is bibliographic coupling (Lim et al., 2024). The application of the bibliographic

coupling technique facilitated the delineation and examination of the intellectual and conceptual structure within the research stream, thereby unveiling the primary macro-thematic areas addressed in the existing literature. The VOSViewer software was employed for this analysis, wherein clusters were generated with a citation threshold set at 10 and the elimination of non-connected papers. The VOSViewer software (Van Eck & Waltman, 2010) is indeed useful to analyse and graphically represent bibliographic data through the visualization of similarities (VOS) mapping technique providing distance-based visualizations of bibliometric networks (Van Eck & Waltman, 2014).

Third, to improve the thematic breakdown and conceptual analysis of the papers, a thematic map was developed with Biblioshiny for Bibliometrics. Based on co-word analysis, the thematic map draws clusters based on the analysis of keywords. Authors' keywords are considered as themes, whose density (internal associations) and centrality (external associations) can be used in classifying them and mapping on a two-dimensional thematic map. We can then analyse themes according to the quadrant in which they are placed (Bretas & Alon, 2021): high density and centrality; low density and high centrality; high density and low centrality; and topics with low values on both axes. The matrix therefore offers four quadrants in which the clusters of papers are placed: niche themes; motor themes; emerging/declining themes; and basic themes. The dimension of each cluster is suggested by the dimension of the circles positioned in the matrix. This final analysis is therefore particularly appropriate for identifying those issues that merit further attention by future literature (i.e. those placed in the "Emerging themes" quadrant).

To conclude, a final step followed both the bibliographic coupling and the identification of the thematic map. In both cases, the clusters derived from the two analyses were screened by the authors who read the papers in each cluster to identify common themes and understand the main topic of the cluster. This final content analysis (Bahoo et al., 2021; Fetscherin & Heinrich, 2015) was conducted to summarize the trends in the literature and to increase the understanding of the clusters that emerged from the bibliometric analysis to propose promising avenues for future research (Bretas & Alon, 2021).

Results

Descriptive data analysis

The research sample encompasses 179 documents published over a span exceeding two decades, ranging from 2000 to 2023. Fig. 2 offers an immediate visualization of the evolution of the literature over the years.

The graph suggests that after an initial paper published on this topic in 2000, the issue was ignored until 2006 when 6 papers of the sample were published. From that year the interest about this topic grew steadily, registering a peak in 2018 and gaining decisive momentum after 2020. In 2017 a pivotal study by McKinnon and colleagues about the importance of skills for supply chain management was published via the World Bank, and this probably inspired many researchers in conducting studies about this topic. Similarly, the socio-economic macro-events that have taken place since 2020 till today (from COVID-19 to the Russia–Ukraine and Middle-East conflicts) are raising new awareness about the importance of logistics and SCM. These reasons completely motivate the peak of publication in recent years, with 88 papers published between 2020 and 2023. At the date of the extraction for this study, in October 2023, 22 papers had already been published in that year. This suggests that this year will probably reach and exceed the number of 29 publications offered by 2022. This recent and growing interest is also suggested by the low average age of the papers (5 years on a time span of publication of 23 years), which underlines a substantial curiosity and attention towards the topic of this study offering promising horizons for this stream of literature. However, a rapid increase of contributions can also lead to a difficult identification of well-defined research areas. This is the reason why a systematization of the extant literature can help to better define the future evolution of the topic.

The analysis of the article sample reveals that it comprises 507 authors, reflecting a significant degree of collaboration, as evidenced by the relatively small number of single-authored documents, which only accounts for 11 out of 179. It is worth noting that the level of international co-authorship is substantial, accounting for 41.34%, indicating a global interest in the subject matter. This global engagement is further demonstrated by the geographical distribution of scientific production, which shows a prominent North American leadership with 30 papers originating from authors affiliated with US universities. After the United States, the United Kingdom follows with 19 documents, China with 16 articles, and India with 14 papers. The sample also reflects a diverse geographical spread, encompassing contributions from regions spanning Europe, South America, and Australia, indicating a widespread and global interest in the topic (see Fig. 3 for details). If we adopt a regional perspective instead of a country-based one, we can observe the essential role of Europe in producing knowledge on LSCM skills and competencies. Indeed, when we sum articles from Italy, Sweden, France, and Germany, we get 31 papers, one more than those produced by the USA overall. This evidence is noteworthy for two reasons. First, it seems to be consistent with the consensus (among professionals) that EU LSCM represents a global best practice worthy of academic and practical investigation. Second, the European Union has emerged over the years as a crucial facilitator of industrial relationships, and this is clearly reflected by the number of scientific contributions devoted to the investigation of LSCM in this region.

Conclusively, in the context of our examined sample's cited references, the essential contributions to this knowledge domain are identified as Giunipero et al.'s "Supply management's evolution: Key skill sets for the supply manager of the future" (International Journal of Operations & Production Management, 2006) and Murphy and Poist's "Skill requirements of senior-level logisticians: A longitudinal assessment" (Supply Chain Management, 2007). Notably, these two documents emerge as the most frequently cited within the sample, signifying their prominent influence and recognition within the broader body of

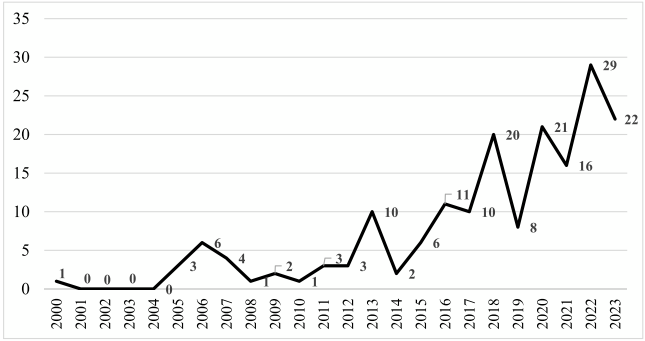

Fig. 2. Annual scientific production (authors' elaboration)

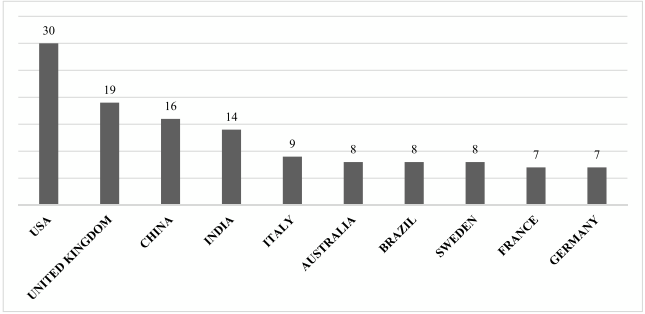

Fig. 3. Countries' scientific production (authors' elaboration)

analysed literature.

Conversely, the documents that exhibit the highest global citation impact within the sample – those most frequently cited across a broader scholarly spectrum – are identified as Waller and Fawcett's "Data science, predictive analytics, and big data: A revolution that will transform supply chain design and management" (Journal of Business Logistics, 2013) accruing a total of 682 citations, and Chowdhury and Quaddus's "Supply chain resilience: Conceptualization and scale development using dynamic capability theory" (International Journal of Production Economics, 2017) with a cumulative citation count of 293.

Bibliographic coupling

The bibliographic coupling revealed four distinct clusters, indicative of as many interconnected main topics (refer to Fig. 4), identified through the reading of the papers included in each cluster. Table 1 presents a comprehensive list of articles included in each cluster. For each cluster, the table provides detailed information on the authors, article titles, source titles, publication years, and DOI links.

The red cluster, designated as "Dynamic capabilities for SCM and logistics", stands as the largest cluster, encompassing 43 articles. Predominantly, the studies within this cluster employ the dynamic capabilities framework (Teece et al., 1997) to articulate the imperative of updating SCM and logistics processes and competencies in response to a continually evolving environment. This perspective is notably applied to examine the adaptations required for sustained competitiveness amidst ongoing technological innovations in the sector.

For instance, Li et al. (2023) present a framework delineating a three-level hierarchy of capabilities – proactive capabilities, reactive capabilities, and resource reconfiguration – to address technological innovation and risk management. Wei et al. (2020) advocate for a combination of explorative and exploitative information technology capabilities, asserting their necessity to enhance information and operations knowledge sharing and support overall performance. Other studies posit that supply chain financing performance is intertwined with a company's innovation capability, market response capability, and the ability to manage new information technology applications (Lu et al., 2020). Yu et al. (2019) similarly assert that supply chains are becoming more dynamic due to the rapid pace of technological changes, emphasizing the criticality of swiftly adapting competencies to new scenarios for firm sustainability.

Furthermore, Pal et al. (2018) identify crucial competitive manufacturing capabilities for thriving in a high-cost environment, specifically highlighting time management, and product and process-related competencies. Another significant body of literature concentrates on the imperative of adapting competencies and processes to the integration of information technologies within firms. Rajesh (2017), for instance, examines the relationship between technological capabilities, supply chain design, and planning capabilities, contending that technological capabilities enhance flexibility and resilience to change. Similarly, Bolívar-Ramos et al. (2013) posit a positive relationship between IT skills, organizational absorptive capacity, and firm performance. Lastly, Dong et al. (2009) analyse the virtuous effect of IT on processes and performance, emphasizing the need to acquire and update IT competencies.

The second cluster, denoted by green and labelled "Soft skills for SCM and logistics", is specifically centred on papers (31) that concentrate on identifying skills unrelated to the management of technology or processes but are equally indispensable for effective operation within this sector.

For instance, effective communication emerges as a linchpin in this cluster (Derwik & Hellstrom, 2017; Dubey & Gunasekaran, 2015), necessitating meticulous coordination with diverse stakeholders, including suppliers, manufacturers, distributors, and retailers. Soft skills, encompassing attributes such as active listening, articulate communication, and the ability to distil intricate information into lucid discourse, are identified as instrumental in facilitating efficacious collaboration (Lambert et al., 2008; Sauber et al., 2008).

Moreover, the imperative of teamwork is underscored, elucidating its pivotal role in surmounting challenges and arriving at collective decisions to ensure the seamless orchestration of supply chain operations (Jordan & Bak, 2016; Lutz & Birou, 2013; Sohal, 2013).

According to Kovács et al. (2012) and Jordan and Bak (2016) the cultivation of soft skills, including empathetic negotiation, adaptability, and the ability to forge mutually advantageous outcomes, is considered paramount as they not only contribute to the formulation of enduring associations but also to the establishment of agreements conducive to mutual benefit.

The relentless dynamism inherent to LSCM begets high-stress scenarios, necessitating adept stress management capabilities among professionals. Soft skills, incorporating judicious time allocation emerged as germane competencies, affording professionals the capacity to maintain equanimity and make judicious decisions amid heightened pressure (Jordan & Bak, 2016; Kovács et al., 2012; Myers et al., 2004).

Myers et al. (2004) also identified social skills, decision-making, and problem-solving as essential for managing contemporary supply chains.

Bals et al. (2019) illuminated a critical facet of professional competence, delineating proficiencies deemed indispensable for practitioners. The authors underscored the pivotal role of negotiation, communication, and relationship management, emphasizing the intricacies inherent in interpersonal communication. Moreover, they advocate for a comprehensive skill set, encompassing strategic thinking and analytical acumen, alongside foundational knowledge in procurement and supply management (PSM) roles and processes.

Concurrently, Al Harrasi et al. (2023) contributed to the discourse by identifying a discernible lacuna in six soft skills. Their discernment extends to critical competencies, such as decision-making, quantitative modelling proficiency, stress management, negotiation acumen, adaptability to change, and self-development.

In parallel, Jordan and Bak (2016) articulated the paramount importance of behavioural acuity, nuanced decision-making, and adept people management skills within the purview of LSCM. Their discourse not only underscores the significance of these proficiencies but also highlights key domains that warrant additional scholarly inquiry.

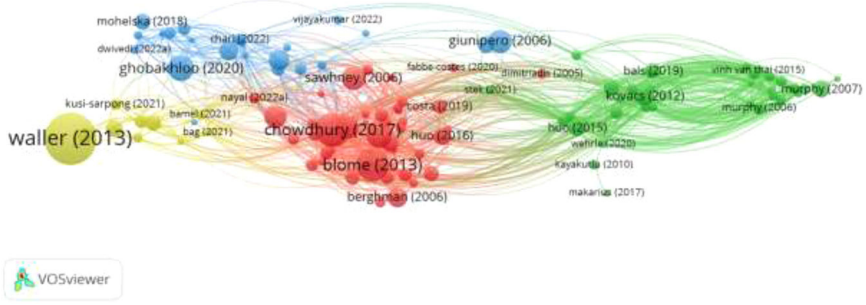

Fig. 4. Bibliographic coupling. Authors' elaboration using VOSViewer

Table 1
clusters resulting from the bibliographic coupling

Cluster	Authors	Article Title	Source Title	Publication Year	DOI Link
Dynamic capabilities for SCM and logistics	Li, LX; Gong, YM; Wang, ZQ; Liu, S	Big data and big disaster: a mechanism of supply chain risk management in global logistics industry	INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT	2023	https://doi.org/10.1108/IJOPM-04-2022-0266
	Nayal, K; Kumar, S; Raut, RD; Queiroz, MM; Priyadarshinee, P; Narkhede, BE	Supply chain firm performance in circular economy and digital era to achieve sustainable development goals	BUSINESS STRATEGY AND THE ENVIRONMENT	2022	https://doi.org/10.1002/bse.2935
	Nayal, K; Raut, RD; Yadav, VS; Priyadarshinee, P; Narkhede, BE	The impact of sustainable development strategy on sustainable supply chain firm performance in the digital transformation era	BUSINESS STRATEGY AND THE ENVIRONMENT	2022	https://doi.org/10.1002/bse.2921
	Jafari, H; Eslami, MH; Paulraj, A	Postponement and logistics flexibility in retailing: The moderating role of logistics integration and demand uncertainty	INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	2022	https://doi.org/10.1016/j.ijpe.2021.108319
	Han, WX; Huang, Y; Hughes, M; Zhang, M	The trade-off between trust and distrust in supply chain collaboration	INDUSTRIAL MARKETING MANAGEMENT	2021	https://doi.org/10.1016/j.indmarmai.2021.08.005
	Fabbe-Costes, N; Lechaptois, L; Spring, M	The map is not the territory: a boundary objects perspective on supply chain mapping	INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT	2020	https://doi.org/10.1108/IJOPM-12-2019-0828
	Wei, SB; Ke, WL; Liu, HF; Wei, KK	Supply Chain Information Integration and Firm Performance: Are Explorative and Exploitative IT Capabilities Complementary or Substitutive?	DECISION SCIENCES	2020	https://doi.org/10.1111/deci.12364
	Partanen, J; Kohtamäki, M; Patel, PC; Parida, V	Supply chain ambidexterity and manufacturing SME performance: The moderating roles of network capability and strategic information flow	INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	2020	https://doi.org/10.1016/j.ijpe.2019.08.005
	Lu, Q; Liu, BN; Song, H	How can SMEs acquire supply chain financing: the capabilities and information perspective	INDUSTRIAL MANAGEMENT & DATA SYSTEMS	2020	https://doi.org/10.1108/IMDS-02-2019-0072
	Ketokivi, M; Mahoney, JT	Transaction Cost Economics As a Theory of Supply Chain Efficiency	PRODUCTION AND OPERATIONS MANAGEMENT	2020	https://doi.org/10.1111/poms.13148
	Irfan, M; Wang, MZ; Akhtar, N	Enabling supply chain agility through process integration and supply flexibility Evidence from the fashion industry	ASIA PACIFIC JOURNAL OF MARKETING AND LOGISTICS	2020	https://doi.org/10.1108/APJML-03-2019-0122
	Yu, WT; Jacobs, MA; Chavez, R; Yang, JH	Dynamism, disruption orientation, and resilience in the supply chain and the impacts on financial performance: A dynamic capabilities perspective	INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	2019	https://doi.org/10.1016/j.ijpe.2019.07.013
	Negrao, LLL; Jabbour, ABLD; Latan, H; Godinho, M; Jabbour, CJC; Ganga, GMD	Lean manufacturing and business performance: testing the S-curve theory	PRODUCTION PLANNING & CONTROL	2020	https://doi.org/10.1080/09537287.2019.1683775
	Bravo, MIR; Stevenson, M; Moreno, AR; Montes, FJL	Absorptive and desorptive capacity configurations in supply chains: An inverted U-shaped relationship	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	2020	https://doi.org/10.1080/00207543.2019.1642530
	Costa, F; Granja, AD; Fregola, A; Picchi, F; Staudacher, AP	Understanding Relative Importance of Barriers to Improving the Customer-Supplier Relationship within Construction Supply Chains Using DEMATEL Technique	JOURNAL OF MANAGEMENT IN ENGINEERING	2019	https://doi.org/10.1061/(ASCE)ME.1943-5479.0000680
	Sallnäs, U; Huge-Brodin, M	De-greening of logistics? - Why environmental practices flourish and fade in provider-shipper relationships and networks	INDUSTRIAL MARKETING MANAGEMENT	2018	https://doi.org/10.1016/j.indmarman.2018.07.001
	Bae, HS; Grant, DB	Investigating effects of organisational culture and learning on environmental collaboration and performance of Korean exporting firms	INTERNATIONAL JOURNAL OF LOGISTICS-RESEARCH AND APPLICATIONS	2018	https://doi.org/10.1080/13675567.2018.1470232
	Durach, CF; Machuca, JAD	A matter of perspective - the role of interpersonal relationships in supply chain risk management	INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT	2018	https://doi.org/10.1108/IJOPM-03-2017-0157
	Gruchmann, T; Seuring, S	Explaining logistics social responsibility from a dynamic capabilities perspective	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2018	https://doi.org/10.1108/IJLM-08-2017-0200
	Lee, CH; Ha, BC	The impact of buyer-supplier relationships' social capital on bi-directional information sharing in the supply chain	JOURNAL OF BUSINESS & INDUSTRIAL MARKETING	2018	https://doi.org/10.1108/JBIM-01-2017-0021

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Cluster	Authors	Article Title	Source Title	Publication Year	DOI Link
	Pal, R; Harper, S; Vellesalu, A	Competitive manufacturing for reshoring textile and clothing supply chains to high-cost environment: A Delphi study	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2018	https://doi.org/10.1108/IJLM-10-2017-0270
	Bravo, MIR; Ruiz-Moreno, A; Montes, FJL	Examining desorptive capacity in supply chains: the role of organizational ambidexterity	INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT	2018	https://doi.org/10.1108/IJOPM-12-2016-0751
	Aharonovitz, MCS; Vieira, JGV; Suyama, SS	How logistics performance is affected by supply chain relationships	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2018	https://doi.org/10.1108/IJLM-09-2016-0204
	Wang, B; Kang, YF; Childerhouse, P; Huo, BF	Service supply chain integration: the role of interpersonal relationships	INDUSTRIAL MANAGEMENT & DATA SYSTEMS	2018	https://doi.org/10.1108/IMDS-02-2017-0062
	Chowdhury, MMH; Quaddus, M	Supply chain resilience: Conceptualization and scale development using dynamic capability theory	INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	2017	https://doi.org/10.1016/j.ijpe.2017.03.020
	Rajesh, R	Technological capabilities and supply chain resilience of firms: A relational analysis using Total Interpretive Structural Modeling (TISM)	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	2017	https://doi.org/10.1016/j.techfore.2017.02.017
	Chowdhury, M; Jayaram, J; Prajogo, D	The influence of socialisation and absorptive capacity on buyer's innovation performance	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	2017	https://doi.org/10.1080/00207543.2017.1346321
	Huo, BF; Ye, YX; Zhao, XD; Shou, YY	The impact of human capital on supply chain integration and competitive performance	INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	2016	https://doi.org/10.1016/j.ijpe.2016.05.009
	Coughlan, P; Draaijer, D; Godsell, J; Boer, H	Operations and supply chain management The role of academics and practitioners in the development of research and practice	INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT	2016	https://doi.org/10.1108/IJOPM-11-2015-0721
	Kumar, G; Banerjee, RN; Meena, PL; Ganguly, K	Collaborative culture and relationship strength roles in collaborative relationships: a supply chain perspective	JOURNAL OF BUSINESS & INDUSTRIAL MARKETING	2016	https://doi.org/10.1108/JBIM-12-2014-0254
	Corsini, F; Rizzi, F; Gusmerotti, NM; Frey, M	Extended Producer Responsibility and the Evolution of Sustainable Specializations: Evidences From the e-Waste Sector	BUSINESS STRATEGY AND THE ENVIRONMENT	2015	https://doi.org/10.1002/bse.1831
	Sangari, MS; Razmi, J	Business intelligence competence, agile capabilities, and agile performance in supply chain An empirical study	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2015	https://doi.org/10.1108/IJLM-01-2013-0012
	Gou, QL; Zhang, J; Liang, L; Huang, ZM; Ashley, A	Horizontal cooperative programmes and cooperative advertising	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	2014	https://doi.org/10.1080/00207543.2013.827809
	Bolívar-Ramos, MT; García-Morales, VJ; Martín-Rojas, R	The effects of Information Technology on absorptive capacity and organisational performance	TECHNOLOGY ANALYSIS & STRATEGIC MANAGEMENT	2013	https://doi.org/10.1080/09537325.2013.823152
	Blome, C; Schoenherr, T; Rexhausen, D	Antecedents and enablers of supply chain agility and its effect on performance: a dynamic capabilities perspective	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	2013	https://doi.org/10.1080/00207543.2012.728011
	Ferrer, M; Santa, R; Storer, M; Hyland, P	Competences and capabilities for innovation in supply chain relationships	INTERNATIONAL JOURNAL OF TECHNOLOGY MANAGEMENT	2011	https://doi.org/10.1504/IJTM.2011.042987
	Hsu, CC; Tan, KC; Laosirihongthong, T; Leong, GK	Entrepreneurial SCM competence and performance of manufacturing SMEs	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	2011	https://doi.org/10.1080/00207543.2010.537384
	Dong, ST; Xu, SX; Zhu, KXG	Information Technology in Supply Chains: The Value of IT-Enabled Resources Under Competition	INFORMATION SYSTEMS RESEARCH	2009	https://doi.org/10.1287/isre.1080.0195
	Binder, M; Clegg, B	Enterprise management: A new frontier for organisations	INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	2007	https://doi.org/10.1016/j.ijpe.2006.07.006
	Alvarez-Suescun, E	Testing resource-based propositions about IS sourcing decisions	INDUSTRIAL MANAGEMENT & DATA SYSTEMS	2007	https://doi.org/10.1108/02635570710758716
	Berghman, L; Matthyssens, P; Vandenbempt, K	Building competences for new customer value creation: An exploratory study	INDUSTRIAL MARKETING MANAGEMENT	2006	https://doi.org/10.1016/j.indmarman.2006.04.006
	Sawhney, R	Interplay between uncertainty and flexibility across the value-chain: Towards a transformation model of manufacturing flexibility	JOURNAL OF OPERATIONS MANAGEMENT	2006	https://doi.org/10.1016/j.jom.2005.11.008
	Dimitriadis, NI; Koh, SCL	Information flow and supply chain management in local production networks: the role of people and information systems	PRODUCTION PLANNING & CONTROL	2005	https://doi.org/10.1080/09537280500112397
Soft skills for SCM and logistics	Stek, K; Schiele, H	How to train supply managers-Necessary and sufficient purchasing skills leading to success	JOURNAL OF PURCHASING AND SUPPLY MANAGEMENT	2021	https://doi.org/10.1016/j.pursup.2021.100700

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Cluster	Authors	Article Title	Source Title	Publication Year	DOI Link
	Derwik, P; Hellström, D	How supply chain professionals learn at work: an investigation of learning mechanisms	INTERNATIONAL JOURNAL OF PHYSICAL DISTRIBUTION & LOGISTICS MANAGEMENT	2021	https://doi.org/10.1108/IJPDLM-11-2019-0335
	Keller, SB; Ralston, PM; LeMay, SA	Quality Output, Workplace Environment, and Employee Retention: The Positive Influence of Emotionally Intelligent Supply Chain Managers	JOURNAL OF BUSINESS LOGISTICS	2020	https://doi.org/10.1111/jbl.12258
	Bals, L; Schulze, H; Kelly, S; Stek, K	Purchasing and supply management (PSM) competencies: Current and future requirements	JOURNAL OF PURCHASING AND SUPPLY MANAGEMENT	2019	https://doi.org/10.1016/j.pursup.2019.100572
	Sangka, BK; Rahman, S; Yadlapalli, A; Jie, F	Managerial competencies of 3PL providers A comparative analysis of Indonesian firms and multinational companies	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2019	https://doi.org/10.1108/IJLM-04-2019-0098
	Benzidia, S; Ageron, B; Bentahar, O; Husson, J	Investigating automation and AGV in healthcare logistics: a case study based approach	INTERNATIONAL JOURNAL OF LOGISTICS-RESEARCH AND APPLICATIONS	2019	https://doi.org/10.1080/13675567.2018.1518414
	Dubey, R; Gunasekaran, A; Childe, SJ; Papadopoulos, T	Skills needed in supply chain-human agency and social capital analysis in third party logistics	MANAGEMENT DECISION	2018	https://doi.org/10.1108/MD-04-2017-0428
	Kotzab, H; Teller, C; Bourlakis, M; Wünsche, S	Key competences of logistics and SCM professionals - the lifelong learning perspective	SUPPLY CHAIN MANAGEMENT-AN INTERNATIONAL JOURNAL	2018	https://doi.org/10.1108/SCM-02-2017-0079
	Makarius, EE; Srinivasan, M	Addressing skills mismatch: Utilizing talent supply chain management to enhance collaboration between companies and talent suppliers	BUSINESS HORIZONS	2017	https://doi.org/10.1016/j.bushor.2017.03.007
	Tatham, P; Wu, Y; Kovás, G; Butcher, T	Supply chain management skills to sense and seize opportunities	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2017	https://doi.org/10.1108/IJLM-04-2014-0066
	Essex, A; Subramanian, N; Gunasekaran, A	The relationship between supply chain manager capabilities and performance: empirical evidence	PRODUCTION PLANNING & CONTROL	2016	https://doi.org/10.1080/09537287.2015.1091519
	Jordan, C; Bak, O	The growing scale and scope of the supply chain: a reflection on supply chain graduate skills	SUPPLY CHAIN MANAGEMENT-AN INTERNATIONAL JOURNAL	2016	https://doi.org/10.1108/SCM-02-2016-0059
	Sinha, A; Millhiser, WP; He, YJ	Matching supply with demand in supply chain management education	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2016	https://doi.org/10.1108/IJLM-03-2015-0058
	Trautrims, A; Defee, C; Farris, T	Preparing business students for workplace reality - using global virtual teams in logistics and SCM education	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2016	https://doi.org/10.1108/IJLM-01-2015-0003
	Huo, BF; Han, ZJ; Chen, HZ; Zhao, XD	The effect of high-involvement human resource management practices on supply chain integration	INTERNATIONAL JOURNAL OF PHYSICAL DISTRIBUTION & LOGISTICS MANAGEMENT	2015	https://doi.org/10.1108/IJPDLM-05-2014-0112
	Thai, VV; Yeo, GT	Perceived competencies required for container shipping logisticians in Singapore and South Korea	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2015	https://doi.org/10.1108/IJLM-02-2014-0031
	Wong, CY; Grant, DB; Allan, B; Jasiuvian, I	Logistics and supply chain education and jobs: a study of UK markets	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2014	https://doi.org/10.1108/IJLM-01-2013-0003
	Lorentz, H; Toyli, J; Solakivi, T; Ojala, L	Priorities and determinants for supply chain management skills development in manufacturing firms	SUPPLY CHAIN MANAGEMENT-AN INTERNATIONAL JOURNAL	2013	https://doi.org/10.1108/SCM-03-2012-0111
	Lutz, H; Birou, L	Logistics education: a look at the current state of the art and science	SUPPLY CHAIN MANAGEMENT-AN INTERNATIONAL JOURNAL	2013	https://doi.org/10.1108/SCM-08-2012-0269
	Onar, SC; Aktas, E; Topcu, YI; Doran, D	An analysis of supply chain related graduate programmes in Europe	SUPPLY CHAIN MANAGEMENT-AN INTERNATIONAL JOURNAL	2013	https://doi.org/10.1108/SCM-06-2012-0209
	Prajogo, D; Sohal, A	Supply chain professionals A study of competencies, use of technologies, and future challenges	INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT	2013	https://doi.org/10.1108/IJOPM-08-2010-0228
	Wu, YCJ; Huang, SK; Goh, M; Hsieh, YJ	Global logistics management curriculum: perspective from practitioners in Taiwan	SUPPLY CHAIN MANAGEMENT-AN INTERNATIONAL JOURNAL	2013	https://doi.org/10.1108/SCM-04-2012-0145
	Kovács, G; Tatham, P; Larson, PD	What Skills Are Needed to be a Humanitarian Logistician?	JOURNAL OF BUSINESS LOGISTICS	2012	https://doi.org/10.1111/j.2158-1592.2012.01054.x
	Thai, VV	Competency requirements for professionals in logistics and supply chain management	INTERNATIONAL JOURNAL OF LOGISTICS-RESEARCH AND APPLICATIONS	2012	https://doi.org/10.1080/13675567.2012.694859

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Cluster	Authors	Article Title	Source Title	Publication Year	DOI Link
	Thai, VV	Competencies required by port personnel in the new era: conceptual framework and case study	INTERNATIONAL JOURNAL OF SHIPPING AND TRANSPORT LOGISTICS	2012	
	Kayakutlu, G; Büyüközkan, G	Effective supply value chain based on competence success	SUPPLY CHAIN MANAGEMENT-AN INTERNATIONAL JOURNAL	2010	https://doi.org/10.1108/13598541011028732
	Sodhi, MS; Son, BG; Tang, CS	ASP, The Art and Science of Practice: What Employers Demand from Applicants for MBA-Level Supply Chain Jobs and the Coverage of Supply Chain Topics in MBA Courses	INTERFACES	2008	https://doi.org/10.1287/inte.1080.0377
	Murphy, P; Poist, RF	Skill requirements of senior-level logisticians: a longitudinal assessment	SUPPLY CHAIN MANAGEMENT-AN INTERNATIONAL JOURNAL	2007	https://doi.org/10.1108/13598540710826353
	Murphy, PR; Poist, RF	Skill requirements of contemporary senior- and entry-level logistics managers: A comparative analysis	TRANSPORTATION JOURNAL	2006	
	Wu, F; Yeniyurt, S; Kim, D; Cavusgil, ST	The impact of information technology on supply chain capabilities and firm performance: A resource-based view	INDUSTRIAL MARKETING MANAGEMENT	2006	https://doi.org/10.1016/j.indmarman.2005.05.003
	Wu, YCJ	Skill requirements for logistics license in Taiwan	SUPPLY CHAIN MANAGEMENT-AN INTERNATIONAL JOURNAL	2006	https://doi.org/10.1108/13598540610682435
LSCM skills and competences for modern challenges	Priyadarshini, J; Singh, RK; Mishra, R; Bag, S	Investigating the interaction of factors for implementing additive manufacturing to build an antifragile supply chain: TISM-MICMAC approach	OPERATIONS MANAGEMENT RESEARCH	2022	https://doi.org/10.1007/s12063-022-00259-7
	Arcidiacono, F; Ancarani, A; Di Mauro, C; Schupp, F	The role of absorptive capacity in the adoption of Smart Manufacturing	INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT	2022	https://doi.org/10.1108/IJOPM-09-2021-0615
	Chari, A; Niedenzu, D; Despeisse, M; Machado, CG; Azevedo, JD; Boavida-Dias, R; Johansson, B	Dynamic capabilities for circular manufacturing supply chains-Exploring the role of Industry 4.0 and resilience	BUSINESS STRATEGY AND THE ENVIRONMENT	2022	https://doi.org/10.1002/bse.3040
	Mukhuty, S; Upadhyay, A; Rothwell, H	Strategic sustainable development of Industry 4.0 through the lens of social responsibility: The role of human resource practices	BUSINESS STRATEGY AND THE ENVIRONMENT	2022	https://doi.org/10.1002/bse.3008
	Dwivedi, A; Paul, SK	A framework for digital supply chains in the era of circular economy: Implications on environmental sustainability	BUSINESS STRATEGY AND THE ENVIRONMENT	2022	https://doi.org/10.1002/bse.2953
	Dwivedi, A; Moktadir, MA; Jabbour, CJC; De Carvalho, DE	Integrating the circular economy and industry 4.0 for sustainable development: Implications for responsible footwear production in a big data-driven world	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	2022	https://doi.org/10.1016/j.techfore.2021.121335
	Singh, J; Perera, V; Magana, AJ; Newell, B; Wei-Kocsis, J; Seah, YY; Strimel, GJ; Xie, C	Using machine learning to predict engineering technology students' success with computer-aided design	COMPUTER APPLICATIONS IN ENGINEERING EDUCATION	2022	https://doi.org/10.1002/cae.22489
	Vijayakumar, V; Sgarbossa, F; Neumann, WP; Sobhani, A	Framework for incorporating human factors into production and logistics systems	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	2022	https://doi.org/10.1080/00207543.2021.1983225
	Singh, RK; Agrawal, S; Modgil, S	Developing human capital 4.0 in emerging economies: an industry 4.0 perspective	INTERNATIONAL JOURNAL OF MANPOWER	2022	https://doi.org/10.1108/IJM-03-2021-0159
	Gupta, A; Singh, RK; Gupta, S	Developing human resource for the digitization of logistics operations: readiness index framework	INTERNATIONAL JOURNAL OF MANPOWER	2022	https://doi.org/10.1108/IJM-03-2021-0175
	Shet, SV; Pereira, V	Proposed managerial competencies for Industry 4.0-Implications for social sustainability	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	2021	https://doi.org/10.1016/j.techfore.2021.121080
	Mishra, R; Singh, RK; Subramanian, N	Impact of disruptions in agri-food supply chain due to COVID-19 pandemic: contextualised resilience framework to achieve operational excellence	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2022	https://doi.org/10.1108/IJLM-01-2021-0043
	Rossini, M; Cifone, FD; Kassem, B; Costa, F; Portioli-Staudacher, A	Being lean: how to shape digital transformation in the manufacturing sector	JOURNAL OF MANUFACTURING TECHNOLOGY MANAGEMENT	2021	https://doi.org/10.1108/JMTM-12-2020-0467
	Ekanayake, EMAC; Shen, GQ; Kumaraswamy, M; Owusu, EK	Critical supply chain vulnerabilities affecting supply chain resilience of industrialized construction in Hong Kong	ENGINEERING CONSTRUCTION AND ARCHITECTURAL MANAGEMENT	2021	https://doi.org/10.1108/ECAM-06-2020-0438

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Cluster	Authors	Article Title	Source Title	Publication Year	DOI Link
	Ralston, PM; Keller, SB; Grawe, SJ	Collaborative process competence as an enabler of supply chain collaboration in competitive environments and the impact on customer account management	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2020	https://doi.org/10.1108/IJLM-11-2019-0310
	Pereira, CR; da Silva, AL; Tate, WL; Christopher, M	Purchasing and supply management (PSM) contribution to supply-side resilience	INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	2020	https://doi.org/10.1016/j.ijpe.2020.107740
	Adobor, H	Supply chain resilience: an adaptive cycle approach	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2020	https://doi.org/10.1108/IJLM-01-2020-0019
	Ralston, P; Blackhurst, J	Industry 4.0 and resilience in the supply chain: a driver of capability enhancement or capability loss?	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	2020	https://doi.org/10.1080/00207543.2020.1736724
	Ghobakhloo, M; Fathi, M	Corporate survival in Industry 4.0 era: the enabling role of lean-digitized manufacturing	JOURNAL OF MANUFACTURING TECHNOLOGY MANAGEMENT	2020	https://doi.org/10.1108/JMTM-11-2018-0417
	Mohelska, H; Sokolova, M	MANAGEMENT APPROACHES FOR INDUSTRY 4.0-THE ORGANIZATIONAL CULTURE PERSPECTIVE	TECHNOLOGICAL AND ECONOMIC DEVELOPMENT OF ECONOMY	2018	https://doi.org/10.3846/tede.2018.6397
	Zangiacomi, A; Fornasiero, R; Franchini, V; Vinelli, A	Supply chain capabilities for customisation: a case study	PRODUCTION PLANNING & CONTROL	2017	https://doi.org/10.1080/09537287.2017.1309718
	Pollack, J; Adler, D	Skills that improve profitability: The relationship between project management, IT skills, and small to medium enterprise profitability	INTERNATIONAL JOURNAL OF PROJECT MANAGEMENT	2016	https://doi.org/10.1016/j.ijproman.2016.03.004
	Bjurklo, M; Edvardsson, B; Gebauer, H	The role of competence in initiating the transition from products to service	MANAGING SERVICE QUALITY	2009	https://doi.org/10.1108/09604520910984346
	Giunipero, L; Handfield, RB; Eltantawy, R	Supply management's evolution: key skill sets for the supply manager of the future	INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT	2006	https://doi.org/10.1108/01443570610672257
	Giunipero, LC; Denslow, D; Eltantawy, R	Purchasing/supply chain management flexibility: Moving to an entrepreneurial skill set	INDUSTRIAL MARKETING MANAGEMENT	2005	https://doi.org/10.1016/j.indmarman.2004.11.004
The potential of big data analytics for supply chain management	Bag, S; Rahman, MS	Navigating circular economy: Unleashing the potential of political and supply chain analytics skills among top supply chain executives for environmental orientation, regenerative supply chain practices, and supply chain viability	BUSINESS STRATEGY AND THE ENVIRONMENT	2023	https://doi.org/10.1002/bse.3507
	Kalaitzi, D; Tsolakis, N	Supply chain analytics adoption: Determinants and impacts on organisational performance and competitive advantage	INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	2022	https://doi.org/10.1016/j.ijpe.2022.108466
	Kusi-Sarpong, S; Orji, IJ; Gupta, H; Kunc, M	Risks associated with the implementation of big data analytics in sustainable supply chains	OMEGA-INTERNATIONAL JOURNAL OF MANAGEMENT SCIENCE	2021	https://doi.org/10.1016/j.omega.2021.102502
	Bamel, N; Bamel, U	Big data analytics based enablers of supply chain capabilities and firm competitiveness: a fuzzy-TISM approach	JOURNAL OF ENTERPRISE INFORMATION MANAGEMENT	2021	https://doi.org/10.1108/JEIM-02-2020-0080
	Gupta, H; Kumar, S; Kusi-Sarpong, S; Jabbour, CJC; Agyemang, M	Enablers to supply chain performance on the basis of digitization technologies	INDUSTRIAL MANAGEMENT & DATA SYSTEMS	2021	https://doi.org/10.1108/IMDS-07-2020-0421
	Zhan, YZ; Tan, KH	An analytic infrastructure for harvesting big data to enhance supply chain performance	EUROPEAN JOURNAL OF OPERATIONAL RESEARCH	2020	https://doi.org/10.1016/j.ejor.2018.09.018
	Gravili, G; Benvenuto, M; Avram, A; Viola, C	The influence of the Digital Divide on Big Data generation within supply chain management	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2018	https://doi.org/10.1108/IJLM-06-2017-0175
	Lamba, K; Singh, SP	Modeling big data enablers for operations and supply chain management	INTERNATIONAL JOURNAL OF LOGISTICS MANAGEMENT	2018	https://doi.org/10.1108/IJLM-07-2017-0183
	Waller, MA; Fawcett, SE	Data Science, Predictive Analytics, and Big Data: A Revolution That Will Transform Supply Chain Design and Management	JOURNAL OF BUSINESS LOGISTICS	2013	https://doi.org/10.1111/jbl.12010

Furthermore, they advocate for the refinement of these identified proficiencies, alongside the cultivation of business ethics.

Conclusively, Keller et al. (2020) significantly expanded the academic understanding by revealing the practical value of emotional intelligence (EI) in LSCM. Their insights highlight EI as a crucial skill employed by leaders in logistics and supply chain operations. According to their findings, EI serves as a valuable tool for leaders to cultivate a nuanced psychological and emotional rapport with their team members. In this context, managers with elevated EI levels are identified as more adept at navigating complex workplace dynamics, ultimately fostering

effective emotional management among employees.

The third cluster, in blue, is labelled “LSCM skills and competencies for modern challenges” and encompasses 24 papers. Supply chain management is analysed to detect the technological and personal impact derived from changes as the introduction of Industry 4.0, the increasing attention toward sustainability and the attempt to strengthen resilience and, especially after 2020, resistance to environmental shocks. Priyadarshini et al. (2022) focused on the analysis of skills and competencies to build an “antifragile supply chain” characterized by both robustness and resilience. The authors identify the proactiveness of top management as well as the presence of skilled employees in the use of digital technologies as crucial for this goal. Chari et al.’s (2022) study is focused on the analysis of dynamic capabilities for the building of a sustainable and circular supply chain. In this study, dynamic capabilities, circular economy, resilience, and Industry 4.0 are studied together to understand their impact on the manufacturing supply chain. The importance of competencies dedicated to digital technologies is similarly outlined by other papers of this cluster. For example, Dwivedi and Paul (2022) found how the lack of digital skills and facilities is the most influential barrier to the development of a digital supply chain, reducing its positive impact on the firm profitability and sustainability. Similarly, Dwidedi et al. (2022) outlined the importance of Industry 4.0 and a circular economy to sustain the improvement of sustainable production in the footwear industry. To conclude, Gupta et al. (2021) and Gupta, Kumar, et al. 2021 proposed a framework that identifies the main organizational, behavioural and technological factors to support the digitization of logistics operation and, at the same time, is useful to assess the readiness for digitalization in the logistics sector. Similarly, Shet and Pereira (2021) identified 14 managerial competencies that are the most relevant to develop Industry 4.0 in the logistics sector.

The fourth cluster, distinguished by yellow and designated as "The potential of big data analytics for LSCM" represents the most recent focus within the analysed literature. This cluster encompasses only 10 articles and centres on the significance of cultivating analytical skills and competencies to harness the potential impact of big data in the realm of logistics. A study by Bag and Rahman (2023) posits a close and integral relationship between supply chain analytic skills and the augmentation of supply chain viability. Similarly, Kalaitzi and Tsolakis (2022) findings validate the importance of supply chain analytics adoption to improve the firm’s performance and competitive advantage, developing technological competencies accordingly. Kusi-Sarpong et al. (2021) accordingly proposed a framework to map the main risks (technological, human, and organizational) related to the adoption of big data analytics in sustainable supply chain. This paper also suggests some strategies to overcome these risks and the main one is the development of commoditized hardware coupled with adequate skill development strategies. Similarly, other studies (Gupta et al., 2021; Gupta Kumar et al. 2021) identified 25 key digitization enablers to improve supply chain management, placing big data technologies and data science skills among the most important. Finally, Gravili et al. (2018) concluded that the improvement of big data for supply chain management is strongly dependent on the quality of the human factor. Indeed, tackling data alphabetization is, according to these authors, the new key to the decision-making process and being able to evaluate and quantify the added value of the human factor in SCM.

Conceptual analysis

The thematic map identified eight different clusters (see Fig. 5).

Three clusters are situated in the quadrant labelled "Basic Themes", indicating a high degree of relevance and development. These clusters encompass papers concentrating on supply chain competencies, supply chain management in manufacturing firms, and the integration of logistics and supply chain technologies. Currently, the body of papers dedicated to the examination of skills, competencies, and education is categorized as focused on "*Motor Themes*" in this research due to their high development degree and comparatively lower relevance degree.

Additionally, the map presents subthemes such as Industry 4.0, supply chain agility, and dynamic capabilities, along with competencies procurement identified as a niche theme. Although these subthemes exhibit a high development degree, signifying a rapid increase in publications in recent years, they are yet to attain comparable levels of relevance and centrality.

Moreover, an emerging and promising avenue for future research pertains to the investigation of the impact of human capital and factors on supply chains and logistics, especially when observed through the theoretical lens of resource orchestration theory. Presently, these topics are characterized by a low level of development, with a limited number of publications compared to other themes, and a low degree of relevance, as they are infrequently cited.

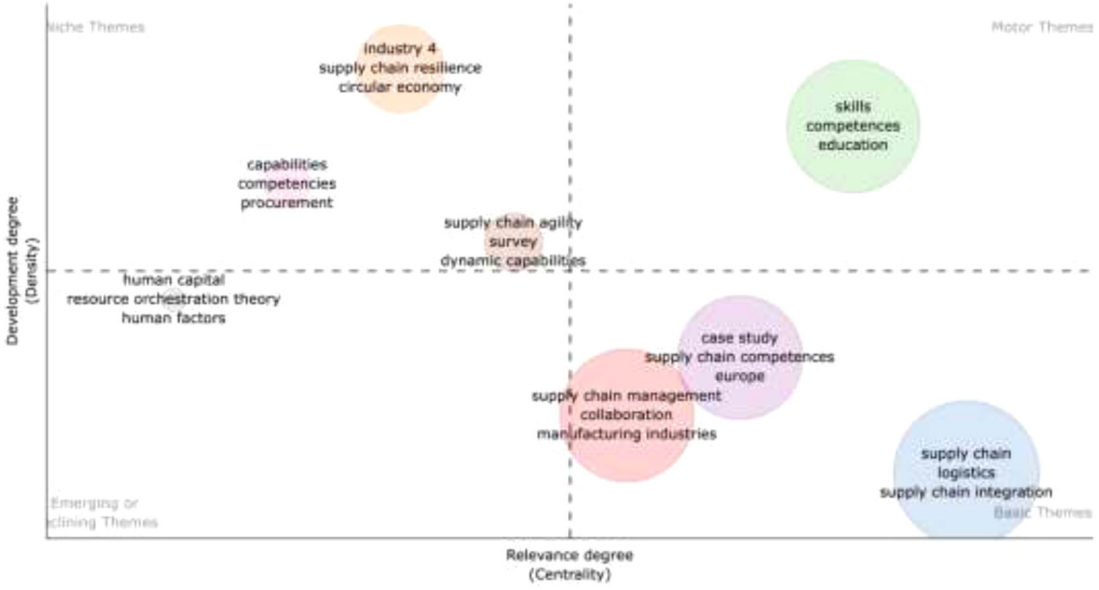

Fig. 5. Thematic map (authors’ elaboration using Biblioshiny for Bibliometrics)

Discussion

The discussion surrounding supply chain skills needs is still not comprehensive or sufficient to cover the complexity of this issue. Therefore, although the emphasis on specific skills areas has evolved over time, the academic debate on supply chain skills started by Murphy and Poist (2007) and van Hoek (2001) is still ongoing.

The results of our analysis suggest that the intricate landscape of LSCM literature is still unbalanced toward the importance of hard skills and on the ability of firms to change and adapt these skills rapidly in a scenario of rapid change. Indeed, this is the focus of the biggest cluster resulted from the bibliographic coupling analysis, the one labelled "Dynamic capabilities for SCM and logistics", which is indeed focused on the potential of dynamic capabilities to manage change (especially technical, IT-related changes) in LSCM. Similarly, the cluster named "The potential of big data analytics for LSCM" suggests an increasing attention toward those skills that enable firms to successfully manage big data analytics dedicated to LSCM scenarios. Again, the focus is on hard and technical skills that need to be developed to the benefit from the potential of new technologies.

Nevertheless, a discernible trend towards emphasizing soft skills is evident in the literature, as evidenced by the presence of two out of the four clusters focusing on competencies of this nature. Specifically, the cluster labelled "LSCM skills and competencies for modern challenges" posits that the effective navigation of contemporary organizational challenges, including sustainability, Industry 4.0, and resilience, necessitates the cultivation of new skills, encompassing both hard and soft elements. Therefore, even if not focused exclusively on soft skills, this group of papers recognizes the importance of developing knowledge beyond hard skills. Furthermore, the cluster titled "Soft skills for SCM and logistics" delves into crucial soft skills essential for successful engagement in LSCM. These skills encompass, among others, effective communication, collaborative decision-making to ensure the seamless orchestration of resources, empathetic negotiation, the ability to work and exercise leadership under pressure, as well as social skills, decision-making, effective people management, and problem-solving.

Fig. 6 offers a visual comprehensive representation of the main hard and soft skills emerged from our analysis.

The escalating interest in soft skills is further elucidated by the conceptual analysis articulated through the thematic map (Fig. 5). While extant literature duly recognizes a pervasive interest in skills and competencies as encapsulated within the "motor theme" quadrant, the quadrant denominated as "emerging themes" sheds light on an intensified focus on the human aspects. A meticulous scrutiny of papers within this thematic cluster reveals that the heightened emphasis on "humanity" signifies a burgeoning inclination toward a more comprehensive perspective in the domain of logistics and supply chains. Consequently, there exists a salient invitation for future inquiries to scrutinize this evolving relationship, given its recent prominence within the scholarly discourse of LSCM.

Therefore, scientific literature on supply chain skills highlights the need for a balance of both hard skills (functional) as well as soft skills to manage global supply chains (Dubey & Gunasekaran, 2015; Ellinger & Ellinger, 2014; Jordan & Bak, 2016). While studies acknowledging the role of soft skills in managerial success are valuable contributions, they seem to operate within the margins of a broader conversation dominated by discussions of hard skills. This imbalance underscores an area for potential growth in research, signalling a need for a more comprehensive understanding of the interplay between technical acumen and interpersonal competence in the realm of logistics management. As the field evolves, addressing this gap could provide a more holistic perspective on the multifaceted nature of managerial competence in logistics and supply chain operations. Our study suggests moving in this direction recommending the potential of new research about soft skills in the field of LSCM, especially those related with challenges such as sustainability and resilience.

Moreover, the present study offers a unique inspiration to thoroughly scrutinize the durable sustainability of competitive advantage derived from integrating hard and soft skills. Future researchers are well positioned to delve into the long-term viability of these advantages, particularly considering technological advancements, evolving market demands, and shifting industry trends. Empirical contributions on these topics would be more than welcomed to further investigate the relationship between logistics and innovation.

In this regard, the results of the bibliometric analyses suggest that topics such as Industry 4.0, supply chain agility, dynamic capabilities, and competencies procurement, although widely investigated, remain underexplored in terms of their academic impact. While the volume of publications on these topics has seen a substantial increase in recent years, their citation metrics, particularly in terms of centrality and

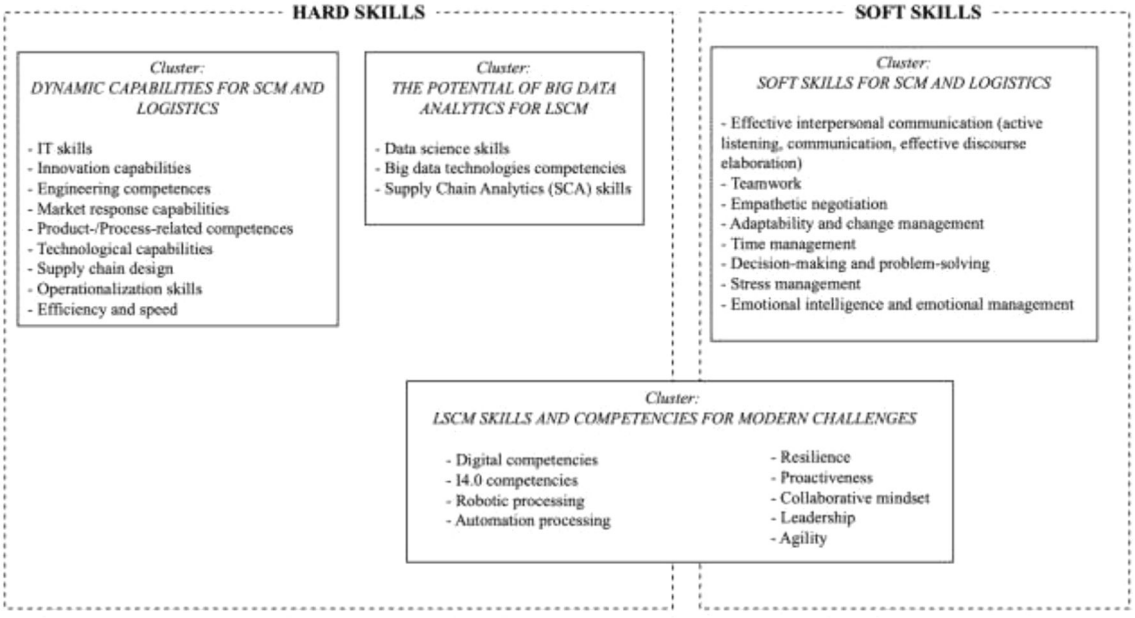

Fig. 6. Main hard and soft skills studied by the papers included in our sample (authors'elaboration)

relevance, indicate that these areas have yet to form core clusters within the broader research landscape. This observation implies that despite the growing body of work, these subfields have not fully matured in terms of scholarly influence.

The analysis reveals that the scholarly contributions on these topics often remain fragmented across diverse subfields, with limited cross-disciplinary interaction. For example, while dynamic capabilities are frequently discussed in the context of strategic management, their integration with Industry 4.0 and supply chain agility is less pronounced, potentially hindering the development of cohesive frameworks that link these concepts. Similarly, while competencies procurement has been studied in both HRM and operations, the citation patterns indicate that these studies do not substantially cross-pollinate with broader discussions in supply chain and logistics literature. This fragmentation may prevent the formation of a unified theoretical foundation that is necessary for the progression of these fields into more central positions in academic research networks.

Moreover, the lack of centrality observed in these subfields may be reflective of an incomplete theoretical synthesis or a need for more robust empirical validations. In particular, emerging themes like Industry 4.0 and supply chain agility are often characterized by exploratory or descriptive studies, which, while valuable in laying the groundwork, may not yet have resulted in the development of widely accepted models or paradigms that anchor them within the core of scholarly debate. As a result, their citation patterns show limited influence on the development of adjacent topics, suggesting that these areas have yet to produce seminal works that drive further theoretical or empirical advancements.

This observation implies that the evolution of these research domains is still in an early stage of intellectual maturation, where foundational studies are prevalent, but the establishment of key theoretical linkages, cross-disciplinary relevance, and empirical generalizations remains a work in progress. The relative absence of such core, high-impact contributions may be indicative of ongoing debates or conceptual ambiguities that need to be resolved for these topics to achieve greater scholarly prominence and influence.

Finally, the results of the conceptual analysis suggest that the investigation of the human capital and factors that impact on supply chains and logistics is a promising avenue for future research, especially if observed through the theoretical lens of resource orchestration theory. Indeed, this topic is currently characterized by a limited number of publications, and yet the “human” part of logistics deserves to be studied. Specifically, the rising interest in social, besides environmental, sustainability calls for future conceptual and empirical studies on the role of people in the context of supply chain and logistics.

Implications

This research presents valuable and systematic insights by collating and analysing existing research on the skills required in LSCM. By doing so, the study emphasizes the increasing and pressing need to investigate the critical role of soft skills in LSCM, with implications that extend to both research and practical applications.

Implications for research

This research has the potential to make a significant contribution to the field of HRM. The results suggest a growing relevance in developing and studying the human side of professionals in LSCM, emphasizing the virtuous relationship between professional and human dimensions. As organizational contexts become increasingly multicultural, it is imperative for professionals to invest in additional skills, such as open-mindedness, cross-cultural collaboration, advocacy for inclusion, and intercultural sensitivity, to navigate diverse environments effectively. Furthermore, given the pivotal influence of technology in the contemporary organizational landscape, there is a necessity for professionals to hone their soft skills, specifically focusing on proficiency within virtual teams. Additionally, fostering coping mechanisms, adaptability, and creativity is crucial to establish robust structures capable of adeptly responding to the dynamic challenges prevalent in today’s business environment.

Furthermore, the study highlights the importance of economic, social, and environmental system thinking, along with ethical decision-making, to address sustainability demands in organizational practices. This is particularly evident in the cluster identified as "LSCM skills and competencies for modern challenges", emphasizing the need for adapting LSCM to increase resistance to environmental shocks and fostering robustness and resilience driven by high-skilled professionals.

To summarize, these results can encourage researchers to explore how organizations can align their recruitment, training, and development strategies to develop a balanced mix of technical and soft skills in their workforce.

Moreover, the potential of this research lies in its capacity to inform the development of innovative metrics or to enhance current ones for assessing the efficiency of HRs in the logistics industry. By recognizing novel key performance indicators (KPIs), it may be possible to gauge the synergistic influence of both technical and soft skills on overall organizational performance.

Furthermore, the results of this bibliometric analysis provide valuable insights for advancing several key theoretical frameworks in logistics and supply chain management. The identified gaps in the integration of Industry 4.0, supply chain agility, and dynamic capabilities highlight an opportunity to extend Dynamic Capabilities Theory by exploring how firms dynamically adapt to continuous technological advancements and disruptions. Specifically, this refinement could focus on how proactive and reactive capabilities interact to enable supply chains to respond swiftly to environmental uncertainties, balancing innovation with risk management.

Moreover, the analysis emphasizes the underexplored role of soft skills and human capital, particularly in navigating complex, multicultural, and technology-driven supply chain environments. This finding underscores the potential for expanding Human Capital Theory to include non-technical competencies. Furthermore, the interplay between these theories can illuminate how organizations configure their resource portfolios to remain agile and resilient in the face of disruptions. By addressing these theoretical gaps, future research can provide a more nuanced understanding of the interdependence between technological capabilities, human capital, and organizational performance, contributing to the development of more comprehensive frameworks for supply chain management.

Implications for practice

From a practical perspective, this research provides innovative and applicable implications primarily targeted at professionals in the logistics industry, logistics associations, universities, and higher education institutions.

Its chief purpose is to assist professionals in maintaining the relevance of their skills and knowledge by detecting discrepancies between their existing competencies and the industry’s requirements. In an ideal setting where a culture of continuous learning is embraced, this support would enable individuals in the logistics sector to establish their learning objectives more effectively. Furthermore, HR departments could employ similar assessments and training planning in a “top-down” approach. This strategic alignment would provide a comprehensive outlook, enabling the identification of comprehensive training needs across the entire workforce.

Another practical implication can be observed from the side of the Logistics Association. For example, the imperative to develop a more comprehensive set of skills in response to transformative changes in logistics and supply chain operations is distinctly exemplified by the European Logistics Association (ELA) Qualification Standards. As a

federation of 22 National Logistics Associations, covering nearly every country in Central, Western, and Eastern Europe and beyond, the ELA Qualification Standards align with the European Qualification Framework (EQF). These standards systematically outline the essential proficiencies required in the domain of LSCM, reinforcing the necessity to adeptly manage systems within environments characterized by unpredictable variables and continually evolving attributes.

The standards, delineating competencies across 13 distinct areas or modules, along with three hierarchical competence levels – Level 4 (Supervisor/Operational Management), Level 6 (Senior Management), and Level 7 (Strategic Management) – have, in fact, been seamlessly integrated with the more recent standards established in 2020. These 2020 standards are characterized by their inclusion of overarching principles and the focal points expressed above and pertaining to resilience, technology, and sustainability. The extension of the standards to encompass these crucial focal points signifies an evolution towards a more holistic approach to LSCM practice, acknowledging the increasing importance of these elements in the ever-changing landscape of the industry.

In this regard, our paramount interest lies in the elucidation of how the ELA 2020 standards (Bisogni et al., in 2021) can be subjected to further refinement, drawing upon the discerning insights derived from the outcomes of our research.

In addition, the spectrum of competencies addressed in this study is sufficiently expansive to serve as valuable input for the development of university curricula. In today's educational environment, universities are under pressure to provide practical foundations in their programmes to remain relevant in a rapidly changing world. The authors suggest that the soft skills highlighted in this study can significantly aid in this effort by modernizing the traditional view of the qualifications needed to become a top-tier logistics professional. Although universities strive to differentiate themselves by emphasizing distinctiveness over conformity, we propose that a course on soft skills for logistics can serve as a unique feature.

Future research avenues

To advance the field of LSCM we have delineated critical future research directions grounded in the thematic analysis of the extant literature. These proposed research areas are designed to enhance our understanding and promote the development of essential competencies within LSCM, thereby offering substantial potential for both scholarly advancement and practical application.

Dynamic capabilities for SCM and logistics

Future research should investigate how companies develop and integrate dynamic capabilities to enhance their adaptability in rapidly evolving technological environments. Additionally, further inquiry into the interaction between proactive and reactive capabilities is warranted, particularly regarding their role in mitigating risks within global supply chains during periods of technological disruption. Analysing these interactions could provide valuable insights into how companies can more effectively anticipate and respond to emerging challenges, thereby strengthening supply chain resilience. Moreover, future studies should explore the impact of technological disruptions on the evolution of supply chain strategies, with a focus on identifying practices for balancing innovation with risk management.

Soft skills for SCM and logistics

Exploring the contribution of soft skills to optimizing supply chain operations, particularly in complex and dynamic environments, represents a critical area of investigation. Additionally, the role of teamwork and negotiation skills in addressing supply chain challenges, especially within multicultural and high-stress contexts, warrants close examination. Such studies could provide valuable insights into how these interpersonal competencies bolster supply chain effectiveness and resilience. Further research should delve into the importance of empathetic negotiation in fostering long-term supplier relationships, assessing how these approaches enhance supply chain resilience. Understanding the impact of empathy and effective communication on the sustainability of supplier relationships could yield important findings for constructing robust supply chains. Moreover, examining the integration of soft skills into supply chain strategies and their influence on overall organizational performance could guide the development of good practices for managing the complexities of global supply networks.

LSCM skills and competencies for modern challenges

As global supply chains face increasing volatility due to environmental, technological, and economic disruptions, there is a critical need for organizations to develop supply chains that are not only resilient but also capable of thriving under such pressures. Understanding how to build "antifragile" supply chains – capable of not only enduring environmental shocks but also benefiting from them – could yield valuable strategies for enhancing both resilience and robustness. Furthermore, identifying and overcoming barriers to developing digital skills in supply chains is essential for boosting sustainability and profitability, as these skills are increasingly central to modern operations. Additionally, investigating the influence of Industry 4.0 technologies on supply chain skill development could reveal the new competencies required to effectively manage and thrive in this evolving landscape. These research areas are crucial for building more adaptive, technologically advanced, and resilient supply chains.

The potential of big data analytics for LSCM

As big data analytics becomes increasingly central to decision-making processes in LSCM, understanding and developing the specific competencies required to effectively interpret and leverage vast and complex data sets is critical. While technical skills such as statistical analysis, machine learning, and data visualization are essential, the importance of soft skills in this context cannot be overstated. For instance, communication skills are vital for conveying complex analytical findings to non-technical stakeholders, ensuring that data-driven decisions are aligned with broader organizational goals. Similarly, critical thinking and problem-solving skills are essential for interpreting data in a way that identifies opportunities, anticipates challenges, and adapts strategies to dynamic supply chain environments.

Research in this area should not only define the technical analytical skills required but also explore the soft skills that are necessary for the successful application of big data analytics in LSCM.

Building on the four research streams identified, Table 2 summarizes the proposed research avenues and presents a set of potential research questions to guide future investigations.

The insights in Table 2 highlight the critical need for an integrated research endeavour that bridges the gap between technical capabilities and essential soft skills, enhancing both operational efficiency and strategic adaptability in supply chain management. As organizations increasingly face global disruptions and technological advancements, future research should focus on how these elements can be harmonized to foster innovation, resilience, and sustainable competitive advantage. Exploring this dynamic interplay will be crucial to developing comprehensive strategies that not only mitigate risks but also drive long-term success in a rapidly evolving environment.

Conclusions and limitations

This study offers several significant implications for the future of LSCM practice, professional development, and academic research. By systematically identifying and analysing essential skills in LSCM, the

Table 2
Suggested research avenues and questions (authors' elaboration)

Research stream	Proposed research avenues	Future research questions
Dynamic Capabilities for SCM and Logistics	**Development and Integration of Dynamic Capabilities**: Investigate how companies cultivate and embed dynamic capabilities to enhance adaptability and maintain competitiveness in rapidly evolving technological landscapes.	What internal and external factors influence the development of dynamic capabilities? How do different industries vary in their approach to building dynamic capabilities for technological adaptation?
	Proactive vs Reactive Capabilities in Risk Mitigation: Explore the interplay between proactive and reactive capabilities in mitigating risks within global supply chains, particularly during technological disruptions.	What are the key challenges companies face when integrating dynamic capabilities into existing organizational structures? What is the relative impact of proactive versus reactive capabilities in minimizing supply chain risks during such disruptions? Are there specific industries where proactive or reactive capabilities are more effective in managing supply chain risks?
Soft Skills for SCM and Logistics	**The Role of Soft Skills in Supply Chain Optimization**: Investigate how soft skills, such as communication, problem-solving, and adaptability, contribute to optimizing supply chain operations, particularly in complex, dynamic environments.	How do specific soft skills (e.g. problem-solving, adaptability) optimize supply chain operations in rapidly changing environments? What impact do teamwork and negotiation skills have on mitigating supply chain disruptions in multicultural and high-pressure contexts?
	Teamwork and Negotiation in Multicultural Supply Chains: Examine the influence of teamwork and negotiation skills in resolving supply chain challenges within multicultural and high-stress contexts.	In what ways does empathetic negotiation enhance the long-term sustainability of supplier relationships, and how does this contribute to overall supply chain resilience?
	Empathetic Negotiation and Long-term Supplier Relationships: Explore the role of empathetic negotiation in fostering long-term supplier relationships and its impact on supply chain resilience.	How does effective communication, particularly in cross-cultural supply chains, influence trust and collaboration between suppliers and organizations?
	Integration of Soft Skills into Supply Chain Strategies: Assess how integrating soft skills into supply chain strategies influences organizational performance and enhances the management of global supply networks.	What are the measurable effects of integrating soft skills into supply chain management strategies on organizational performance, particularly in global and complex supply networks?
LSCM Skills and Competencies for Modern Challenges	**Developing Digital Skills for Sustainable Supply Chains**: Explore the barriers to developing essential digital skills within supply chains and how overcoming these obstacles can enhance sustainability and profitability in modern operations.	What are the key barriers to developing digital skills within supply chains, and how can overcoming these barriers improve sustainability and profitability? How are Industry 4.0 technologies transforming the skill requirements in supply chain management, and what new competencies are necessary to navigate this evolving landscape? In what ways do digital skills and technological proficiency contribute to the long-term adaptability and sustainability of modern supply chains?
	Influence of Industry 4.0 on Supply Chain Skill Development: Examine how the adoption of Industry 4.0 technologies (e.g. AI, IoT, automation) is reshaping the required skill sets for supply chain management and how organizations are adapting to these new demands.	
The Potential of Big Data Analytics for LSCM	**Technical and Soft Skills in Big Data Analytics for LSCM**: Investigate the specific technical skills (e.g. machine learning, statistical analysis, data visualization) and soft skills (e.g. communication, critical thinking) required to effectively utilize big data analytics in decision-making processes within LSCM.	What are the key technical and soft skills required to effectively interpret and leverage big data analytics for decision-making in logistics and supply chain management? How can communication skills be developed to enhance the ability of data professionals to convey complex analytical insights to non-technical stakeholders in LSCM?
	Communication Skills for Interpreting and Conveying Analytical Insights: Explore the role of communication skills in ensuring that complex analytical insights from big data are effectively communicated to non-technical stakeholders, aligning data-driven decisions with broader organizational goals.	In what ways do critical thinking and problem-solving skills enhance the interpretation of big data, helping supply chain managers to anticipate challenges and seize new opportunities? How can organizations bridge the communication and understanding gap between data analysts and non-technical stakeholders to ensure that data-driven strategies are aligned with business goals?
	Problem-solving and Critical Thinking in Data Interpretation: Assess the importance of critical thinking and problem-solving in interpreting big data insights to identify opportunities, anticipate challenges, and adapt supply chain strategies to dynamic environments.	What training and development initiatives are most effective in fostering both technical and soft skills among LSCM professionals, enabling them to maximize the potential of big data analytics?
	Bridging the Gap Between Technical and Non-technical Stakeholders in LSCM: Examine how LSCM professionals can bridge the gap between technical data analysts and non-technical decision-makers to ensure a unified approach to leveraging big data for strategic outcomes.	

research provides a detailed framework that can be utilized by industry professionals to tailor training and development programmes more effectively. This will enable logistics practitioners to align their skill sets with the evolving demands of the industry, ensuring that they remain competitive and adept at managing modern supply chain challenges.

For academic institutions, the study underscores the importance of incorporating both technical and soft skills into LSCM curricula. Universities and educational bodies can leverage these insights to design courses that equip future logistics professionals with a balanced skill set, thus enhancing their employability and readiness to tackle industry-

specific issues. This alignment with industry needs ensures that educational programmes remain relevant and valuable.

From a research perspective, the study highlights the existing gaps in the literature, particularly the understudied soft skills that are crucial for effective LSCM. This revelation sets the stage for future scholarly inquiry, encouraging researchers to delve deeper into these overlooked areas. The emphasis on soft skills, such as emotional intelligence, effective communication, and collaborative decision-making, opens new avenues for research that can significantly enhance our understanding of their impact on supply chain efficiency and resilience.

The study's originality is further highlighted by its methodological rigour, utilizing advanced tools like Biblioshiny for Bibliometrix and VOSViewer to perform descriptive, bibliographic coupling, and conceptual analyses. This multi-faceted approach not only provides a detailed understanding of the current state of LSCM skills but also identifies emerging trends and areas requiring further exploration.

In terms of value, this research stands out by providing actionable insights that can be directly applied by industry practitioners, academic curriculum designers, and future researchers. It serves as a foundational reference that can guide the development of comprehensive training programmes and educational courses while also setting a clear agenda for future research in the field. By focusing on both well-established and understudied skills, the study ensures a balanced perspective that is crucial for the sustained advancement of LSCM practices and scholarship.

Finally, this research presents some limitations. While conducting this literature review, we restricted our scope to papers written in English within the domains of economics and engineering. It is conceivable that a more expansive and less specialized sample could have produced results of comparable significance.

Moreover, our bibliometric study is exclusively based on papers extracted from the WoS database. Although motivated by the will to increase the manageability of results and to focus on the more relevant studies, this surely impacted on the numerosity of our sample. Future studies could include studies extracted from other databases (e.g. Scopus) and work on merged samples.

Declaration

The work described has not been published previously and it is not under consideration for publication elsewhere.

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CRediT authorship contribution statement

Franca Cantoni: Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization. **Arcangela Ricciardi:** Writing – review & editing, Writing – original draft, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Paolo Gaetano Bisogni:** Validation, Investigation. **Helmut Zsifkovits:** Validation, Supervision.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

References

Al Harrasi, N., Salah El Din, M., Reason, M., Al Balushi, B., & Al Habsi, J. (2023). Knowledge and skills gap of graduates entry-level: Perception of logistics and supply chain managers in Oman. *Higher Education, Skills and Work-Based Learning, 13*(6), 1269–1285. https://doi.org/10.1108/HESWBL-11-2022-0240

Ambulkar, S., Blackhurst, J., & Grawe, S. (2015). Firm's resilience to supply chain disruptions: Scale development and empirical examination. *Journal of Operations Management, 33*, 111–122. https://doi.org/10.1016/j.jom.2014.11.002

Asefer, A., & Abidin, Z. (2021). Soft skills and graduates' employability in the 21st century from employers' perspectives: A review of literature. *International Journal of Infrastructure Research and Management, 9*(2), 44–59. https://doi.org/10.2991/ictvt-17.2017.58

Ayres, J. B. (2010). Supply chain project management. *A Structured Collaborative and Measurable Approach* (2nd ed.) C.

Babić, V., & Slavković, M. (2011). Soft and hard skills development: A current situation in Serbian companies. In *Proceedings of the Management, Knowledge and Learning International Conference* (pp. 407–414).

Backhaus, K., Steiner, M., & Lügger, K. (2011). To invest, or not to invest, in brands? Drivers of brand relevance in B2B markets. *Industrial Marketing Management, 40*(7), 1082–1092. https://doi.org/10.1016/j.indmarman.2011.09.002

Bag, S., & Rahman, M. S. (2023). Navigating circular economy: Unleashing the potential of political and supply chain analytics skills among top supply chain executives for environmental orientation, regenerative supply chain practices, and supply chain viability. *Business Strategy and the Environment, 33*(2), 1–25. https://doi.org/10.1002/bse.3507

Bahoo, S., Alon, I., & Floreani, J. (2021). Corruption in economics: A bibliometric analysis and research agenda. *Applied Economics Letters, 28*(7), 565–578. https://doi.org/10.1080/13504851.2020.1764476

Bals, L., Schulze, H., Kelly, S., & Stek, K. (2019). Purchasing and supply management (PSM) competencies: Current and future requirements. *Journal of Purchasing and Supply Management, 25*(5), Article 100572. https://doi.org/10.1016/j.pursup.2019.100572

Bargoni, A., Alon, I., & Ferraris, A. (2023). A systematic review of family business and consumer behaviour. *Journal of Business Research, 158*, Article 113698. https://doi.org/10.1016/j.jbusres.2023.113698

Bolívar-Ramos, M. T., García-Morales, V. J., & Martín-Rojas, R. (2013). The effects of information technology on absorptive capacity and organisational performance. *Technology Analysis & Strategic Management, 25*(8), 905–922. https://doi.org/10.1080/09537325.2013.823152

Bozarth, C. C., & Handfield, R. B. (2016). *Introduction to Operations and Supply Chain Management* (4th ed.). Pearson.

Bretas, V. P., & Alon, I. (2021). Franchising research on emerging markets: Bibliometric and content analyses. *Journal of Business Research, 133*, 51–65. https://doi.org/10.1016/j.jbusres.2021.04.067

Budler, M., Župič, I., & Trkman, P. (2021). The development of business model research: A bibliometric review. *Journal of Business Research, 135*, 480–495. https://doi.org/10.1016/j.jbusres.2021.06.045

Chari, A., Niedenzu, D., Despeisse, M., Gonçalves Machado, C., Azevedo, J., Boavida-Dias, R., & Johansson, B. (2022). Dynamic capabilities for circular manufacturing supply chains: Exploring the role of Industry 4.0 and resilience. *Business Strategy and the Environment, 31*(5), 2500–2517. https://doi.org/10.1002/bse.3040

Christofi, M., Vrontis, D., & Cadogan, J. W. (2021). Micro-foundational ambidexterity and multinational enterprises: A systematic review and a conceptual framework. *International Business Review, 30*(1), Article 101625. https://doi.org/10.1016/j.ibusrev.2019.101625

Christopher, M. (2005). *Logistics and supply chain management* (3rd ed.). FT Prentice Hall.

Derwik, P., & Hellström, D. (2017). Competence in supply chain management: A systematic review. *Supply Chain Management: An International Journal, 22*(2), 200–218. https://doi.org/10.1108/SCM-09-2016-0324

Dong, S., Xu, S., & Zhu, K. (2009). Research note – Information technology in supply chains: The value of IT-enabled resources under competition. *Information Systems Research, 20*(1), 18–32. https://doi.org/10.1287/isre.1080.0195

Dubey, R., & Gunasekaran, A. (2015). Shortage of sustainable supply chain talent: An industrial training framework. *Industrial and Commercial Training, 47*(2), 86–94. https://doi.org/10.1108/ICT-08-2014-0052

Dwivedi, A., & Paul, S. K. (2022). A framework for digital supply chains in the era of circular economy: Implications on environmental sustainability. *Business Strategy and the Environment, 32*(4), 1249–1274. https://doi.org/10.1002/bse.2953

Enginoğlu, D., & Arikan, C. L. (2016). A literature review on core competencies. *International Journal of Management (IJM), 7*(3), 120–127.

Fahimnia, B., Sarkis, J., & Davarzani, H. (2015). Green supply chain management: A review and bibliometric analysis. *International Journal of Production Economics, 162*, 101–114. https://doi.org/10.1016/j.ijpe.2015.01.003

Fetscherin, M., & Heinrich, D. (2015). Consumer brand relationships research: A bibliometric citation meta-analysis. *Journal of Business Research, 68*(2), 380–390. https://doi.org/10.1016/j.jbusres.2014.06.010

Gammelgaard, B., & Larson, P. D. (2001). Logistics skills and competencies for supply chain management. *Journal of Business logistics, 22*(2), 27–50. https://doi.org/10.1002/j.2158-1592.2001.tb00002.x

Geissdoerfer, M., Vladimirova, D., & Evans, S. (2018). Sustainable business model innovation: A review. *Journal of Cleaner Production, 198*, 401–416. https://doi.org/10.1016/j.jclepro.2018.06.240

González-Salamanca, J. C., Agudelo, O. L., & Salinas, J. (2020). Key competencies, education for sustainable development and strategies for the development of 21st-

century skills. A systematic literature review. *Sustainability, 12*(24), 10366. https://doi.org/10.3390/su122410366
Gravili, G., Benvenuto, M., Avram, A., & Viola, C. (2018). The influence of the digital divide on big data generation within supply chain management. *The International Journal of Logistics Management, 29*(2), 592–628. https://doi.org/10.1108/IJLM-06-2017-0175
Gupta, H., Kumar, S., Kusi-Sarpong, S., Jabbour, C. J. C., & Agyemang, M. (2021). Enablers to supply chain performance on the basis of digitization technologies. *Industrial Management & Data Systems, 121*(9), 1915–1938. https://doi.org/10.1108/IMDS-07-2020-0421
Gupta, A., Singh, R. K., & Gupta, S. (2021). Developing human resource for the digitization of logistics operations: Readiness index framework. *International Journal of Manpower, 43*(2), 355–379. https://doi.org/10.1108/IJM-03-2021-0175
Hohenstein, N. O., Feisel, E., Hartmann, E., & Giunipero, L. (2015). Research on the phenomenon of supply chain resilience: A systematic review and paths for further investigation. *International Journal of Physical Distribution & Logistics Management, 45*(12), 90–117. https://doi.org/10.1108/IJPDLM-05-2013-0128
Iriarte, C., & Bayona Orè, S. (2018). Soft skills for IT project success: A systematic literature review. In , *6. Trends and Applications in Software Engineering: Proceedings of the 6th International Conference on Software Process Improvement (CIMPS 2017)* (pp. 147–158). Springer International Publishing.
Jordan, C., & Bak, O. (2016). The growing scale and scope of the supply chain: A reflection on supply chain graduate skills. *Supply Chain Management: An International Journal, 21*(5), 610–626. https://doi.org/10.1108/SCM-02-2016-0059
Kalaitzi, D., & Tsolakis, N. (2022). Supply chain analytics adoption: Determinants and impacts on organisational performance and competitive advantage. *International Journal of Production Economics, 248*(6), Article 108466. https://doi.org/10.1016/j.ijpe.2022.108466
Kalenyuk, I., Tsymbal, L., & Aslanzade, R. (2019). Greening the supply chain in corporate responsibility. *Management Theory & Studies for Rural Business & Infrastructure Development, 41*(4), 501–510. https://doi.org/10.15544/mts.2019.40
Keller, S. B., Ralston, P. M., & LeMay, S. A. (2020). Quality output, workplace environment, and employee retention: The positive influence of emotionally intelligent supply chain managers. *Journal of Business Logistics, 41*(4), 337–355. https://doi.org/10.1111/jbl.12258
Kessler, M. M. (1963). Bibliographic coupling between scientific papers. *American Documentation, 14*(1), 10–25. https://doi.org/10.1002/asi.5090140103
Kovács, G., Tatham, P., & Larson, P. D. (2012). What skills are needed to be a humanitarian logistician? *Journal of Business Logistics, 33*(3), 245–258. https://doi.org/10.1111/j.2158-1592.2012.01054.x
Krajewski, L. J., Malhotra, H. K., & Ritzman, L. P. (2016). *Operations Management, Processes and Supply Chains* (11th ed.). Pearson.
Kusi-Sarpong, S., Orji, I. J., Gupta, H., & Kunc, M. (2021). Risks associated with the implementation of big data analytics in sustainable supply chains. *Omega, 105*, Article 102502.
Lambert, D. M., García-Dastugue, S. J., & Croxton, K. L. (2008). The role of logistics managers in the cross-functional implementation of supply chain management. *Journal of Business Logistics, 29*(1), 113–132. https://doi.org/10.1002/j.2158-1592.2008.tb00071.x
Lamri, J., & Lubart, T. (2023). Reconciling hard skills and soft skills in a common framework: The generic skills component approach. *Journal of Intelligence, 11*(6), 107. https://doi.org/10.3390/jintelligence11060107
Li, L., Gong, Y., Wang, Z., & Liu, S. (2023). Big data and big disaster: A mechanism of supply chain risk management in global logistics industry. *International Journal of Operations & Production Management, 43*(2), 274–307. https://doi.org/10.1108/IJOPM-04-2022-0266
Li, L., Su, F., Zhang, W., & Mao, J. Y. (2018). Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal, 28*(6), 1129–1157. https://doi.org/10.1111/isj.12153
Lim, W. M., Kumar, S., & Donthu, N. (2024). How to combine and clean bibliometric data and use bibliometric tools synergistically: Guidelines using metaverse research. *Journal of Business Research, 182*, Article 114760. https://doi.org/10.1016/j.jbusres.2024.114760
Lu, Q., Liu, B., & Song, H. (2020). How can SMEs acquire supply chain financing: The capabilities and information perspective. *Industrial Management & Data Systems, 120*(4), 784–809. https://doi.org/10.1108/IMDS-02-2019-0072
Lutz, H., & Birou, L. (2013). Logistics education: A look at the current state of the art and science. *Supply Chain Management: An International Journal, 18*(4), 455–467. https://doi.org/10.1108/SCM-08-2012-0269
Marasco, A. (2008). Third-party logistics: A literature review. *International Journal of production economics, 113*(1), 127–147. https://doi.org/10.1016/j.ijpe.2007.05.017
Marin-Zapata, S. I., Román-Calderón, J. P., Robledo-Ardila, C., & Jaramillo-Serna, M. A. (2022). Soft skills, do we know what we are talking about? *Review of Managerial Science, 16*(4), 969–1000. https://doi.org/10.1007/s11846-021-00474-9
Maucuer, R., & Renaud, A. (2019). Business model research: A bibliometric analysis of origins and trends. *Management, 22*(2), 176–215. https://doi.org/10.3917/mana.222.0176
McKinnon, A., Flöthmann, C., Hoberg, K., & Busch, C. (2017). *Logistics Competencies, Skills, and Training: A Global Overview*. World Bank.
Melnyk, B. S. A., Closs, D. J., Griffis, S. E., Zobel, C. W., & Macdonald, J. R. (2014). Understanding supply chain resilience. *Supply Chain Management Review, 18*(1), 34–41.
Myers, M. B., Griffith, D. A., Daugherty, P. J., & Lusch, R. F. (2004). Maximizing the human capital equation in logistics: Education, experience, and skills. *Journal of Business Logistics, 25*(1), 211–232. https://doi.org/10.1002/j.2158-1592.2004.tb00175.x
Obreja, D. M., Rughiniș, R., & Rosner, D. (2024). Mapping the conceptual structure of innovation in artificial intelligence research: A bibliometric analysis and systematic literature review. *Journal of Innovation & Knowledge, 9*(1), Article 100465. https://doi.org/10.1016/j.jik.2024.100465
Pal, R., Harper, S., & Vellesalu, A. (2018). Competitive manufacturing for reshoring textile and clothing supply chains to high-cost environment: A Delphi study. *The International Journal of Logistics Management, 29*(4), 1147–1170. https://doi.org/10.1108/IJLM-10-2017-0270
Pazil, A. H. M., & Razak, R. C. (2019). Perspectives of Asian employers on graduates' soft skills: A systematic review. *Universal Journal of Educational Research, 7*(11), 2397–2405. https://doi.org/10.13189/ujer.2019.071117
Priyadarshini, J., Singh, R. K., Mishra, R., & Bag, S. (2022). Investigating the interaction of factors for implementing additive manufacturing to build an antifragile supply chain: TISM-MICMAC approach. *Operations Management Research, 15*, 567–588. https://doi.org/10.1007/s12063-022-00259-7
Pynadath, M. F., Rofin, T. M., & Thomas, S. (2023). Evolution of customer relationship management to data mining-based customer relationship management: A scientometric analysis. *Quality & Quantity, 57*(4), 3241–3272. https://doi.org/10.1007/s11135-022-01500-y
Rajesh, R. (2017). Technological capabilities and supply chain resilience of firms: A relational analysis using Total Interpretive Structural Modeling (TISM). *Technological Forecasting and Social Change, 118*(1), 161–169. https://doi.org/10.1016/j.techfore.2017.02.017
Ramos-Rodríguez, A. R., & Ruíz-Navarro, J. (2004). Changes in the intellectual structure of strategic management research: A bibliometric study of the *Strategic Management Journal*, 1980–2000. *Strategic Management Journal, 25*(10), 981–1004. https://doi.org/10.1002/smj.397
Sabet, E., Yazdani, N., & De Leeuw, S. (2017). Supply chain integration strategies in fast evolving industries. *The International Journal of Logistics Management, 28*(1), 29–46. https://doi.org/10.1108/IJLM-01-2015-0013
Saebi, T., Lien, L., & Foss, N. J. (2017). What drives business model adaptation? The impact of opportunities, threats and strategic orientation. *Long Range Planning, 50*(5), 567–581. https://doi.org/10.1016/j.lrp.2016.06.006
Sauber, M. H., McSurely, H. B., & Rao Tummala, V. M. (2008). Developing supply chain management program: A competency mode. *Quality Assurance in Education, 16*(4), 375–391. https://doi.org/10.1108/09684880810906517
Shamsollahi, A., Chmielewski-Raimondo, D. A., Bell, S. J., & Kachouie, R. (2021). Buyer–supplier relationship dynamics: A systematic review. *Journal of the Academy of Marketing Science, 49*, 418–436. https://doi.org/10.1007/s11747-020-00743-1
Shet, S. V., & Pereira, V. (2021). Proposed managerial competencies for INDUSTRY 4.0: Implications for social sustainability. *Technological Forecasting and Social Change, 173*(4), Article 121080. https://doi.org/10.1016/j.techfore.2021.121080
Sohal, A. S. (2013). Developing competencies of supply chain professionals in Australia: Collaboration between businesses, universities and industry associations. *Supply Chain Management: An International Journal, 18*(4), 429–439. https://doi.org/10.1108/SCM-07-2012-0228
Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509–533. https://doi.org/10.1142/9789812834478_0002
Thai, V. V., Cahoon, S., & Tran, H. T. (2011). Skill requirements for logistics professionals: Findings and implications. *Asia Pacific Journal of Marketing and Logistics, 23*(4), 553–574. https://doi.org/10.1108/13555851111165084
Vallaster, C., Kraus, S., Lindahl, J. M. M., & Nielsen, A. (2019). Ethics and entrepreneurship: A bibliometric study and literature review. *Journal of Business Research, 99*(C), 226–237. https://doi.org/10.1016/j.jbusres.2019.02.050
Van Eck, N., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics, 84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3
Van Eck, N. J., & Waltman, L. (2014). CitNetExplorer: A new software tool for analyzing and visualizing citation networks. *Journal of Informetrics, 8*(4), 802–823. https://doi.org/10.1016/j.joi.2014.07.006
Vrontis, D., & Christofi, M. (2021). R&D internationalization and innovation: A systematic review, integrative framework and future research directions. *Journal of Business Research, 128*, 812–823. https://doi.org/10.1016/j.jbusres.2019.03.031
Wei, S., Ke, W., Liu, H., & Wei, K. K. (2020). Supply chain information integration and firm performance: Are explorative and exploitative IT capabilities complementary or substitutive? *Decision Sciences, 51*(3), 464–499. https://doi.org/10.1111/deci.12364
Widad, A., & Abdellah, G. (2022). Strategies used to teach soft skills in undergraduate nursing education: A scoping review. *Journal of Professional Nursing, 42*, 209–218. https://doi.org/10.1016/j.profnurs.2022.07.010
Willis, G., Genchev, S. E., & Chen, H. (2016). Supply chain learning, integration, and flexibility performance: An empirical study in India. *The International Journal of Logistics Management, 27*(3), 755–769. https://doi.org/10.1108/IJLM-03-2014-0042
Yu, W., Jacobs, M. A., Chavez, R., & Yang, J. (2019). Dynamism, disruption orientation, and resilience in the supply chain and the impacts on financial performance: A dynamic capabilities perspective. *International Journal of Production Economics, 218*, 352–362. https://doi.org/10.1016/j.ijpe.2019.07.013
Zamore, S., Djan, K. O., Alon, I., & Hobdari, B. (2018). Credit risk research: Review and agenda. *Emerging Markets Finance and Trade, 54*(4), 811–835. https://doi.org/10.1080/1540496X.2018.1433658
Zhu, Q., Krikke, H., & Caniëls, M. C. (2017). Integrated supply chain risk management: A systematic review. *International Journal of Logistics Management, 28*(4), 1123–1141. https://doi.org/10.1108/IJLM-09-2016-0206