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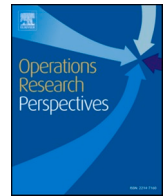
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A review of supply chain integration extents, contingencies and performance : A post Covid-19 review

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ABSTRACT

This research intends to synthesize and analyze the existing research published with respect to “extent of supply chain integration” and impact of Multiple extents of supply chain integration on supply chain performance. Three fundamental questions, including; How the extent of supply chain integration has been defined and measured in the exiting SC literature? What are the bases of differences/inconsistencies in defining various extents of integration, and What is the impact of certain contingencies (i.e. moderators & situational factors) on a relationship between, supply chain integration (extents), and supply chain performance?. In desire of sketching the available extents of supply chain integration, and their impact on chains performance, an organized technique is made use of, to observe 293 (Ultimately trimmed to 113) research studies, within the time frame of Jan 1st, 2015 till April 2020, gathered through multiple platforms, including, Emerald, Taylor & Francis, Wiley & Science Direct. Results of the study, generate the notable list of dimensions, performance outcomes, contingent variables, theoretical lenses and list of Industries which have been considered for studies in the field of SCI within the considered time frame.

1. Introduction

From inception in 1980s [40], SCM, has been in the lime light as a prime concept in the domain of management [29]. In order to make supply chains even innovative and responsive, firms scholar and managers, have frequently researched on SCM topic [25]. That's the reason why SCM is regarded as a useful strategy for firms in pursuit of enhancing their competitive performance [42].

Scholars have defined supply chain management in number of ways [35], and most of those, are associated with integration, like: “the entire concept of SCM is predicated on integration” [41]. Integrating supply chains is valued at both strategic and operational level [16,30]. As, Stevens and Johnson [47] defined supply chain integration (SCI) as “alignment, linkages and coordination of processes, people, information, knowledge, strategies, and communication across the supply chain amongst all points of contact and making the efficient and effective movement of materials, information, money and knowledge as needed by the customer.” It has also been defined as a “set of two or more organizations directly involved for coordination of upstream and downstream activities from source to the customer” [7]. Moreover, both academically and practically, number of empirical studies have agreed

with the notion of more integration with increased performance [17].

Number of research studies in the field of SCI have talked about the positive connection between integration of supply chains and performance [25,53] likewise, numerous survey researches have linked SCI with number of performances including business performance, and aspects connected with operations, financial profits and customer service. [15,36,37]. However, other studies have showed mixed, contradicting and not so convincing findings related to relationship between SCI & performance connection [3]. Such diverse findings are because of scarcity of consistent operationalization of the concept of SCI [51,53].

While eyeing survey studies, an extensive compilation of multiple measurement constructs of SCI can be observed. Still, researchers, usually measure only few items, and scales, and also disregard tentative possible interaction effects along various dimensions of SCI [22,53]. Despite SCI treated as a one-dimensional construct across larger number of studies, recent researchers have brought its multi-dimensional nature to the fore [19]. So, it's imperative to enhance ones knowledge of multidimensional nature of SCI construct, and how its multiple dimensions relate in a sequence [22].

In line with the above presented argument, Eriksson [14] proposed, strength, duration depth and scope of integration as four dimensions of

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SCI. While, the clear connection between available extents of SCI and SCP is yet to be explored fully. Scarce studies have looked into the extent of integration and supply chain performance connection, contesting the view point of increased integration and increased performance relation across the globe. Hence it was the need of the hour to mature the connection between intensity and extent of SCI and SCP, through a thorough review of available literature. Keeping the discussed gap at hand, this study intends to make a notable contribution in the field of supply chain in general and supply chain integration in particular.

Beyond introductory part (i.e. Section 01), the manuscript is arranged in a following manner. Section 02 shares the objectives and development of research questions. Moreover, Section 03 talks about study's methodology, and also assembles the shortlisted articles in a meaningful manner, along with bibliometric analysis. Section 04 displays the basic outcomes of the review. It talks about the contribution of the studied literature by classifying the extents, or dimensions of SCI, their connection with supply chain performance, in interaction with the interpretive lenses and contingent variables used. Finally, the study presents some complementary classifications (i.e. Industry, country, Journal, and year wise listing of study), followed by the conclusion, implications, and limitations, complemented by research directions for future aspirants.

2. Research questions and objectives

Taking forward the empirical and literature studies, pursued by, ([19]; D.-Y. [26,31]) and recently by [25,38] in the field of SCI, this review intends to further the understanding extracted and highlighted.

Supply chain integration has been in focus, in several research studies over the years. Multiple extents of SCI (Strategic, Tactical & Operational) have been studied concerning numerous performance outcomes, like financial, informational, and physical integration, [18] Supplier, internal & Customer Integration [43], Upward and Downward Supply chain Quality Integration (Q. [58]) and information sharing, strategic partnership, operational coordination and synchronized planning (H. [33]).

However, there is still a need for understanding the level, to which the concept of SCI has already been explored, especially from the viewpoint of its influence on supply chain performance. For the given reason, the categorization of SCI in multiple dimensions, types, or extents and measuring the impact of the identified extents on performance in the latest previous studies, leads to the primary objective of the given study. To answer the crafted objective, the below mentioned questions needs sufficient attention:

RQ1. What supply chain integration dimensions, domains, and extents have been explored in previous SCI studies in connection with numerous performance outcomes?

Previous studies measuring relations between extents of supply chain integration performance outcomes have shown in consistent findings, because of multiple aspects and limitations. Such a contradiction in studies on the Extent of supply chain integration, also makes it significant to assess the SCI area of research again for possible gaps [3].

The above referred inconsistent results are usually because of multiple operationalization's and explanations associated and used in context of SCI [51]. A scarce use of the contingency approach because of industrial and contextual differences is one more reason for the varying outcomes generated as for SCI and its influence on performance [53].

As business dynamics usually reflect striking differences in the way operations are managed, it is of great importance to define and implement SCI in several ways across multiple industrial situations [14]. This is why this systematic review intends to look into certain incongruities associated with extents of supply chain integration and their impact of SCP. In line with the above-shared argument, this work intends to address the RQ2:

RQ2. What possible ambiguities and conflicts exist in previous SCI studies associated with extents of SCI and their impact on Supply chain performance, and reasons for such contradictions?

Supply chain integration is regarded as one of the monumental indicator of performance [2]. Literature also talks about multiple intents of practitioners and businesses for utilizing SCI, like delivery [10], Monetary [42], operational [36] and SC-performance [60].

As per available literature, multiple moderators have reflected a notable influence on relationship between SCI and performance [55]. Likewise, several interpretive lenses have been the focus of studies to observe the SCI and supply chain performances [18] While, as per our understanding, there is a scarcity of focus on observing and classifying the available moderators and theoretical lenses which possibly can and already have affected the supply chain integration and performance relation.

Consequently, this review study makes an effort to list down and share an observation of such contingent factors and theoretical approaches that have the potential effect and can be of use in explaining the above-shared relationships. This helps us in the development of the RQ3:

RQ3. What influence does contingent variables have on SCI extents in relation to supply chain performance?

Additionally, this study also categorized:

- Yearly frequency of publications.
- listing publications on a geographical basis.
- listing variants of integration used in SCI research
- Categorizing articles as per industries and sectors they are published in.
- Sorting publication as per their types (i.e. empirical, literature and technical studies, etc.)
- Classifying papers on the basis of analysis tools used (i.e. SEM, EFA, CFA etc.)
- grouping paper in accordance with their Journals.

3. Methodology

An organized and managed review of literature is a scientific process of research, which helps to accumulate the scattered knowledge on a particular area of work. Tranfield, Denyer, and Smart [49] defined a systematic review as a process of "synthesizing research in a systematic, transparent, and reproducible manner with the twin aim of enhancing the knowledge base and informing policymaking and practice."

The reason for carrying out such a review is not only to synthesize the literature available, rather to investigate and examine and compile a detailed analysis of literature accessible on extents of supply chain integration and its relation with performance, through the prism of the contingency approach. The systematic review is managed on the basis of technique propagated by [49] that incorporates a comprehensive and planned searching of articles, their synthesis and analysis, for the ultimate purpose of sequentially reporting the results. According to Tranfield et al. [49] such a systematic observation of literature provides practitioners with the useful articulation for guiding both the policy and practice in any field or discipline, and that's the main research agenda for academicians and practitioners over the years. This makes this literature review papers even more significant for assisting logical decision making and other upcoming research endeavors.

3.1. Review design

Before initiating the review process, research related problems in the field of SCI have been looked into by seeking necessary consultation from the review panel, and experts of the shortlisted research area. As

stated by Tranfield et al. [49] “the initial stages of systematic reviews may be an iterative process of definition, clarification, and refinement.” So, the review is promulgated in line with the approach available, to identify, classify and to observe the impact of extents of SCI the literature available,

Throughout the study, it was observed that the extents and scope of SCI and its relation with multiple aspects of performance have received reasonable attention in past studies. This study throws light on the role and impact of multiple moderating variables on several domains and intensities of SCI and their relation with types of performance available. Moreover, different dimensions of SCI have reflected varying results when connected with many performance variables.

3.2. Executing the review

Once the research queries were formulated, a proper procedure for keywords was chalked out, to search for data from several databases including Elsevier’s Science Direct, Willey Online Library, Emerald Insight, and MDPI. For the given reason, research studies are compiled according to the mechanisms suggested by, [12] & pursued by [25].

To reach out to the maximum number of related articles, we went through a search process with a specified keyword, including “Supply chain integration” within all the fields (i.e. keywords, abstract & title). The range of time for shortlisted studies was in between Jan 1st, 2015 till April 2020. In line with established protocol, initial articles found were more than 800, across peer-reviewed journals and proceedings. Later on for refinement of data collected, a focused review of the abstract was conducted.

To be specific, a critical review of initially reached articles, resulted in the emergence of a total of 103 studies, which were considered for descriptive and thematic categorizations. These studies contained sufficient details concerning the extent of supply chain integration and their connection with many performance outcomes. They also help in finding a suitable answer to crafted research questions. Furthermore, 10 more studies were referred and mentioned to develop argument related to multiple aspects of the given study, all above-shared number makes a list of 113 research studies referred to and cited.

3.3. Details on review

This part of the review deals in both descriptive as well as thematic analysis in the subject matter:

3.3.1. Descriptive analysis

The study has ensured a critical analysis of the referred SCI studies published throughout the considered time frame amongst the shortlisted journals. We also took into count the state and sector-oriented scrutiny in the study. Furthermore, the descriptive analysis incorporated multiple research techniques implemented in previous studies. Articles are also categorized following the interpretive lenses used to assist the researches pursued in SCI domain.

3.3.2. Thematic exploration

Sorting is a basic method, to develop a detailed understanding of any variable and its utility, which is also one of the fundamental objectives of the given literature analysis. Lately, literature classification, analysis, and impact of SCI on supply chain performance haven’t been looked into exclusively.

Hence, this document, evaluates the compilation of research studies and assembles them into three prominent essential scopes: Categorization of SCI in different extents and dimensions, in relation with performance, disparities among researchers on the impact of SCI and its extents onto the supply chain performance, and the influence of contingent variables (i.e. Moderators) on the relationship between SCI and its outcome variables

4. Research scheme

| Sequential steps | Process |
|---------------------------------------|--|
| Research Questions formulation | Eyeing for research prospects associated with the concept of SCI Crafting research questions backed by the available research themes from literature, related to supply chain integration extents and SCP |
| Streamlining Articles | Classification of keywords or phrases in line with the research agenda. |
| Literature extraction | Extracting research articles using phrase “Supply Chain Integration” across keywords, title & abstract. |
| Exclusion Measures | Non-peer reviewed & unpublished studies, conference papers, reports, books & studies in language other than English were excluded. |
| Inclusion Measures | Included studies must answer any or all of the above crafted research questions, through its research output. |
| Critical Observation | Going through the shortlisted studies critically & systematically in pursuit of extracting the desired information & excluding studies which don’t answer the research questions of this review. |
| Comparative approach | Utilization of cross-referencing & other available studies in order to add clarity to the subject matter, & resultantly producing scopes for future researches. |
| Finalization | Maturing & ending the process of finding the desired studies. |

5. Review outcomes

Review outcomes have been seen through the prism of both descriptive and thematic philosophies. Descriptive examination, looked into the journals, patterns of publications, within the shortlisted time frame, data collections tools, and country/Industry wise classification of articles considered. While thematic, overview the relation between available extents of SCI in relation to multiple aspects of performance, considering contingent variables applied to this relationship.

5.1. Descriptive investigation

5.1.1. Examination of journals, and patterns of publications

In order to observe the impact that journals have on the field of SCI, this study categorized the articles published along with their journals. Moreover, number of studies published in a particular journal have also been specified, to add into the body of knowledge in terms of research trends. As per the outcomes generated, a notable number of studies (i.e. more than 50%) were published in journals with impact factor of 2.50 or more. The given research observed 113 documents, published in approx 47 journals spread across 9 publishers in recent 5yrs (Table 1). It has also been observed that the field of SCI has been subjected to a steady rise (i.e specifically in last 5 yrs), and researchers and practitioners have paid reasonable attention to it. In year 2019 almost 28, studies have observed the relationship between SCI and its impact on performance.

5.1.2. Classification by state and sector

The industry specific categorization reflects that most of the studies, i.e. 49.5 % of total, reveal the view point of manufacturing organizations. Most notable manufacturing sectors, which have been the focus of SCI research are; automotive, electronics and shipping etc. furthermore, a large number of studies, (almost 50+ in total) from manufacturing sector, observed the supply chain integration and performance relationship, across industries (Table 2).

Country wise classification resulted in an understanding that almost 28% studies out of the shortlisted ones belong to Chinese manufacturing concern, which means that recently, Chinese firm have more inclination towards the concept of SCI. As stated by Cai et al. [107], China has shown a progression towards becoming a global manufacturing hub. Additionally, 23% of researches have been subjected to different nations, with comparative intend, along with some developed nations who

Table 1
Classification of journals.

| Journals title | Studies Count |
|--|---------------|
| In't Journal of production economics | 13 |
| SCM, an international journal | 11 |
| The international journal of logistics mgt | 9 |
| Sustainability | 8 |
| International journal of operations and production management | 6 |
| Industrial management and data systems | 5 |
| Benchmarking: an international journal | 4 |
| Business process management journal | 4 |
| Journal of cleaner production | 3 |
| International journal of logistics research and applications | 3 |
| Journal of purchasing and supply management | 3 |
| A journal of the decision sciences institute, Journal of coastal research, The Asian journal of shipping and logistics, Sustainable Development, Production planning & control, Enterprise Info Management & Cogent, business & management | (2*7) = 14 |
| Business strategy and the environment, Global journal of flexible systems management, Maritime policy & management, The services industries journal, Transportation journal, Decision support systems, Asia pacific management review, Computers in industry, European journal of operational research, Journal of operations management, European business review, Journal of manufacturing technology management, International journal of emerging markets, British food journal, International journal of physical distribution & logistics management, Journal of supply chain management, Operations management research, TQM & business excellence. Production research. Applied sciences. European mgt, Industrial marketing & mgt, Int Journal of PM, Transportation research part D, Procedia manufacturing, Business research, Asia pacific journal of marketing and logistics, Humanitarian logistics and SCM, Int Journal of operations & Production, & Global operations and strategic sourcing journal. | (1*30) = 30 |
| Total | 113 |

Table 2
Industry-wise classification of selected papers.

| Industry | Industries Count |
|--|------------------|
| Manufacturing | 53 |
| Across different industries (Not restricted to one specific industry) | 12 |
| Literature Reviews, Meta-Analysis and Models | 6 |
| Automotive | 7 |
| Shipping | 6 |
| Retail | 5 |
| Agricultural | 4 |
| Food & Beverages, Logistics and Oil & Gas Industry | (3*3) = 9 |
| Banking, Electronics | (2*2) = 4 |
| Construction, Hotpot, Professional Service, Telecommunication, Fashion, Haulage & Satellite Production | (1*7) = 7 |
| Total | 113 |

Table 3
Country-wise analysis and count of SCI papers.

| Titles | Count of Countries |
|---|--------------------|
| China | 31 |
| Not restricted to one specific country/Comparative studies) | 26 |
| Non Empirical, Meta, Systematic Reviews | 6 |
| India | 6 |
| Korea | 6 |
| Taiwan | 4 |
| United States | 4 |
| Malaysia | 5 |
| Pakistan | 3 |
| Singapore | 4 |
| United Kingdom, Turkey, New Zealand, Spain & Australia | (2*4) = 10 |
| Jordan, Brazil, Thailand, Ireland, Sweden, Indonesia, Greater China & Ghana | (1*8) = 8 |
| Total | 113 |

have researched in the subject of SCI recently (Table 3).

5.1.3. Categorization of basic data analysis and collection tools

The given identification process revealed that the most used data analysis technique has been structural equation modeling (SEM), in pursuit of analyzing the relation between integration extents and resulting performances. Almost 40% the observed studies, (i.e. 42) used Structural Modeling as their primary analysis tool, to validate the relationship. Likewise hierarchical regression Technique is another, notable tool utilized in reasonable quantity of studies (11 times to be specific), followed by techniques like OLS regression analysis, cluster analysis, threshold regression, and path analysis, etc. (Table 4).

Referring to data collection approaches used, survey-based studies stand at almost 85%, which dealt in used of both structured and un-structured questionnaires with the help multiple mediums, for the purpose of gathering responses. Other data gathering approaches include, Delphi technique, focus group, case studies, and archival data collection tools (Table 5).

5.2. Thematic exploration

Thematic analysis has looked into the studies on the basis of content available and used, and have arranged them in order to answer the research objectives coined by this study.

5.2.1. Categorization of the concept of SCI

Though reasonable number of studies have considered SCI by the way of unidimensional construct, yet its multidimensional essence has also been pursued in many studies [19,52]. Eriksson [14] has shared four dimensions of SCI including depth, scopes, strength and duration

Table 4
Analysis techniques used.

| Analysis Tools Used | No. of Tools |
|---|--------------|
| Structural Equation Modelling | 42 |
| Partial Least Squares SEM | 13 |
| Hierarchical Regression Analysis | 11 |
| Regression Analysis | 5 |
| Cluster Analysis | 4 |
| Content analysis | 3 |
| Threshold Regression Analysis | 2 |
| OLS Regression Analysis | 2 |
| Hierarchical Linear Regression Analysis | 2 |
| Path Analysis and OLS Regression Analysis | 2 |
| Extensive literature review | 2 |
| Hierarchical Regression Analysis and Cluster Analysis | 2 |
| Meta-Analysis | 2 |
| Structured Delphi Technique | 1 |
| Path analysis and Structural equation modelling | 1 |
| Cluster Analysis and Structural Equation modelling | 1 |
| Covariance Based Structural Equation Modelling | 1 |
| Structural Equation Modelling and Regression Analysis | 1 |
| Mixed Effect Models | 1 |
| Sobel test | 1 |
| Confirmatory Factor Analysis | 1 |
| Multi Sampling Analysis | 1 |
| Correlation Analysis | 1 |
| Multi-criteria Approach | 1 |
| Multilevel Regression Analysis | 1 |
| Multiple Regression Analysis | 1 |
| Moderated Regression Analysis and Path analysis | 1 |
| Contingency Analysis | 1 |
| Mediated Regression Analysis | 1 |
| Mediated Multiple Regression Analysis | 1 |
| Ordinary Least Square Regression | 1 |
| Systematic Approach | 1 |
| Hierarchical Multiple Regression Analysis | 1 |
| Seemingly Unrelated Regression Techniques and Simulation-based Mediation Analysis | 1 |
| Total | 113 |

Table 5

Tools/Techniques for data collection.

| Data Collection Approach(es) | Count |
|---|-------|
| Survey (including use of secondary data) | 90 |
| Survey and Interviews | 7 |
| NA (Literature reviews, meta-analysis and modeling) | 6 |
| Case Study Approach (Interviews) | 4 |
| Interviews | 3 |
| Survey and Focus Groups | 1 |
| Delphi Research | 1 |
| Survey and Archival Data | 1 |
| Total | 113 |

specifically for project specific supply chains. The main idea with SCI revolves around inter-functional & inter-organizational practices, and cooperation in order to make SCI work with vigor [25].

Recently, in Supply chain integration literature, multiple extents of SCI have been considered, reflecting the interaction between SCI and performance related outcomes. From 113 used studies of this work, many studies have materialized SCI as a unidimensional scope, in relation with performance outputs [64].

Approximately 20% studies out of considered ones have made use of SCI as a single construct. Number of extents of integrations can be traced from recent literature in line with SCI-SCP relation under consideration. Such extents mainly revolve around internal integration ([8, 55]; J. [57]), external integration ([9,10]; Y. [34]), customer integration [36, 37] followed by supplier integration [24,39] are the most frequently used ones. While some of the infrequently used ones have been upstream &down-stream quality integration (Q. [58]), Supply chain relationship, and performance related integration [59], complemented by integration associated with process and organization [46] and others.

As identified by Wang, Childerhouse, Kang, Huo, and Mathrani[54], there exist three extents related with SCI, including process coordination, strategic alliance and information sharing. While, Shou, Li, Park, and Kang [45] believes that system coupling, information sharing, joint decision making, and collaboration are mere integrative behaviors which chain members reflect, then that of these as SCI dimensions. In line with the above identified conceptual discrepancies, there has been a notable debate on scarcity of conceptual clarity on the concept of SCI. This is one of the highlight of the given study, which intends to draw reader's attention to such gaps and looks forward to add clarity to the concept of SCI. Studies defining SCI in several ways are as follows (Table 6).

5.2.2. Inconsistencies between SCI-SCP relationships

As it has already been explained that multiple extents of SCI have been observed in relation with scores of firm's performance. Recently, SCI's effect on many performances including organizational performance [36] SCP [60] contract manufacturing [65], monetary and ecological [64], delivery related [10] logistics oriented performance [13] were considered.

As has found by Jajja, Chatha, and Farooq[23] that agility performance is a product of its positive relation with supplier, internal and customer integration, with internal integration showing a comparatively weaker connection on agility performance. While Chang, Ellinger, Kim, and Franke[6], has verified the positive relation between integration dimensions and financial performance, followed by [1] indirect effect of customer integration with financial outcomes for an organization.

Likewise, handful of Supply chain integration dimensions have been utilized over the years. Considering Supplier, Internal and Customer Integration as primary extents/dimensions of SCI [36,42,55,60]. Number of other dimensions have played their part in formalizing and facilitating the concept under discussion. Some of such commonly utilized dimensions within the time frame under considerations include: Green supplier, internal, & external ([20,32,58]), Customer/Supplier Product & Process (H. M. [27]) Kim et al. [108], Cross Functional ([21];

Table 6.

Performance outcomes (Annex-1).

| Researcher(s) | SCI Dimensions/ Extents | Resulting Performance Types |
|---|---|--|
| Zhou et al. (2019) | GSCI | Economic & Environment related Performance |
| Yang, Q., Geng, R., &Feng, T. [58] | Green SI Green II Green CI | Operational, Financial, Environmental and Societal Performance. |
| Wei, S., Yin, J., & Chen, X. [55] | II EI | Firm related Performance |
| Kim, Y. H., &Schoenherr, T. [65, 66] | Supplier & Customer Product (I) Supplier & Customer, Process (I) Mutli-Functional (I) | Return on Contract Production |
| Srinivasan, R., &Swink, M. [67], Pakurar et al. (2017), Wantao Yu (2015), Ding et al. (2017), Chang et al. [68], Kumar et al. [28], Lii and Kuo (2015), Wong et al. (2016), Lee et al. (2015), Kim and Chai [69], Ebrahimi et al. (2017), Miah et al. (2018), Boer et al. (2018), Tarifa-Fernandez et al. (2019), &Ataseven (2017), Lu et al. (2017), Ellinger et al. [13], Song et al. (2017), Munir et al. [36], Jajja et al. [23], Huo et al. (2015), Mostaghel et al. (2015), Wong et al. (2017), Yunus and Tadisina (2015), Ali et al. (2017), Thai and Jie (2017), Kang et al. (2018), Delic et al. (2019), Kwamega et al. (2019) | SI II CI | Operational, Relational, Financial, Strategic, Competitive, Supply Chain, Firm, Agility, Logistical, Business, Service, Sustainable, Internal Process and Innovation oriented Performance, |
| Hyun Jung Kim [70] | SCI | Firm oriented Performance SCP |
| Yuen, K. F., Wang, X., Ma, F., Lee, G., & Li, X. [60] | II EI | |
| Yang, Y., Jia, F., &Xu, Z. [71] | Upstream SCI Quality Downstream SCI Quality | Customer-oriented Performance |
| Chiang et al. (2015) | II CI | Operational (P) |
| Doering, T., De Jong, J., & Suresh, N. [10] | II EI | Delivery (P) |
| Wiengarten, F., &Longoni, A. [72] | SI CI | Financial (P) |
| Xu& Long [73] | SCI | Transformational (P) |
| Yuen and Thai [59] | Information Integration Relationship Integration Performance Integration Operational Integration | Operational (P) |
| Shafique et al. (2018) | SI CI | Green Supply Chain Performance |
| Song et al. (2017) | Green SI Green CI | Operational & Business Specific Performance |
| Ji et al. (2019) | II EI | Sustainable Development |
| Qian et al. (2019) | SCI | Financial & Environmental Specific Performance |
| Ni et al. (2019) | SI CI | Business Specific Performance |
| Yang et al. [56] | SCI | Technological Innovation |

(continued on next page)

Table 6. (continued)

| Researcher(s) | SCI Dimensions/ Extents | Resulting Performance Types |
|--|--|---|
| Chavez et al. (2015) | CI | Operational Positives |
| Li et al. [32] | Green II Green SI | Environment related Performance |
| Sung Bae [74] | SCI | Operational Success |
| Bruque-Camara et al. (2016) | Information SCI Physical SCI | Operations Specific Performance |
| Chen et al. (2018) | SI CI | Firm Specific Performance |
| Huang and Huang [75] | SCI | Firm Related Performance |
| De Mattos and Laurindo [76] | SCI | Perceived benefits |
| Debadyuti Das [77] | SCI | Environmental, Employee Centered Social, Community Centered Social, & Operation specific Performance |
| Durach and Wiengarten [78] | II EI | Operational Performance |
| Demirkesen, S., & Ozorhon, B. [79] | SCI | Project Management related Performance |
| Gong et al. [18] | Information Integration Physical Integration Financial Collaboration | Business Specific Performance |
| Sinnandavar, C. M., Wong, W. P., & Soh, K. L. [80] | Information Integration Operational Integration | Operational Efficiency Environmental Performance |
| Kumar et al. [28] | II SI CI Information Specific Integration | Supply Chain Oriented Performance |
| Chul-Hwan Han [81] | SI CI | Terminal Competitive Outcomes (Cost, Quality, Responsiveness oriented Performance) |
| Ni, W., & Sun, H. [37] | SI CI | Business Related Performance |
| Liu, L., Cheung, C. M., & Lee, M. K. [82] | Synchronized Planning Information Sharing Operational Coordination Strategic Partnership | Operations Specific Performance |
| Shou et al. (2017) | SI CI | Operational Positive Outcomes |
| Qi et al. (2016) | II EI | Finance oriented Performance |
| Zsdisin et al. (2015) | II SI | Supplier Performance |
| Wiengarten et al. (2015) | SI CI | Operational |
| Sundram et al. (2015) | SCI | Supply Chain Oriented performance |
| Zhang et al. [62] | Information Sharing Cooperative Bond | Supplier specific Performance |
| Chung Shan Yung [83] | Top Management Support Collaborative Communication Information Technology Goal Congruence Cross Functional Cooperation | Market Performance Financial Performance |
| Cheng, Y., Chaudhuri, A., & Farooq, S. [8] | II EI | Operational Performance |
| Willis, G., Genchev, S. E., & Chen, H. [84] | II EI | Flexibility Performance |

Table 6. (continued)

| Researcher(s) | SCI Dimensions/ Extents | Resulting Performance Types |
|---|---|--|
| Tsanos and Zografos [50] | Information Integration | Supply Chain Oriented Performance |
| Chaudhuri et al. (2017) | II EI | Manufacturing Flexibility |
| Yuen, K. F., & Thai, V. V. [59] | II EI | Operational Outcomes |
| Vanpoucke et al. (2016) | Information Exchange Operation Integration | Operations Specific Performance |
| Feng et al. (2016) | SCI | Operational Positives |
| Fu et al. (2016) | SCI | Quality Related Performance |
| Liu et al. [34] | II EI | Environmental & Economics oriented Performance |
| Mora-Monge et al. (2019) | SCI | Business Specific Performance |
| Afshan and Motwani [85] | CI | Financial & Customer Specific Performance |
| Sundram et al. (2018) | SCI | Manufacturing Related Performance |
| Song et al. [46] | SCI | Operational & Financial Success |
| Shashi, S., Cerchione, R., Centobelli, P., & Shabani, A. [86] | II EI | Cost Performance Environmental Performance |
| Kalyar et al. [24] | II SI CI External Integration Orientation | Supply Chain Performance (Efficiency and Effectiveness) |
| Ataseven, C., Nair, A., & Ferguson, M. [4] | II Supply Integration Demand Integration | Basic Programs Food Distribution |
| Yu et al. (2019) | SCI | Operations Specific Performance |
| Wiengarten et al. (2019) | SI CI | Operations Related Performance |
| Chen et al. (2019) | SCI | Financial Gains Operational Gains Business Specific Performance |
| Hu et al. [21] | Cross Functional Integ Manufacturing Network Integ EI | Operational Gains (Efficiency and Effectiveness) |
| Liu & Jayaraman [87] | II EI | Professional Service Providers |
| Irfan and Wang [88] | II EI | Competitive Success |
| Han and Huo [89] | Green II Green SI Green CI | Environmental, Economic & Society Oriented Performance |
| Song et al. [46] | Information, Process, and Organizational Collaboration. | Firm Performance |

Note: II (Internal Integration), CI (Customer Integration), External Integration, G (Green), & I (Integration)

H. M. [27]), Up-Downstream quality ([58]) Operational/Information [18,28,50,59] Performance/Relationship [59] Sustainable Supplier, Internal & External [48], Operational Coordination, Strategic Partnership (H. [33]) & Cooperative Relationship [62], Top Management Support, Cross Functional Cooperation, Information Technology, Goal Congruence & Collaborative Communication (C.-S. [56]), Demand Integration [4] & Manufacturing network integration [21] etc.

5.2.3. Specific theoretical lenses used, in SCI and SCP studies

This section lists down all the theoretical lenses used in SCI studies

considered in the given study. Considering SCM as “intra- and inter-organizational process to collaborate supply chain partners for efficient flow of money, information and material [63]”, number of theories, actually been observed & have been used as a foundation for SCI studies. As already mentioned that number of underpinning theories were observed, to be specific, the resource based view leads the chart, followed by contingency theory, complemented by information processing theory (i.e. 29, 14, & 13 times), are the leading lenses used to give strength and clarification to the concept of SCI.

Other prominent theories identified include, transaction cost economics, followed by, relational view & dynamic capability theory, along with number of other ones used to the limited yet useful extent for materialization of SCI studies with other variables used (Table 7).

5.2.4. Moderators applied in SCI-performance connection

Zhang et al. [62] affirmed that in given circumstances of ever rising environmental uncertainties, businesses need to have an eye on the emerging dynamics and to manage timely response to unforeseen market forces. Du, Bai, and Chen [11] also propagated researchers to make use of contingency perspective. While, Contingency theory demonstrates that organizations need to become promptly responsive to ever dynamic environment, (which was described by [5] as volatile, uncertain, complex and ambiguous), filled with increased velocity and hyperactive turbulence. In line with the contingency theory, the fit between firm's strategy and its design is the main factor governing company's performance. So, it can be said that in case of SCI, its dimensions need to be linked with the contingencies available, which can also be labeled as the moderators used. Considering the above shared argument, this study intended to take count of list of moderators which have been under consideration in recent SCI studies, across industries, types of studies and nations. To be specific, Table 8 provides a detailed outlook into the number of prominent moderators. It surely will be of use for future researchers to not only reuse the moderators already used in different contexts for cross validation, and also to look for new ones.

6. Findings and discussion

The paper, systematically and critically looked in the studies conducted into the field of Supply chain integration, intending to identify or specify the types and extents of supply chain integrations used & their impact on overall supply chain performance. Likewise, it also identifies the role of contingencies or contingent variables (i.e. Moderators) available and their contribution in shaping the supply chain integrations studies over the years. Along with the primary research questions, this study also list down number of secondary details for the ease of researchers who look forward to the field of supply chain in general and

Table 7
Interpretive lenses used.

| Interpretive lenses Titles | No. of Interpretive approaches |
|--|--------------------------------|
| RBV | 29 |
| Contingency theory | 14 |
| Information processing theory | 13 |
| Relational view | 6 |
| Dynamic capabilities view & Extended resource based view | 5 |
| Configuration, Transaction cost economics, Social exchange theory & Social capital theory | 4 |
| Organizational capability perspective & Resource dependence theory | 3 |
| Institutional theory, Complementarity theory & Strategy-structure-performance view | 2 |
| Theory of absorptive capability Resource mobilization, Service-profit-chain model, & Uncertainty management theory | 1 |
| Total | 104 |

Table 8
Moderators used.

| Contingent Variables | Frequency of use | Researches With Yrs. |
|---|------------------|--|
| Technology Turbulence | 1 | Zhou, J., Mavondo, F. T., & Saunders, S. G. [90] |
| Usage of Technology Enabled SCM Systems | 1 | Srinivasan, R., & Swink, M. (2015) |
| Distributive Justice | 1 | Wei, S., Yin, J., & Chen, X. [55] |
| Demand Uncertainty | 1 | Ding, Y., Lu, D., & Fan, L. [91] |
| Cross Functional Integration | 1 | Kim et al. (2018), Hu et al. [21] |
| Macro-micro Institutional Environment | 1 | Yang et al. [58] |
| Market Uncertainty | 1 | Lu, D., Ding, Y., Asian, S., & Paul, S. K. [92] |
| Procedural Justice | 1 | Wei, S., Yin, J., & Chen, X. [55] |
| Power | 1 | Doering, T., De Jong, J., & Suresh, N. [10] |
| Regulatory Quality | 1 | Wiengarten et al. [93] |
| Masculinity | 1 | Doering et al. [10] |
| Energy Consumption Behavior | 1 | Shafique et al. [94] |
| Long Term Orientation | 1 | Doering et al. [10] |
| Individualism | 1 | Doering et al. [10] |
| Organizational Risk Propensity | 1 | Yu et al. [95] |
| Uncertainty Avoidance | 1 | Doering, T., De Jong, J., & Suresh, N. [10]. |
| Green HR Training | 1 | Shafique et al. [94] |
| Relational Quality | 1 | Chang et al. (2015) |
| Firm size | 1 | Song, H., Turson, R., Ganguly, A., & Yu, K. [96] |
| Marketing Turbulence | 1 | Chen et al. [97] |
| Time | 1 | Chang, W., Ellinger & Franke, G. R. [98] |
| Supply Chain Integration | 1 | Yang et al. [56] |
| National Culture | 1 | Chang et al. (2015) |
| Relational Capability | 1 | Li et al. [32] |
| Data Consistency | 1 | Sinnandavar et al. [99] |
| Institutional Collectivism | 1 | Wong, C. W., Sancha, C., & Thomsen, C. G. [100] |
| Risk | 1 | Wiengarten et al. [93] |
| Humane Orientation | 1 | Wong, C. W., Sancha, C., & Thomsen, C. G. (2017) |
| Customer Integration | 1 | Ni, W., & Sun, H. [37] |
| Cross-functional Application | 1 | Sinnandavar, C. M., Wong, W. P., & Soh, K. L. (2018) |
| Integration | 1 | Wong, C. W., Sancha, C., & Thomsen, C. G. (2017) |
| In-group Collectivism | 1 | Ni and Sun [37] |
| Supplier Integration | 1 | Wong, C. W., Sancha, C., & Thomsen, C. G. (2017) |
| Assertiveness | 1 | Lee et al. [101] |
| Supply Chain Dynamism | 1 | Chaudhuri, A., Boer, H., & Taran, Y. [103] |
| Supply Chain Risk Management | 1 | Wong, C. W., Sancha, C., & Thomsen, C. G. (2017) |
| Future Orientation | 1 | Kim and Chai (2015) |
| Manufacturing Approaches (Push & Pull) | 1 | Yunus, E. N., & Tadisina, S. K. [61] |
| Organizational Culture | 1 | Vanpoucke, & Muylle, S. [102] |
| IT Use | 1 | Hu, W., Shou, Y., Kang, M., & Park, Y. [104] |
| International Asset Dispersion | 1 | Shee, H., & Pujawan, N. (2018). |
| Top Management Support | 1 | Hu et al. [21] |
| External Integration | 1 | Wiengarten, & Fynes, B. [105] |
| Competitive Priorities (Cost, Flexibility, Delivery, Quality) | 1 | Yuen and Thai [59] |
| Supply Chain Type | 1 | Hu et al. [21] |
| Manufacturing Network | 1 | Kalyar, M. N., & Ahmad, B. [106] |
| Integration | 1 | Tarifa-Fernández, & Cespedes-Lorente, J. (2019). |
| Environmental Uncertainty | 1 | Song et al. [46] |
| Absorptive Capacity | 1 | |
| Product Variety | 1 | |

supply chain integration in particular. The secondary categorizations include: *Types of Journals for SCI studies*, *Countries/Industries Studies conducted in*, *Type of Data Collection & Analysis Tools used*, *Types of SCI terms used*, *type of performance outcomes* and others. This comprehensive list of factors concerning the recent supply chain integration studies and its yearly trend suggests scholars a reference point, where they can make use of this information in giving direction to their future intended studies.

Managers, interested in rethinking their integrative relations with their supply chain partners (Especially in Post Covid-19 Scenario), can make use of this review study. It can also act as a lime light for organization operating in given environmental uncertainty, to regroup, reevaluate and reengineer their supply chains priorities in desire of increasing overall supply chain performance.

7. Implications for researchers

Generation of mixed, nonlinear and contingent relationships between SCI and performance has been the reason for this review, which intends to direct the intensions of the future researchers and academicians towards contextual implementation of SCI and its relation with multiple dimensions of performance. It intends to reflect, based on previous literature, that supply chain integration can be measured in number of ways, (i.e. Unidimensional) and also through second-order constructs including supplier, internal and customer integration [15], which surely will change the output produced.

This study will help researchers in not only clarifying the concept of SCI, rather it will also help in going beyond the above stated three dimensions (i.e. EI, II, & CI), so that scholar must make use of other dimensions of the SCI construct [44]. Moreover, in line with the contingency theory, this research has listed number of moderating contingent variables along with the interpretive lenses used in the previous studies, so that the researchers who intend to research in the given area must consider these aspects as well.

Similarly, this study lists down, the types of industries, and classifies the Countries in which the recent studies related to SCI and its effect on SCP has taken place. Such a classification, will surely be of academic assistance for all those who intend to pursue their researches in the field of SCI. It also helps establishing the basic understanding of that, which industries (i.e. Contextual domains), and countries are still untouched, which if considered can be of significance for overall development of SCI concept.

There has also been a long standing debate on the right extent or intensity of integration which must be employed in desire to reach out the required level of performance. To find out the answer to this, firstly it was required to define the concept of extent of supply chain integration, which for most of the researchers is a debate of "More vs less" integrated resources, activities and actors, others have labeled it as arcs of integration [16]. So, this research through classification of dimensions, and thorough analysis of literature has highlighted certain dimensions and extents of integration, which needs to be implemented considering their context (i.e. Industry type, and Geographical proximity) in mind.

This study nullifies the idea of utility of more integration across all types of value chains, and their network factors (actors, activities and resources). Rather, it brought researchers attention to the idea of considering context, through the lens of contingency theory, especially through detailed review of SCI related articles from recent five years.

7.1. Implications for practice

Determination of effectiveness of a supply chains is a product of level of, intensity and types of integration techniques and extents used, so it's really important for policy makers to have an eye on multiple types and approaches of integration available. They also need to understand the importance of cost which is associated to the varying extents of SCI which they intend to go for, so that firms could weigh the cost and

benefits to be reaped at the end of the day. This need for implementing the required extent of integration, as highlighted by the given study will make policy makers understand the contingency perspective even more. Especially in post Covid-19 era, it has emerged as one of the monumental contingency, which has reshaped the landscape of how, integration among supply chain partners must be managed & executed. Such, a mindful selection of right extent of supply chain integration across network factors (actors, activities, and resources), will help firms in saving cost and earning notable profits.

7.2. Limitations and future recommendations

Firstly, the given study made use of systematic approach for data collection, by reviewing the existing literature, making it collective in nature. So. Meta analytical approach can be used, which by synthesizing empirical data can generate more specific outcomes. Secondly, the study made use of the peer reviewed published research studies, excluding the published reports, practitioner's literature and white paper. Future researches can rely on extended body of knowledge and data sources. Lastly, this paper relied on papers published only in last five years, considering the limited time and resources available, which means, that future studies can make use of data available in a given field even beyond the considered time frame.

Though, we believe that this study has considered significant numbers of studies in a detailed manner, to make a point, still we believe that more detailed analysis of studies by increasing the span of time, and keywords could add to the knowledge base. Future researches can also consider the varying extents of supply chain integration available (strategic, tactical and operational) across different industries and observe the changes in results because of the environment related contextual differences. Likewise, there is a dire need to consider the moderating impact of contextual variables available on a SCI and performance relation (i.e. especially in post Covid-19) scenario to observe the difference in outputs generated. Lastly, a critique study, justifying the performance relation of lower intensity & extent of SCI in comparison to the broader span and extent of integration used, because of the contextual nature of research studies, will be of real contribution.

Declaration of Competing Interest

None.

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