

Bibliometric Analysis On The Thematic Evolution Of Supply Chain Sustainability In Manufacturing Sector: A Literature Review From 2000 To 2019

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Abstract

Bibliometric analysis is applied to study the evolution and operationalization of supply chain sustainability in the manufacturing sector over a two-decade time span from 2000 to 2009; and 2010 to 2019. This provides collective insights on fields and sub-fields of inquiry and the opportunity of enhanced comprehension of supply chain sustainability as a continuous improvement endeavor in terms of specific trends, progression, and approaches. To provide the empirical foundation for the study, Shneider's (2009) four-stage scientific evolution theory is discussed in parallel to the temporal phases explored within. By employing protocols of co-occurrence and citation analyses key journals, active countries, and most cited authors have been identified through 778 records retrieved from the Web of Science database. VOSviewer software was used. In the first decade, it was found that research in supply chain sustainability is at the end of first stage of Shneider's knowledge evolution theory. During the second decade the research progression flourished in the next successive stage of knowledge evolution with the advanced investigation of domain scope and horizon. This study contributes with the identification of thematic trends under practice for last two decades that can be construed on two levels: first, researchers could assess their respective position with regards to their research approach and contribution in the research community; and secondly they can judge that in what capacity, as a contributor, they are expected to participate towards the propagation of the particular knowledge sphere.

Keywords: Supply chain sustainability, Manufacturing, Bibliometric analysis.

Introduction

Sustainable supply chain management refers to categorical integration of social, environmental, and economic dimensions of the triple bottom line with a focus on forward and reverse supply chains. This sub-discipline of supply chain management has gained attention particularly in the last two decades. Though research efforts have been endeavored for comprehension and

operationalization of sustainability in the domain of supply chain, there is still a gap with regards to models that are multifaceted which could serve the purpose of comprehension and identification of the current state of sustainability in supply chain and significant feedback mechanisms for ameliorative actions. Researchers have focused on specific areas of sustainable supply chain management only, such as sustainability issues,

industrial contexts, methodological rigor and definitions (Ahi & Searcy, 2013; Carter & Liane Easton, 2011; Winter & Knemeyer, 2013). However some variations are also observed as reflected in the modelling based research of Seuring (2013) and Brandenburg, Govindan, Sarkis, and Seuring (2014). The few comprehensive review of developments in the literature conducted, reflects either the structural (Fahimnia, Sarkis, & Davarzani, 2015) or the conceptual (Carter & Rogers, 2008; Seuring & Muller, 2008; Sarkis, Zhu, & Lai, 2011; Touboulic & Walker, 2015) orientations of aspects of sustainable supply chain management and very few studies have been conducted on its thematic evolution across a larger study sample size. For instance, Srivastava (2007) focuses on the reverse logistics aspect of the literature, and Abbasi (2012) thematically explores the literature on sustainable supply chain management. These authors, too, have limited their scope of study to environmental dimension in logistics and transportation. Likewise, Ashby, Leat, and Hudson-Smith (2012) limit their sustainability review scope to the environmental and social dimensions minus the economic aspect. Bibliometric cartography by Pang and Zhang (2019) has been carried out but on green manufacturing research and Patel and Desai (2018) conducted a systematic review of sustainable supply chain management literature development over different industry sectors.

The temporal changes in any scientific discipline is explained through various systematic efforts that capture the scientific change. This change, termed as evolution, is a gradual process that makes the explanatory work possible (Dawkins, 2009). Various theories exist for the explanation of evolution in any scientific domain. The theories presented by Kuhn (Kuhn, 1962), Fuchs (Fuchs, 1993), and Shneider (Shneider, 2009) serve as classic models that adequately encompass the major characteristics of progression of a scientific domain. In his

structure of scientific revolutions, Kuhn (1962), proposes that science progresses in a repetitive revolutionary manner characterized by paradigm shifts. This progression follows a four-stage life cycle viz pre-paradigm, paradigm birth, paradigm expansion, and paradigm constructive-destruction.

Fuchs (1993) in his scientific change theory, offers that advancements in sciences are determined by the competition among scientists for sociological variables of organizational recognition and reputation. He proposes that change, depending on the interplay of organizational variables of task uncertainty and mutual dependence, can be in the form of permanent discovery, stagnation, specialization and cumulation, or fragmentation.

Another, comparatively, recent scientific evolution theory which actually complements the work of Kuhn (1962) is presented by Shneider (2009).

For the purpose of this study the underpinning theoretical framework of Shneider (2009) have been applied to evaluate the thematic evolution of the study topic.

One dominant difference from Kuhn's theory is that Shneider is of the view that along the four-stage sequence of evolution changes occur, in tandem, to the psychology of individual scientists involved in each phase, unison with the prevalent mindset of the overall community. In the first stage, new subject matter pertaining to a new scientific discipline is introduced for exploration and analysis. Researchers at this stage, need not be discoverers but rather contributors and hypothesis generators. Their efforts are to be validated by the ones working in the next stage. In the second stage the scientists work towards enhancement of comprehension of the new discipline by means of developing research instruments and tools in the form of methodologies and sophisticated techniques through which the scope and horizon of the phenomena could be explained. They are

expected to be ingenious, enterprising and have high tolerance for professional risks. The application of these new methodologies and skills take place in the third stage in the form of genuine scholarly publications and knowledge generation about the phenomena. In this stage, the scientists are anticipated to be immaculate and precise in their practices towards the creation of novel perceptions, comprehensions, and queries regarding a knowledge domain. Fourth stage is all about the presentation, continuation, revision, transmission and communication of knowledge production of the previous three stages. The scientists at this stage have the responsibility to comprehensively review, synthesize, and convey the accumulated domain knowledge in the realm of on-going developments as well as future research areas.

An all-encompassing tool, bibliometric analysis, is applied to study the evolution of supply chain sustainability in the manufacturing sector over a time span from 2000 to 2019 and to explore the operationalization of this domain.

Bibliometric analysis is a unique and significant exploratory tool used for the analysis of research articles or books in academia (Şenel et al., 2017). Different protocols are utilized to investigate the thematic patterns of scholarly work. Bibliometric analysis, by the employment of methodologies (mathematical and statistical), not only probe into the characteristics and patterns of the subject-matter of a discipline, it identifies research hotspots, prospective trends and research directions and guidelines in the study field (Du et al., 2015). With the tools and techniques of bibliometric analysis, key journals, active countries, and most cited authors have been identified in this study.

Bibliometric analysis provides collective insights on fields and sub-fields of inquiry and offers the opportunity of enhanced comprehension of supply chain sustainability as a continuous improvement endeavor in terms of specific trends, progression, and approaches,

keeping in view Shneider's (2009) four stages of evolution. Explanation and categorization of the evolution of supply chain domains in light of Shneider's scientific evolution theory would assist researchers in two ways. Firstly, they could assess their position, with regards to their research approach and contribution, in the research community. Secondly, they can judge that in what capacity, as a contributor, they are participating towards the propagation of the particular knowledge sphere.

Methodology and Material

Bibliographic overview of literature was conducted about the evolution of supply chain sustainability in the manufacturing sector between 2000 and 2019 time sliced into two decades (2000-2009, 2010-2019). Relevant literature in English, published in peer-reviewed journals enjoying international reputation and book chapters that are available in repositories by using the databases of Clarivate Analytics Web of Science Core Collection and Dimensions.ai were retrieved. Document search was undertaken using the basic as well as advanced search options. The search string comprised of keywords 'supply chain sustainability' AND 'manufacturing'. The 778 records retrieved were analyzed for co-occurrence and citation of the documents, authors, sources, and countries. Enhanced comprehension of supply chain sustainability as a continuous improvement endeavor in terms of specific trends, progression, and approaches were carried out keeping in view Shneider's (2009) four stages of evolution. For bibliometric analysis and visualizations, CiteSpace (Chen, 2017) and VOSviewer (van Eck & Waltman, 2014) software packages were used.

Results and Discussion

The search string, with the application of database filter criteria, made available 778 records which were segmented into the two time slices.

Decade One (2000-2009)

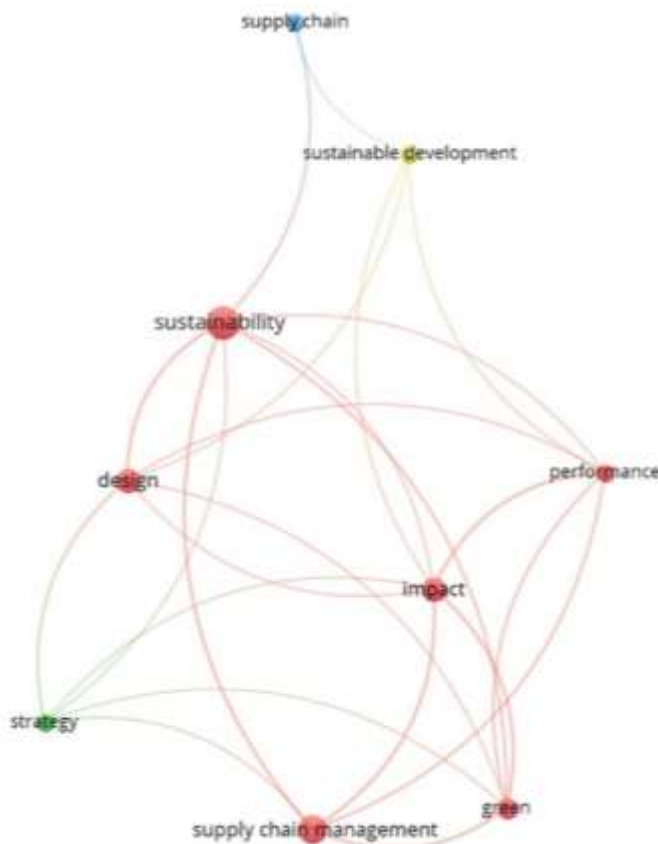
The first decade had 22 records, only.

Keywords Analysis

With the help of keywords important information could be gleaned about the main content of the research paper.

For co-occurrence analysis, of the 123 “all keywords”, 9 met the minimum threshold criteria of 3 occurrences. The threshold was kept low because the emergence of sustainability in supply chain domain had just started and the research focus was dispersed. The purpose was to maximize the coverage of the scholarly work. In Figure 1 the network visualization depicts the formation of 4 clusters and 24 links.

Figure 1 Co-occurrence analysis of “all keywords” network visualization (2000-2009)



The first cluster (red) has keyword ‘sustainability’ which makes strong links with ‘supply chain management’, ‘design’, ‘impact’, ‘green’, ‘performance’; a less strong link with ‘strategy’;

and the weakest link with ‘supply chain’. The second cluster (green) has five links with the keyword ‘strategy’ in the center. All its links are distant and not very strong. Cluster blue is the

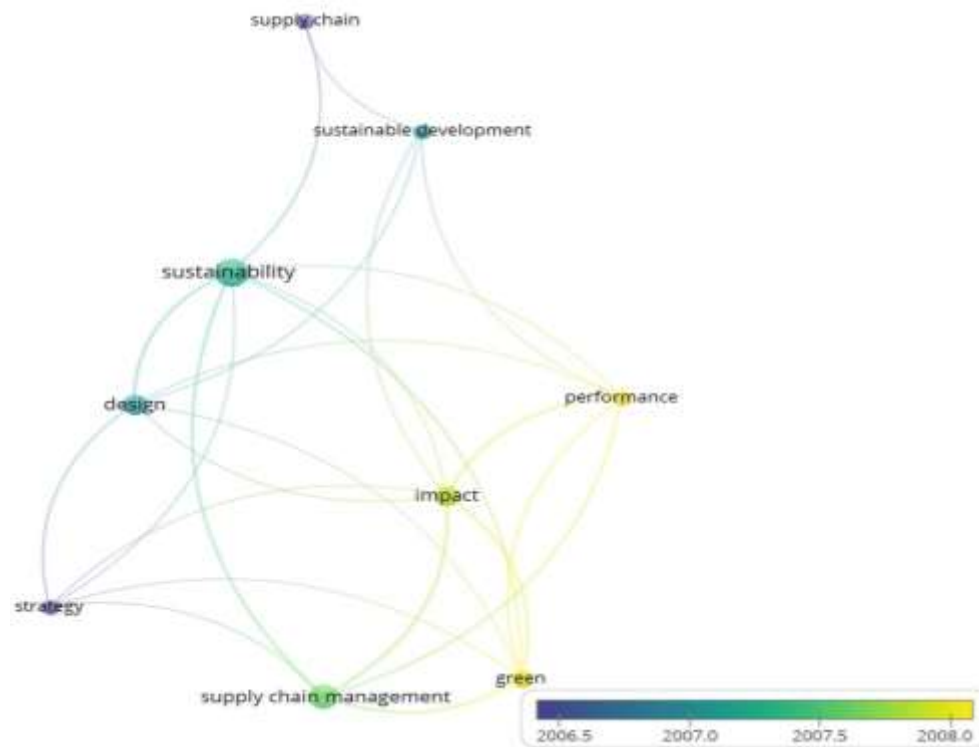
third in sequence and has keyword ‘supply chain’ forming two weak links. The last cluster is yellow with ‘sustainable development’ as the keyword and forming comparatively, significant four links.

The network visualization exhibits the items (bibliometric unit of analysis e.g. documents, journals, authors, keywords etc.) by their respective labels and by a colorful circular blob and the size of the circular blob is determined and depicted by item’s respective weight. On the other hand, the overlay visualization in VOSviewer software has two distinctive areas of visualization. One is based on

a time-line approach and the other one, as may be desired by choosing an option manually, is called an item score relatedness approach. The item may be a bibliometric unit, depicted as a node. For the study, time-based overlay visualization is manifested as it is a suitable choice for visualizing research publications since they are easily tracked and traced with their specific date (year) of publication. The overlay network colors signify specific points in time, say year(s).

The overlay visualization of the co-occurrence network is given in Figure 2.

Figure 2 Co-occurrence analysis of “all keywords” overlay visualization (2000-2009)



Overlapping of the clusters are not visible which indicates that most of the research was standalone

in nature. The earliest work appears in 2006 with the focus on ‘supply chain’, ‘strategy’, and

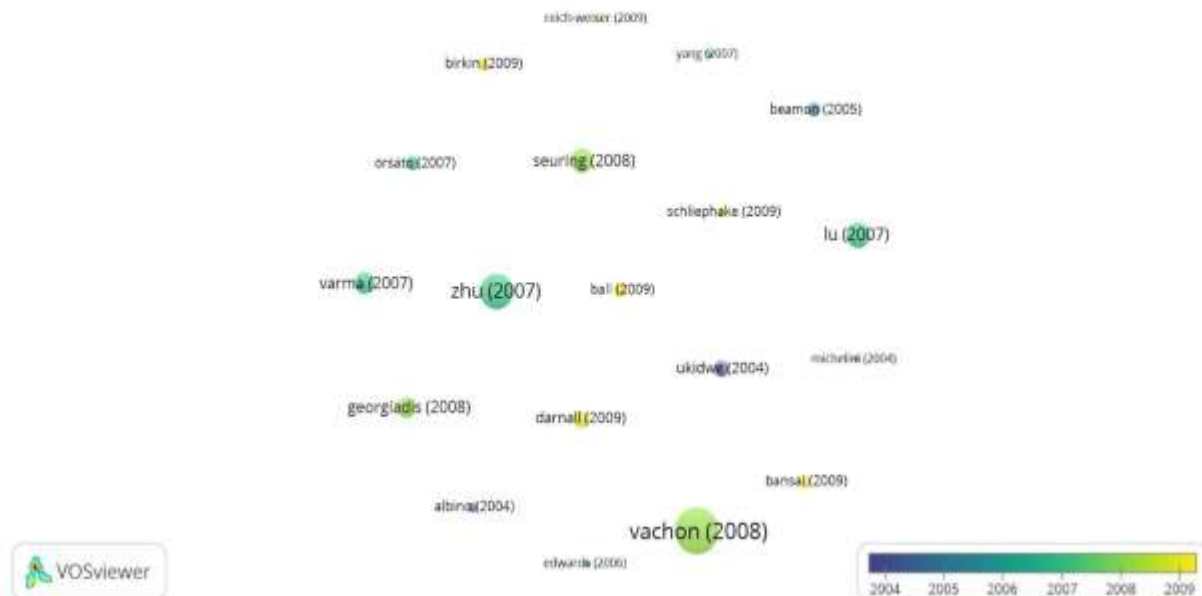
‘sustainable development’. By the end of the decade the research focus has shifted to topics of ‘supply chain management’, ‘impact’, ‘performance’, and ‘green’.

Citation Analysis

From a total of 22 records available, 19 met the minimum threshold criteria of 10 citations of a single record (research work). The earliest paper available matching the search string and as seen in the overlay visualization of citation analysis of documents (Figure 3) is from 2004. As seen in

the overlay visualization none of the clusters are linked or overlapped (contrarily, the depiction of overlapping can be seen in Figure 5). This signifies the inception of the concept in the study domain. The research work carried is an exploration of the topic and the researchers independently conducted their research work devoid of influence of peers’ work. The visualization depicts single item in each of the 19 clusters, therefore the detail of each cluster is given in Table 1 .

Figure 3 Citation analysis of documents overlay visualization (2000-2009)



The trend and theme of research in decade one revolves around the introduction of sustainability in the realm of supply chain management. Focus of research work is on the design and implementation of sustainability doctrine and programs. Special emphasis is on the green aspect of sustainability and how it could be incorporated

in the design of supply chains. The exploration of ‘greening’ the processes and outcomes of supply chain network have attracted the interest of researchers. The development of research seems to be progressing from a later phase of first stage of knowledge evolution to the beginning of the second stage (Shneider, 2009).

Table 1 Supply chain sustainability: non-linked authors in decade 2000-2009

Cluster	Author	Year	Citation
1	Schliephake, Stevens, and Clay	2009	33
2	Ball, Evans, Levers, and Ellison	2009	54
3	Darnall, Seol, and Sarkis	2009	90
4	Birkin, Cashman, Koh, and Liu	2009	50
5	Reich-Weiser and Dornfeld	2009	17
6	Bansal and Mcknight	2009	44
7	Vachon and Klassen	2008	600
8	Seuring, Sarkis, Mueller and Rao	2008	161
9	Georgiadis and Besiou	2008	119
10	Varma, Reklaitis, Blau and Pekny	2007	135
11	Lu, Wu and Kuo	2007	188
12	Zhu and Sarkis	2007	350
13	Yang and Sheu	2007	21
14	Orsato and Wells	2007	54
15	Edwards	2006	20
16	Beamon	2005	58
17	Ukidwe, and Bakshi	2004	75
18	Michelini, and Razzoli	2004	14
19	Albino and Kutzt	2004	35

Decade Two (2010-2019)

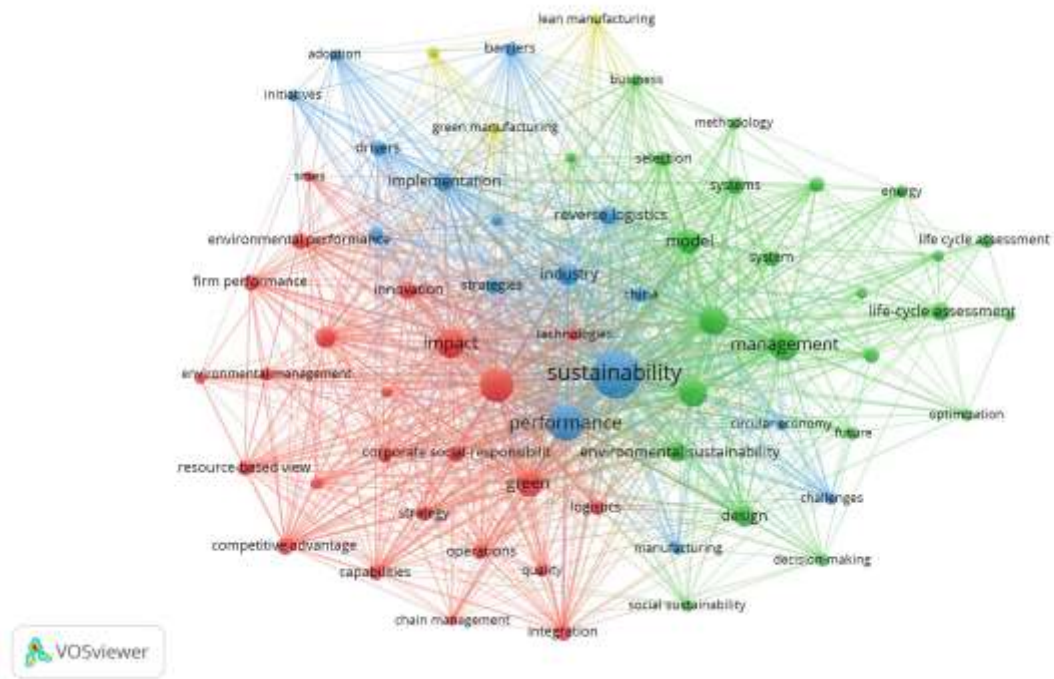
756 records were available in decade two.

Keyword Analysis

The co-occurrence analysis of 3332 “all keywords”, yielded 67 documents after employing the minimum threshold criteria of 20

occurrences. The threshold criteria was kept higher than decade one because the research focus has gained momentum, as depicted from the records retrieved, and also because research papers concentrating solely on the study topic were intended to be highlighted.

Figure 4 Co-occurrence analysis of “all keywords” network visualization (2010-2019)



The network visualization in Figure 4 shows four clusters with 1673 links. In each cluster the circles with the largest size would be considered. The size of the circle signifies the count of the keyword cited in that cluster. The bigger the size, the more that keyword is prevalent as a theme in that cluster evidenced from the literature analysis. The first cluster (red) has keywords ‘impact’, ‘supply chain management’, and ‘green’ with large circle sizes. The size of these three circles in the cluster are almost the same and have equal research perspective significance. Green cluster has significant thematic keywords of ‘management’, ‘framework’, ‘model’, and ‘supply chain’. The blue cluster has ‘sustainability’ and ‘performance’ as keywords identifying its thematic prevalence. The fourth

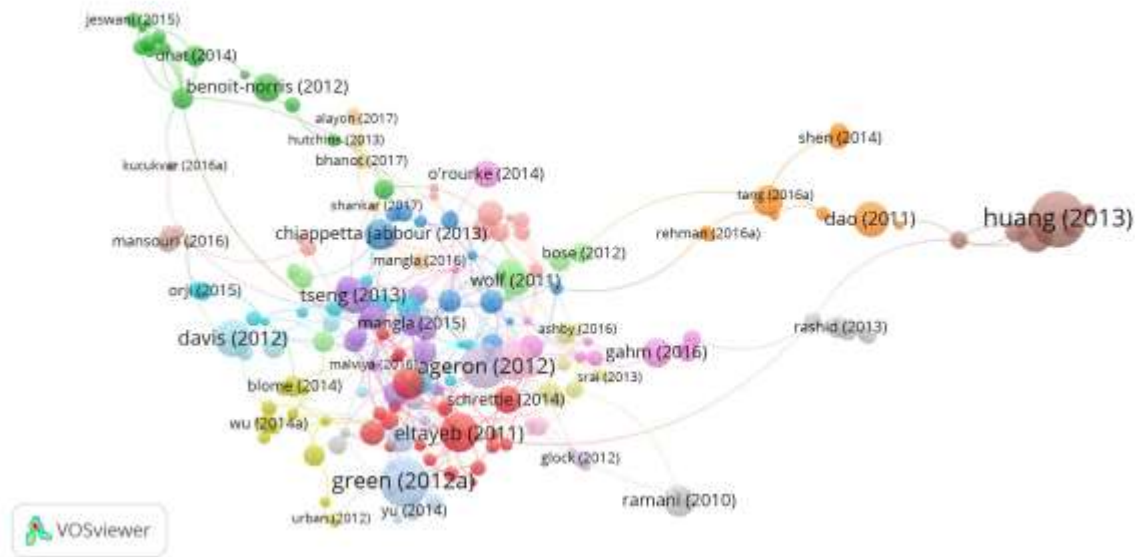
cluster (yellow) highlighted the keywords ‘critical success factors’, ‘lean manufacturing’, and ‘green manufacturing’.

The overlapped clusters with close-knit links is an indication that various aspects of sustainability are explored in the domain of supply chain. The researchers are analyzing and evaluating new vistas along with theoretical models and managerial elements. Interdisciplinary exploration is also evident from the visualization.

Citation Analysis

The search string provided 756 documents out of which 208 met the minimum threshold criteria of 10 citations of each document (Figure 5).

Figure 5 Citation analysis of documents network visualization (2010-2019)



From the size of the clusters it is evident that most of the research work cited belongs to the first half of the decade (can be studied from author, year typology given in the figure). Majority of the research has endeavored on the impact, adoption, and implementation of environmental sustainability dimensions in the supply chain domain.

Citation Analysis - Thematic outlook

Six major research themes have emerged in the second decade. Each theme has been extracted from the (common) networks as depicted in each cluster. The contribution of authors towards each theme is given in Table 2. The six themes are discussed below.

Theme 1: Green SCM – product, practices, performance

The first theme highlights the selection, impact, barriers, and adoption of institutional practices and product design that would affect the manufacturing and sustainability performance, with special emphasis on environmental dimension of sustainability. Factors contributing towards the development of a sustainable supply chain management is also a part of this theme.

Theme 2: SC and social sustainability in manufacturing

Here the major focus of discussion are the characteristics of social sustainability criteria applied in the supply chains of manufacturing industry. Exploration of the repercussions of manufacturing on the social performance with reference to the identification of contextual social indicators, and integration of sustainability dimensions have been studied.

Theme 3: Lean and green manufacturing – global extension

Approaches and methodologies of lean and green manufacturing available for sustainable business processes provide the basis for this theme. The integration and collaboration of various models, drivers and related critical success factors are deliberated upon. The generalizability of the mentioned system in different economic scenarios, and industrial setups and sectors are also explained.

Theme 4: Sustainable supplier selection configuration

The role and importance of sustainable supplier selection towards development of sustainable supply chain cannot be overlooked.

The significance of such suppliers in small and medium enterprise structures through various analytical modelling techniques have been discussed.

Theme 5: Sustainable supply chain strategies and integrated operations

The integration of sustainability practices and operations into supply chains through various strategies have gained high significance. The purpose here is the provision of sustainable products and services, along with information and resources to maximize the value which is provided to the stakeholders.

Table 2 Thematic Outlook

S.No	Theme	Author
1.	Green Supply Chain Management – Product, Practices, Performance	abdul-rashid (2017); adebanjo (2016); aragon-correa (2015); barari (2012); blome (2014); chiappetta jabbour (2016); chithambaranathan (2015); chu (2017); clark (2014); dabhilkar (2016); diabat (2013); dubey (2017); dubey (2017a); eltayeb (2011); gandhi (2016); gaussin (2013); graham (2015); green (2012); green (2012a); green (2015); grekova (2016); hussain (2016); khor (2013); kumar (2016); kumar (2017); laari (2017); large (2011); li (2018); liu (2016); lo (2014); lo (2016); lu (2016); malviya (2016); mangla (2015); mathivathanan (2018); mathiyazhagan (2014); mitra (2014); nejati (2017); paulraj (2017); schmidt (2017); schrettle (2014); scur (2017); shaharudin (2015); shaharudin (2015a); shaharudin (2017); theissen (2014); tseng (2011); tseng (2013); urban (2012); wu (2014); wu (2014a); wu (2015); xu (2013); yang (2016); yu (2014); zailani (2012)
2.	Supply Chain and Social Sustainability in Manufacturing	ahmadi (2017); alayon (2017); anvari (2017); benoit-norris (2012); bhanot (2017); chen (2014); curkovic (2011); egilmez (2014); egilmez (2014a); egilmez (2016); govindan (2016); govindan (2016a); hutchins (2013); jeswani (2015); kucukvar (2015); kucukvar (2016); kumar (2014); mangla (2016); mani (2016); mani (2016a); mani (2017); mani (2018); moktadir (2018); neupane (2013); onat (2014); park (2015); park (2016); schoenherr (2013); shankar (2017); souza (2018); sutherland (2016); turkay (2016); yu (2017)
3.	Lean and Green Manufacturing - Global Extension	ageron (2012); altmann (2015); ashby (2016); banasik (2018); baumers (2013); boutkhoum (2016); brennan (2015); brown (2014); cai (2019); caldera (2017); cerdas (2017); chan (2018); cherrafi (2016); chiappetta jabbour (2013); chiu (2013); chiu (2016); chun (2013); dao (2011); davis (2012); de oliveira neto (2016); despeisse (2017); dey (2013); fahimnia (2015); gahm (2016); gebler (2014); glock (2012); golini (2014); goucher (2017); gualandris (2014); gualandris (2014a); gualandris (2016); gunasekaran (2012); gupta (2018); helleno (2017); huang (2013); jabbour (2019); jin (2017);

		kamble (2018); kannegiesser (2014); kaur (2018); kellens (2017); koo (2014); kukvar (2016a); kurdve (2015); kusiak (2018); kusisarpong (2019); law (2012); lee (2010); lee (2014); li (2017); lu (2014); lu (2015); luthra (2016); luthra (2018); luthra (2018a); mangla (2018); mansouri (2016); marti (2015); miemczyk (2016); nagurney (2015); o'rourke (2014); prasad (2016); rehman (2016a); ryoo (2013); sajan (2017); sarkar (2017); seth (2016); sharma (2010); shen (2014); simpson (2010); srai (2013); stindt (2017); subic (2012); tajbakhsh (2015); tang (2016); tang (2016a); thanki (2016); thanki (2016a); thomas (2016); tseng (2014); verrier (2014); wiengarten (2012); wu (2016); zander (2018)
4.	Sustainable Supplier Selection Configuration	aboelmaged (2018); agan (2013); bhardwaj (2016); fallahpour (2017); ghadimi (2017); ghadimi (2018); heidrich (2013); hsu (2017); orji (2015); schoenherr (2012); singh (2014); singh (2018); thornton (2013); trappey (2012)
5.	Sustainable Supply Chain Strategies and Integrated Operations	bose (2012); dubey (2019); golini (2017); gonzalez-benito (2010); liu (2017); longoni (2014); longoni (2015); wiengarten (2015); wolf (2011); wong (2015)
	Holistic Perspective of Sustainable Supply	accorsi (2014); accorsi (2015); alsaffar (2016); deutz (2013); kremer (2016); moreno (2016); ramani (2010); rashid (2013);
6.	Chain Management – Design, Products, Practices	schenkel (2015); wilhelm (2015); younis (2016)

Theme 6: Holistic perspective of sustainable supply chain management – design, products, practices

Authors have researched on the inclusion of triple bottom line of sustainability in the supply chain for efficient and effective performance. From conceptual frameworks to assessment networks, resources have been established and verified through supply chain designs, production practices and processes for optimal environmental, social, and economic implications.

The literature in the second decade focused on the enhancement of the concept of sustainability in the domain of supply chain. Major emphasis has been on the green first, and then social dimensions of sustainability integration. Simultaneously, inclusion and application of different multi-criteria decision making techniques and methodologies have also been evident in the supply chain sustainability

field. The same is reflected from the works of the most cited authors (Gunasekaran and Sarkis) where the major focus is on application of techniques and technology within the manufacturing practices and their trends including environmental and social perspectives. These techniques were experimented within different industrial sectors, such as food, construction, services, etc. Instances of research in reverse logistics and development and compilation of various dimensions of sustainable supply chain have also attracted the interest of research scholars. The progression of supply chain sustainability research is burgeoning towards the second stage of Shneider's (2009) knowledge evolution framework as the scope and horizon of the domain continues to be investigated.

Significant Authors, Sources and Countries' Contribution towards SC sustainability Evolution in both decades (2000-2019)

Among the authors quoted in the literature of supply chain sustainability (Table 3) the top three

authors who were cited the most are Gunasekaran (786), Sarkis (704), and Govindan (489).

Table 3 Top 20 SC Sustainability Cited Authors

No.	Authors	Citations
1	Gunasekaran, Angappa	786
2	Sarkis, Joseph	704
3	Govindan, Kannan	489
4	Kucukvar, Murat	263
5	Zailani, Suhaiza	254
6	Mangla, Sachin Kumar	227
7	Egilmez, Gokhan	216
8	Golini, Ruggero	197
9	Longoni, Annachiara	183
10	Papadopoulos, Thanos	156
11	Dubey, Rameshwar	155
12	Tan, Keah Choon	148
13	Kalchschmidt, Matteo	146
14	Tatari, Omer	135
15	Kannan, Devika	117
16	Luthra, Sunil	115
17	Wiengarten, Frank	112
18	Park, Yong Shin	101
19	Mani, Venkatesh	87
20	Shaharudin, Mohd Rizaimy	68

Among the mainstream journals that published research articles in the domain of supply chain sustainability which are shown in Table 4, the top three journal that were cited the most are Journal

of Cleaner Production (2201), International Journal of Production Economics (2165), and International Journal of Production Research (1175).

Table 4 Top 20 SC Sustainability Cited Sources

No.	Journals	Citations
1	Journal of Cleaner Production	2201
2	International Journal of Production Economics	2165
3	International Journal of Production Research	1175
4	Resources Conservation and Recycling	678
5	Supply Chain Management-An International Journal	498
6	International Journal of Advanced Manufacturing Technology	494
7	Sustainability	459
8	International Journal of Operations & Production Management	397
9	European Journal of Operational Research	246
10	Business Strategy and the Environment	229
11	Journal of Business Ethics	145
12	International Journal of Life Cycle Assessment	139
13	Production Planning & Control	120
14	Computers & Industrial Engineering	118
15	Journal of Manufacturing Technology Management	109
16	Ecological Indicators	105
17	Journal of Industrial Ecology	93
18	Industrial Management & Data Systems	89
19	Technological Forecasting and Social Change	89
20	Journal of Environmental Management	87

The list of countries that contributed towards the evolution of supply chain sustainability are given in Table 5 ranked in descending order of citations.

The three dominant countries are USA (5519), China (2024), and England (1705).

Table 5 Top 20 SC Sustainability Cited Countries

No.	Countries	Citations
1	USA	5519
2	Peoples Republic of China	2024
3	England	1705
4	India	1346
5	Canada	1200
6	Italy	1011
7	Germany	954
8	France	918

Table 5 Top 20 SC Sustainability Cited Countries

No.	Countries	Citations
9	Taiwan	798
10	Denmark	788
11	Malaysia	725
12	Netherlands	656
13	Spain	578
14	Brazil	353
15	Sweden	321
16	Turkey	317
17	Australia	292
18	Philippines	226
19	Switzerland	208
20	Greece	192

The analysis conducted has its impact and implications on researchers and management scientists. The scientific knowledge evolution of supply chain sustainability with the focus on manufacturing has gone through temporal thematic evolution during the discussed decades (2000-2009; 2010-2019).

From the identification of the knowledge evolution stages, the researchers would have a clear direction and appropriate research approach in terms of:

1. Status of the knowledge themes and trends
2. Ingenuity and creativity required for the respective knowledge evolution stage

To benefit from the scientific evolution framework, the researchers need to focus their research work as per the protocols of the evolution phase/stage through which the knowledge domain is currently in transition. Deviation from such protocol would yield either outdated research or work labeled as ahead of its time. In both cases the research work would deem to be rejected by the research community resulting in wastage of precious knowledge and

efforts. The researcher could overcome such a problem by appending the existing knowledge through value addition by expanding its applied framework in different domain.

Conclusion

Bibliometric analysis protocols of co-occurrence and citation analysis were used to study the evolution of supply chain sustainability literature from 2000 to 2019. Shneider's (2009) scientific evolution theory was employed to study the evolution of the domain on 778 records retrieved through Web of Science and Dimensions.ai databases. Mainstream work on sustainability in supply chain accelerated around 2012 and the main focus was on the environmental and social aspects. Gunasekaran and Sarkis are the top two most cited authors in the literature. Their scholarly work has been ubiquitous in the disciplines of supply chain management, supply chain process, and supply chain sustainability. USA and China are the two countries which have contributed the most with large number of publications in the field of study. Among the mainstream journals that published research

articles in the domain of supply chain sustainability, the top two journals were *Journal of Cleaner Production* and *International Journal of Production Economics*.

According to Shneider's (2009) scientific evolution theory framework, in the first decade the development of research seems to be progressing from a later phase of first stage of knowledge evolution to the beginning of the second stage of comprehension enhancement. In the second decade the progression of literature is flourishing in the second stage of knowledge evolution with the advanced investigation of domain scope and horizon.

The study is not without its fair share of limitations. The technique of meta-analysis could be adopted for an in-depth analysis of the literature and other databases (e.g., SCOPUS, EBSCO, Emerald Insight, and Google Scholar) could be utilized for retrieval of literature.

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