

Review

# Sustainable Global Sourcing: A Systematic Literature Review and Bibliometric Analysis

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**Abstract:** Sustainable Global Sourcing (SGS) is a rapidly emerging field with a geometric growth that is evidenced by the number of articles published within this field. The aim of this paper is to develop a systematic study quantitatively depicting the knowledge structure of the SGS field. A bibliometric analysis in conjunction with citation analysis and co-citation analysis is adopted to evaluate a total of 287 journal articles identified from systematic selection of influential work. A further content analysis is performed to obtain the detailed insights on the results of bibliometric analysis. Findings show five research clusters that constitute the SGS field, i.e., (i) Global Sourcing (GS) practice and environmental performance; (ii) Social sustainability/ethical sourcing practice in GS; (iii) Environmental evaluation criteria and certification; (iv) Fuzzy modelling of environmental practice in GS; (v) Effects of environmental and social sustainability practice on economic performance. On this basis, eight research directions are outlined for future research. This study provides an innovative method for systematic literature review work and robust indications for future investigations in the SGS field.

**Keywords:** sustainable global sourcing; bibliometric analysis; citation analysis; co-citation analysis; content analysis; systematic literature review

## 1. Introduction

During the past 20 years, Global Sourcing (GS) has been a major industrial practice for multinational corporations (MNCs) [1,2] and a significant topical area in purchasing and supply management (PSM) research [3,4]. However, firms sourcing globally have also long been accused of not addressing social and environmental concerns sufficiently, e.g., disregarding for environmental regulations, working conditions and corruption [5]. Large multinational companies, e.g., H&M, IKEA, Nestlé, Pfizer and Puma, have begun to proactively integrate both social and environmental sustainability into their corporate strategy, largely due to pressure from consumers [6–8]. In the literature, the number of papers concerned with supply chain management (SCM) and social and environmental sustainability, as well as corporate social responsibility (CSR), has increased exponentially [9–13]. This reflects the increasingly common perception that a company is no more sustainable than its supply chain (SC) [14].

There are broad and narrow definitions of GS; broadly speaking, Quintens et al. (2006) [15] define global purchasing as “the activity of searching and obtaining goods, services and other resources on a possible worldwide scale, to comply with the needs of the company and with a view to continuing and enhancing the current competitive position of the company”; on the other hand, GS refers to the “proactive integration and coordination of common materials, designs, methods, processes, standards, specifications, and suppliers across international locations” [16]. This paper adopts a broad definition of GS since the review is intended to be comprehensive. GS has been considered by many scholars

as a general PSM topic worthy of independent attention [17–19]. The rationale for doing so is that global sourcing requires more complex organizational structures to manage issues caused by cultural differences, longer shipping distances and less cost/benefit analysis [20]. In addition, designing a global sourcing organization and maintaining control over decentralized value added activities and affiliated subsidiaries can be considered as two of the most difficult challenges facing managers [21]. Therefore, it is argued that GS is an important embedded part of PSM, possessing more serious challenges than domestic procurement, so it has its own characteristics and deserves special attention.

The number of literature reviews and empirical studies on the overlapping of sustainability and GS research has recently increased [22–26]. The statement that “the company of no more sustainable than its supply chain” (Krause et al., 2009, p. 18) indicates that simply focusing on internal operations is not enough. GS provides the possibility of achieving sustainability along the global supply chain and, therefore, it is particularly worth investigating the potential implications of GS for sustainability performance [27]. This research area is labeled Sustainable Global Sourcing (SGS), which is embedded in several research areas within supply chain management research, including global sourcing/international purchasing, sustainable supply chain management (SSCM) and sustainability and/or CSR/ethical sourcing focusing on both public and private sectors. The purpose of this paper is to obtain a comprehensive understanding of the literature development of SGS, and furthermore to have an insight of the specific themes under the SGS topic and therefore to pursue the implications for further directions of SGS research. Thus, this research aims to answer the following two questions.

1. What is the knowledge structure of existing studies in the field of SGS?
2. Under the present research structure in this field, could we find some insightful implications for the future research agenda for SGS?

To do this, a bibliometric analysis in conjunction with citation analysis and co-citation analysis is conducted to map out the knowledge structure of the SGS topic. A further content analysis is carried out to obtain the detailed insights on this topic. The remainder of the paper is structured as follows. Section 2 introduces the systematic literature review methodology used and descriptive analysis. In Section 3, a thorough citation analysis and a co-citation analysis that eventually results in identifying key clusters of primary research streams, is presented. Section 4 provides an extended content analysis including the latest articles to present detailed insights of each cluster. Section 5 suggests major implications for future SGS research. Finally, the paper is concluded in Section 6.

## 2. Methodology and Primary Data Statistics

The literature review is one of the most relevant approaches, which aims to map and assesses the relevant literature identifying the potential research gaps evidencing the boundaries of the existing knowledge [28]. Structured analysis of the literature can manage a large variety of the literature and research methods providing an accurate analysis.

The systematic reviews approach is different from other narrative reviews because they include a replicable, scientific and transparent process that reduces the selection bias through an exhaustive literature search [28,29]. The systematic literature helps to minimize bias of studies and to summarize them objectively [28].

According to Sanders et al. (2009) [30], a structured research process of defining the appropriate keywords, analysing literature search and elaborating analysis is considered to be an adaptive cycle in this research. For the bibliometric and citation and co-citation analysis approach, the readers are advised to refer to a recent review work of green supply chain published by Fahimnia et al. (2015) [31]. Furthermore, an additional content analysis of papers obtained from co-citation analysis and the latest articles published between 2014 and 2017 was also carried out.

### 2.1. Defining the Appropriate Keywords

To collect the articles, Scopus as the biggest abstract and citation source database was used. The term, SGS, consists of two elements, sustainability and global sourcing. To ensure that both aspects are fully captured, we include two search strings, which are shown in Table 1. The first string is GS-related terminologies including such terms as “global”, “international”, “worldwide”, “foreign” and “offshoring” combined with “sourcing”, “purchasing”, “procurement” and “buying”. The second search string contains sustainability-related keywords including two sub-dimensions of green and social, with such keywords as “green”, “environmental”, “social”, “ethical”, “responsibility” and corresponding evaluation standards. The keywords were chosen based on previous literature reviews on similar topics, the authors’ own research experience and expert views from fellow PSM academics after intensive brainstorming discussions between co-authors. For example, many recent studies are focused on international suppliers’ sustainability; therefore, international supplier-related keywords were included.

**Table 1.** The search strings and keywords.

|  |
|--|
| <b>Global Sourcing (GS) Keywords:</b>  |
| (global sourcing) OR (global purchas*) OR (global procur*) OR (global buying) OR (international sourcing) OR (international purchas*) OR (international procur*) OR (international buying) OR (worldwide sourcing) OR (worldwide purchas*) OR (worldwide procur*) OR (worldwide buying) OR foreign sourcing) OR (foreign purchas*) OR (foreign procur*) OR (foreign buying) OR (offshoring sourcing) OR (offshoring purchasin) OR (offshoring procurement) OR (offshoring buying) OR (import sourcing) OR (multinational sourcing) OR (global supplier) OR (international supplier) OR (multinational supplier) OR (multinational sourcing) OR (multinational procur*) OR (multinational purchas*) |
| <b>AND</b>   |
| <b>Green-Related Keywords:</b>   |
| Sustainab* OR environment* OR ecolog* OR green OR EMAS OR ISO14001 OR corporate social responsibility OR LEED OR (closed loop) OR recycl* OR (low carbon)  |
| <b>Social-Related Keywords:</b>  |
| (social accountability) OR social OR (social responsibility) OR CSR <sup>1</sup> OR ethic* OR SA8000 OR ISO26000   |

<sup>1</sup> CSR: corporate social responsibility.

### 2.2. Search Results

A four-step approach was followed to identify the papers for final review. First, searching in the title, abstract and keywords disciplines in the Scopus database, which is the most comprehensive and commonly used one in recent reviews [9,32]. Only journal articles in peer reviewed (excluding conference and seminar papers, books, book chapters and other not relevant documentation) were selected for the defined search terms, with an open starting time in order to trace back to the origin of SGS research up to late October 2017. The first search attempt resulted in a total of 6780 titles (without removing duplicates). The final search output was aggregated in RIS format to collect all the relevant citation details, such as paper title, authors’ names, affiliations and journal source; as well as abstract, keywords and references.

Second, the titles and abstracts were reviewed applying inclusion and exclusion criteria based on the discussion among the researchers/co-authors. The inclusion criteria were: (i) focus on SGS; (ii) peer-reviewed journal papers in English language; and (iii) subject areas include Social Sciences and Humanities, and Physical Sciences. The exclusion criteria included: (i) GS studies not related to any one dimension of sustainability; (ii) SSCM studies focusing on domestic rather than international or global sourcing; and (iii) SGS at a macro-level (e.g., economic modeling, government policy and regional economic development). Conference papers and book chapters were excluded because of

difficulty to retrieve the bibliometric information. As a result, 491 journal articles were selected for the third-round selection.

Third, the full texts of the 491 papers were reviewed applying the same inclusion and exclusion criteria, and 262 journal articles remained. Fourth and last, a cross-referencing approach was adopted by reviewing the titles, keywords and abstract of all the references of recently published papers of those 262 articles (from 2015 to 2017) and identified a further 120 relevant papers. Applying the same selection criteria, 25 papers were eventually identified and added to the 262. Ultimately, 287 papers were identified for the bibliometric analysis. To do this, two authors drew a table with all 611 papers (491 plus 120), which included a column for “include” or “exclude” or “unsure” with reasons given independently. Then, the results were agreed, and agreement reached on all the items they did not agree on initially.

### 2.3. Initial Data Statistics

The 287 journal articles were published between 1989 and 2017. There is a general upward trend concerning the number of articles published per year since 2000. Before 2000, there were 1–3 papers published per year. It was found that the 287 papers were scattered over almost 100 journals, from which 45 journals have contributed 77.19% of all publications reviewed. The top 10 journals have published 131 of these identified articles, representing 45.64% of the 287. Table 2 shows the top 10 journals. It can be seen that the majority of the journals are Operations Management and Supply Chain Management (OM/SCM) ones including International Journal of Operations and Production Management (IJOPM), International Journal of Production Economics (IJPE), Supply Chain Management: An International Journal (SCMIJ), Journal of Supply Chain Management (JSCM) and Journal of Purchasing and Supply Chain Management (JPSM) and International Journal of Physical Distribution and Logistics Management (IJPDLM).

## 3. Citation and Co-Citation Analysis

A citation and co-citation analysis and graphical presentation were conducted for the sampled papers. In this work, BibExcel [33] and Gephi [34] were selected as the best applicable to conduct the analysis. First data was prepared in BibExcel software and then transferred to Gephi to perform citation analysis, co-citation analysis, and the topical content-based classification. Gephi was adopted among other software due to its flexibility in visualization, the advanced filtering techniques and the capacity to manage with different data formats [35].

### 3.1. Citation Analysis

In recent years, several methods have been used to calculate the significance or attractiveness of a publication [31]. The most used method is the citation analysis, which helps to calculate the citation frequency “popularity” is the number of the times that a publication is cited by other publication [36]. The degree of attractiveness of a paper may vary from one to another based on citations and quality of contributions. A citation analysis of the 287 papers reveals that 216 papers out of the 287 have cited at least one other paper in the sample. 28% of the 216 papers have been cited only once by another paper within the 287. The upper half of Table 2 shows the top 10 papers based on their number of citations.

Local citation analysis shows the cited times of a paper by others within the 287-node network, and Global Citation Analysis provides the total number of citations in Scopus, including citations in other disciplines and research areas. The obvious mismatch between local citation and global citation value suggests that SGS is also an active research area in several other disciplines in addition to OM. This finding is evidenced by the fact that ranking of papers, regarding citations, differs between their local and global citation. For example, Handfield et al. [37] is ranked the eighth on the basis of local citations; however, it is the most widely cited paper in global citation. In general, it requires time for a paper to build citations; therefore, most of the highly cited papers in the upper half of Table 3 have been for more than a decade old.

**Table 2.** The top 10 publishing journals contributing to the area of sustainable global sourcing.

| Source   | Publish Year |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | Total |      |
|--|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
|  | 1996         | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |       | 2017 |
| Journal of Cleaner Production (JCP)  |              |      |      |      |      |      | 1    |      |      | 2    |      | 1    | 5    | 1    |      | 1    |      | 7    |      | 4    | 7    |       | 29   |
| Journal of Business Ethics (JBE)   |              |      |      |      |      |      |      | 1    | 1    |      | 1    | 3    | 4    | 3    | 5    | 3    |      | 4    | 2    | 1    | 2    | 1     | 31   |
| Supply Chain Management:<br>An International Journal (SCMIJ)                           |              |      |      |      |      |      |      |      |      | 1    |      |      |      | 3    |      | 1    | 2    |      | 2    | 3    | 1    |       | 13   |
| International Journal of Operations and<br>Production Management (IJOPM)               |              |      |      |      | 1    | 2    | 1    |      | 1    | 1    |      | 1    | 1    |      | 1    |      |      | 1    | 1    |      | 1    |       | 12   |
| Corporate Social Responsibility and<br>Environmental Management (CSREM)                |              |      |      |      |      |      |      |      |      | 1    | 1    | 1    | 1    | 1    | 2    |      | 3    | 1    |      |      |      |       | 11   |
| Business Strategy and the<br>Environment (BSE)   | 1            |      |      | 1    |      |      |      |      |      |      |      |      | 2    | 1    | 2    |      | 1    | 1    |      | 1    |      |       | 10   |
| International Journal of Production<br>Economics (IJPE)                                |              |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      | 6    |      |      | 3    |      |       | 10   |
| Journal of Purchasing and Supply<br>Management (JPSM)                                  |              |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    | 1    | 1    | 1    |      | 1    |      |       | 5    |
| International Journal of Physical<br>Distribution and Logistics<br>Management (IJPDLM) |              |      |      |      |      |      |      |      |      | 1    |      |      |      | 1    | 2    |      |      | 1    |      |      |      |       | 5    |
| Journal of Supply Chain<br>Management (JSCM)   |              |      |      |      |      |      |      |      |      |      |      |      |      | 1    | 2    |      |      | 2    |      |      |      |       | 5    |
| Total  | 1            | 0    | 0    | 1    | 1    | 2    | 2    | 1    | 2    | 6    | 2    | 6    | 13   | 11   | 16   | 6    | 13   | 18   | 5    | 13   | 11   | 1     | 131  |

**Table 3.** Top 10 papers by citation and PageRank.

| Author (Year)                     | Local Citation <sup>1</sup> | Global Citation <sup>2</sup> |
|-----------------------------------|-----------------------------|------------------------------|
| Rao (2002) [38]                   | 34                          | 294                          |
| Rao and Holt (2005) [39]          | 30                          | 616                          |
| Noci (1997) [40]                  | 22                          | 185                          |
| Carter and Jennings (2002) [41]   | 20                          | 144                          |
| Carter (2005) [22]                | 20                          | 129                          |
| Carter and Carter (1998) [42]     | 19                          | 177                          |
| Handfield et al. (2002) [37]      | 18                          | 396                          |
| Welford and Frost (2006) [43]     | 18                          | 101                          |
| Koplin et al. (2007) [44]         | 17                          | 142                          |
| Geffen and Rothenberg (2000) [45] | 16                          | 279                          |

| Author (Year)                     | PageRank | Local Citation | Global Citation |
|-----------------------------------|----------|----------------|-----------------|
| Welford and Frost (2006) [43]     | 0.0391   | 18             | 101             |
| Zsidisin and Siferd (2001) [46]   | 0.0334   | 11             | 220             |
| Rao and Holt (2005) [39]          | 0.0325   | 30             | 616             |
| Rao (2002) [38]                   | 0.0281   | 34             | 294             |
| Simpson and Power (2005) [47]     | 0.0222   | 8              | 176             |
| Yu (2008) [48]                    | 0.0221   | 7              | 70              |
| Reuter et al. (2010) [24]         | 0.0210   | 10             | 124             |
| Zsidisin and Hendrick (1998) [49] | 0.0208   | 2              | 95              |
| Ponte and Gibbon (2005) [50]      | 0.0186   | 2              | 318             |
| Simpson et al. (2007) [51]        | 0.0173   | 8              | 175             |

<sup>1</sup> Citation within the 287 papers; <sup>2</sup> actual Scopus citation.

### 3.2. PageRank Analysis

Brin et al. (1998) [52] introduce PageRank is commonly used as a measure of both popularity and prestige. This is an important method to prioritise the results of keyword searches and also to find the citation link between papers. The top 10 high ranked papers formulated on a PageRank score are highlighted in the lower half of Table 2. PageRank values of the 287-node network vary between zero and 0.0391. It can be seen that a higher number of local and global citations cannot guarantee the “prestige” of a paper. Noci (1997) [40], for example, represents a high-ranked paper by citations (ranked fourth in the upper half of Table 2), not listed in the top 10 prestigious papers in the lower half of Table 2. Papers that are not highly ranked (e.g., Welford and Frost, 2006 [43]; Zsidisin and Siferd, 2001 [46]) are considered prestigious. According to Mishra et al. (2017) [53], generally citation analysis is not a satisfactory method, as it does not link to the prestige of the paper, which is reflected by the measure of PageRank.

### 3.3. The Analysis of Co-Citation

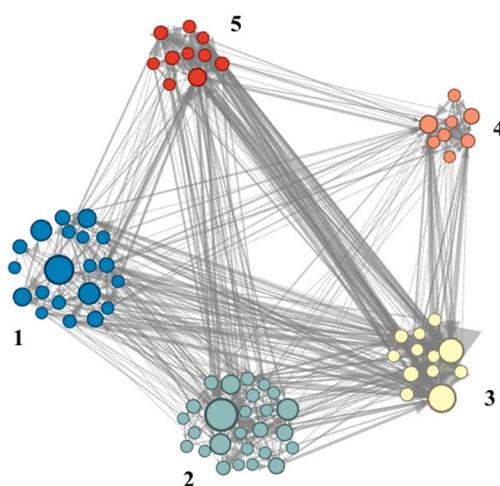
The co-citation is a research approach used to analyze the level of correlation between two articles referred on citations. Two publications can be considered co-cited if they appear jointly in the same reference lists of other documents [31]. In the papers jointly cited, the probability is higher to present analogous thematic areas or be linked [54]. The initial co-citation mapping with Gephi reveals that 76 articles out of the 287 have been co-cited by other two papers (i.e.,  $n = 2$ ) within this sample (local co-citation). The reason for the selection of  $n = 2$  is that the clustering results are the most visibly identifiable [31]. The network is arranged in a way that the connecting nodes attract each other, and the non-connecting nodes are mutually exclusive. It also allows manual adjustment of repulsion strength, gravity, speed, node size and other features [35]. Using this algorithm, the most connected nodes move to the center of the network while the more isolated (less connected) nodes move to the edge of the network.

#### 3.3.1. Data Clustering: Research Themes in the Literature

Data clustering is a research technique and can be used to collect together groups of articles that have the same characteristics [55]. This approach can be done by grouping the nodes divided

into clusters where the link is greater between the nodes of the same cluster are dense compared to those of various clusters [55–57]. In a co-citation network, a cluster can be considered as a group of well-connected papers in a research area with less connected papers in other clusters or research areas.

In Gephi [34], the default clustering tool is based on the Louvain algorithm. This algorithm was tested to 76-node co-citation network in Gephi, and five main clusters were produced. In each cluster the number of the papers varies from eight articles for cluster 4 to 26 articles for cluster 2, the largest one. The positioning and interaction is illustrated in Figure 1, and the value of the modularity index for this network is equal to 0.268. This proves a robust inter-relationship among the nodes within each cluster and among the nodes of different clusters. The papers that are frequently cited together they probably share the similar area of interests [54]. In addition, a specific analysis of the papers, which is part of one cluster, can support to defining the research area of that cluster [53].



**Figure 1.** The positioning of the five literature clusters.

To determine the area of research focus for each cluster, the “lead papers” of each cluster need to be identified. This is a common practice of other bibliometric analysis papers [31]. The PageRank tool is used for this purpose (see Table 4 for a list of lead papers for each cluster identified). In the co-citation network, the PageRank algorithm takes into account times a paper is co-cited by other papers (“popularity” tool) and the co-cited times of a paper by other co-cited papers (“prestige” tool). Most of the papers with the higher PageRank scores in this study also show the higher citations number. In order to find out the areas of research focus and labeling each cluster, the contents of all the top 10 papers were analyzed and evaluated in terms of PageRank score in each cluster except for cluster 4, which only has eight papers in total.

**Table 4.** The lead (top 10) papers of each cluster using a PageRank measure.

| Cluster 1 (20 Papers)             |
|-----------------------------------|
| Zsidisin and Siferd (2001) [46]   |
| Simpson and Power (2005) [47]     |
| Zsidisin and Hendrick (1998) [49] |
| Simpson et al. (2007) [51]        |
| Theyel (2001) [58]                |
| Wycherley (1999) [59]             |
| Kleindorfer et al. (2005) [60]    |
| Pagell et al. (2010) [61]         |
| Vachon (2007) [62]                |
| Pullman et al. (2009) [63]        |

Table 4. Cont.

|   |
|---|
| <b>Cluster 2 (26 Papers)</b>            |
| Welford and Frost (2006) [43]           |
| Yu (2008) [48]                          |
| Reuter et al. (2010) [24]               |
| Ponte and Gibbon (2005) [50]            |
| Pedersen and Andersen (2006) [64]       |
| Preuss (2009) [65]                      |
| Maignan et al. (2002) [66]              |
| Lund-Thomsen (2008) [25]                |
| Jiang (2009) [67]                       |
| Park and Stoel (2005) [68]              |
| <b>Cluster 3 (12 Papers)</b>            |
| Rao and Holt (2005) [39]                |
| Rao (2002) [38]                         |
| Min and Galle (2001) [69]               |
| Geffen and Rothenberg (2000) [45]       |
| Rao (2005) [70]                         |
| Drumwright (1994) [71]                  |
| Nawrocka (2008) [72]                    |
| Green et al. (1996) [73]                |
| Kogg (2003) [74]                        |
| Chien and Shih (2007) [75]              |
| <b>Cluster 4 (8 Papers)</b>             |
| Noci (1997) [40]                        |
| Yeh and Chuang (2011) [76]              |
| Handfield et al. (2002) [37]            |
| Lee et al. (2009) [77]                  |
| Kannan et al. (2013) [78]               |
| Nagel (2003) [79]                       |
| Awasthi et al. (2010) [80]              |
| Govindan et al. (2013) [27]             |
| <b>Cluster 5 (10 Papers)</b>            |
| Koplin et al. (2007) [44]               |
| Carter (2005) [22]                      |
| Ciliberti et al. (2008) [81]            |
| Carter and Jennings (2002) [41]         |
| Carter (2004) [82]                      |
| Carter et al. (2000) [83]               |
| Carter (2000) [84]                      |
| Alwaysseh and Klassen (2010) [85]       |
| Barrientos and Smith (2007) [86]        |
| Andersen and Skjoett-Larsen (2009) [87] |

### 3.3.2. Analysis of the Primary Research Clusters Based on Local Co-Citation

Our literature mapping and citation and co-citation analysis of the topic analyzed identify five primary research clusters based on local citations (76 papers) (Table 5). Cluster one focuses on international purchasing/supply management practice and its influence on firm's environmental performance, in particular the supplier selection practice and buyer-supplier relationship management using empirical research methodologies of case study and survey. Cluster two emphasizes on the adoption of social sustainability-related practices such as CSR, supplier management in relation to ethical sourcing standards, social/labour aspects of suppliers' code of conduct practices in international sourcing/purchasing of international companies, and the role of CSR in international sourcing decision-making process using the empirical research methodologies of case study and survey.

The journals publishing the papers in this cluster tend to be development study ones. Cluster three encompasses the effects of the adoption of “green” practice in purchasing/supply management and ISO14001 certification e.g., greening the supplier process, green purchasing, greening the supply chain management of international companies and its effects on environmental performance using empirical methods. Cluster four concentrates on the fuzzy multiple selection criteria of international suppliers in environmental purchasing practice, using quantitative modeling analysis approach. This cluster is isolated from the other clusters perhaps because of the modeling method used. Cluster five focuses on the effects of social and/or environmental practice in GS on the economic performance of international companies using both empirical and modeling methods.

**Table 5.** Literature classification: the primary research clusters.

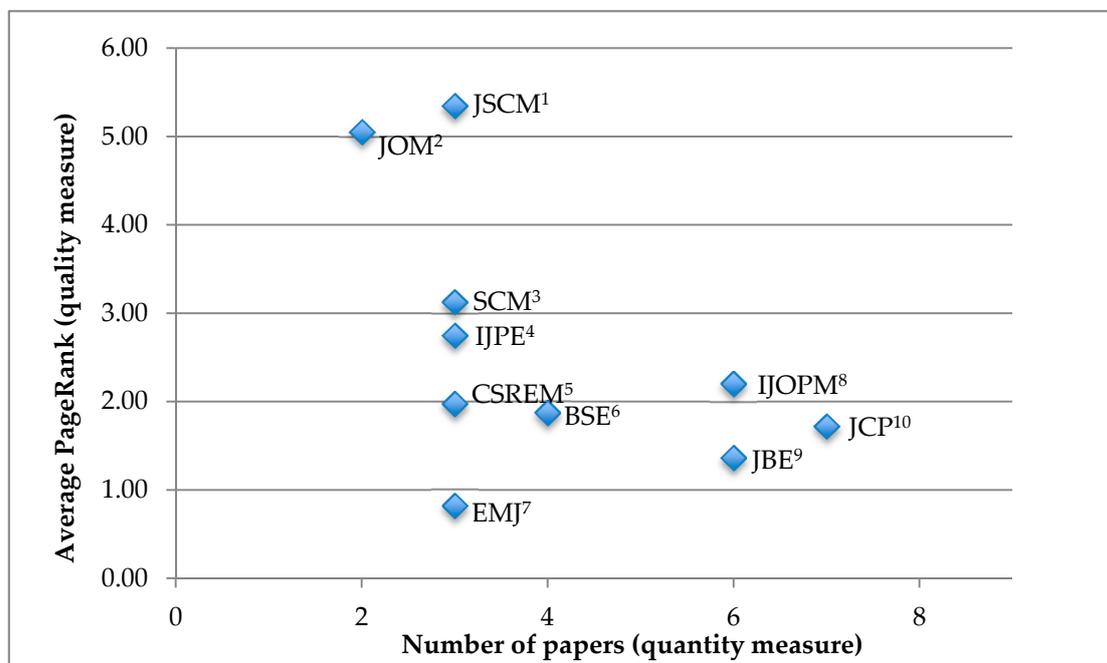
| Cluster Title  | Description   |
|--|---|
| 1. GS <sup>1</sup> practice and environmental performance                              | International purchasing/supply management practice and its influence on firm’s environmental performance using empirical research methodologies of case study and survey   |
| 2. Social sustainability/ethical sourcing practice in GS                               | Social sustainability-related practices such as CSR <sup>2</sup> , supplier management in relation to ethical sourcing standards, social/labour aspects of suppliers’ code of conduct practices using the empirical research methodologies of case study and survey |
| 3. Environmental evaluation criteria and certification                                 | The effects of the adoption of “green” practice in purchasing/supply management and ISO14001 certification, e.g., green purchasing and greening the supply chain management using empirical methods   |
| 4. Fuzzy modeling of environmental practice in GS                                      | Fuzzy multiple selection criteria of international suppliers in environmental purchasing practice, using pure quantitative modelling analysis approach  |
| 5. Effects of environmental and social sustainability practice on economic performance | The effects of social and/or environmental practice in GS on the economic performance of international companies using both empirical and modelling methods   |

<sup>1</sup> GS: global sourcing, <sup>2</sup> CSR: corporate social responsibility.

Clusters 1, 3 and 5 tend to be located close to each other in the Force Atlas diagram (Figure 1). Cluster 3, focusing on green certification, seems to be derived from or a continuation of Cluster 1. Cluster 5 extends cluster 1 from a green sustainability focus to green and social sustainability in GS. Additional statistics of these clusters support these arguments and indicate that the average PageRank score is significantly higher for Cluster 1 (GS practice and environmental performance), while the connection between Clusters 1 and 3 (environmental evaluation criteria and certification, and environmental performance in GS) is considerably stronger than the others. Meanwhile, Cluster 2 (social sustainability/ethical sourcing practice in GS) has the largest number of articles and conversely Cluster 4 (fuzzy modeling of environmental practice in GS) has the least number of articles out of all five clusters, but these two clusters have only limited connections to the other three research clusters. This observation can provide an important and interesting insight about the relationships between the five clusters and has implications for future research.

BibExcel can be used to analyze the frequency of occurrence of a text in different fields of the bibliographic data. The journal field was extracted from the data file and frequency of appearance for all the journals was recorded. An analysis was conducted to investigate the performance of the contributing journals to all research clusters in terms of both quantity and quality of the papers published, using PageRank as a quality measure (PageRank analysis measures popularity and prestige). The results are shown in Figure 2, which illustrates this quantity versus quality (based on PageRank score) analysis. It is found that the high-quality ranking journals e.g., Journal of operation Management (JOM) and Journal of Supply Chain Management (JSCM) contribute the relatively smaller number of papers; and the three primary prolific journals to the field are Journal of Cleaner Production (JCP),

International Journal of Operations and Production Management (IJOPM) and Journal of Business Ethics (JBE), which have the modest value of quality ranking. It is not surprising that JSCM holds the greatest “quality/quantity ratio” among all journals matching its prestigious status gained in the supply chain management field in recent years.



**Figure 2.** Major contributing journals to the development of Sustainable Global Sourcing (SGS) research clusters: a quality versus quantity. <sup>1</sup> Journal of Supply Chain Management, <sup>2</sup> Journal of Operations Management, <sup>3</sup> Supply Chain Management: An International Journal, <sup>4</sup> International Journal of Production Economics, <sup>5</sup> Corporate Social Responsibility and Environmental Management, <sup>6</sup> Business Strategy and the Environment, <sup>7</sup> European Management Journal, <sup>8</sup> International Journal of Operations and Production Management, <sup>9</sup> Journal of Business Ethics, <sup>10</sup> Journal of Cleaner Production analysis

To understand the evolution of SGS research over time, a dynamic co-citation analysis was conducted for the papers of all clusters, which shows the evolution/development of clusters over time. Table 6 shows the number of papers published in each cluster since 1994. It can be seen that Cluster 1 emerged in 1998 and the number of publications steadily increased and peaked in 2008 (four articles) and then suddenly declined after 2010 (zero articles in 2011 and 2013). The publications for Cluster 2 increases from two to three to four per year in the period from 2001 to 2010. Before 1998, the publications are only found for Clusters 3 and 4. The publication trend for cluster 3 was steady between 1994 and 2008, and the number slightly increased after 2005 but disappeared after 2008. The earliest publication for Cluster 4 is in 1997, which then went quiet until 2002. After that, the number of papers was either zero or one from 2002 to 2013. Cluster 5 emerged in 2000 and had a steady stream of one or two papers per year after that.

Social sustainability/ethical sourcing practice in GS (Cluster 2) and the effects of environmental and social sustainability practice on economic performance in GS (Cluster 5) are two emerging areas of research in SGS, with the potential to grow and may become mainstream SGS research in the years to come. Meanwhile, through comparing the top journals publishing on each cluster, it is found that the top journals publishing on Cluster 2 tend to be CSR and general management journals, e.g., Journal of Business Ethics (6 papers), Politics and Society (3 papers), European Management Journal (2 papers) and Corporate Social Responsibility and Environmental Management (2 papers). While for Cluster 5, Journal of Cleaner Production (2 papers) and Transportation Research Part E:

Logistics and Transportation Review (2 papers) publish the most number of papers. It seems that the journals publishing papers on these two clusters are not OM/SCM journals. Therefore, there is a significant potential for OM/SCM researchers to publish papers focusing on these two clusters/topics in OM/SCM journals [24,25,43,88].

**Table 6.** The number of published papers in each cluster (1994–2013).

| Year  | Number of Published Articles |           |           |           |           |
|-------|------------------------------|-----------|-----------|-----------|-----------|
|       | Cluster 1                    | Cluster 2 | Cluster 3 | Cluster 4 | Cluster 5 |
| 1994  |                              |           | 1         |           |           |
| 1995  |                              |           |           |           |           |
| 1996  |                              |           | 1         |           |           |
| 1997  |                              |           |           | 1         |           |
| 1998  | 1                            |           | 1         |           |           |
| 1999  | 1                            |           |           |           |           |
| 2000  |                              |           | 1         |           | 2         |
| 2001  | 3                            | 2         | 1         |           |           |
| 2002  |                              | 2         | 1         | 1         | 1         |
| 2003  |                              |           | 1         | 1         |           |
| 2004  | 1                            | 2         |           |           | 1         |
| 2005  | 2                            | 4         | 2         |           | 1         |
| 2006  | 1                            | 2         |           |           |           |
| 2007  | 1                            | 3         | 1         |           | 2         |
| 2008  | 4                            | 3         | 2         |           | 1         |
| 2009  | 1                            | 4         |           | 1         | 1         |
| 2010  | 3                            | 4         |           | 1         | 1         |
| 2011  |                              |           |           | 1         |           |
| 2012  | 2                            |           |           |           |           |
| 2013  |                              |           |           | 2         |           |
| Total | 20                           | 26        | 12        | 8         | 10        |

#### 4. Content Analysis of Five Clusters

A content analysis based on the five clusters obtained from co-citation analysis was conducted to identify the detailed sub-themes and insights. As the evolution of 76 articles of primary research clusters base on local citation ended in 2013, all the articles published from 2014 to 2017 (60 papers) within the initial 287 papers identified for the final review were selected in order to capture the recent trends/topics on SGS. In total, there are 136 (76 plus 60) papers for content analysis and all the additional selected 60 papers can be justified into the five primary research clusters, without any new cluster identified but show some novel trends (sub-themes) comparing to earlier articles. This finding improves the confidentiality for the results obtained from the bibliometric method and provides additional insights for SGS research.

##### 4.1. Cluster 1: GS Practices and Environmental Performance

Cluster 1 is a large cluster consisting 28 articles and it is labelled as GS practices and environmental performance. This cluster includes articles focusing on focal companies' consideration and efforts to take into account environmental sustainability when purchasing globally. Articles in this cluster can be further classified into the following three sub-themes: the antecedent, practice and consequence.

The first sub-theme, antecedent of GS practices for sustainability goals, mainly consists of drivers and barriers. The drivers can be further divided into internal drivers and external drivers. Several articles describe that the internal drivers are purchasing managers' intention [49], commitment to sustainability [59,89,90], internal environment orientation [90], alignment with corporate strategy [91,92], way of working with suppliers [59,91], and top management support [90]. The external drivers found include pressure from external stakeholders and environment e.g., customers [93],

national culture [94], society [92,95], and regulatory [92]. Regarding the barriers of GS practices for sustainability, Wycherley (1999) [59] proposes commercial advantage and increased costs are two barriers in working with suppliers to improve the overall environmental impact.

The second sub-theme is GS practice. The rate of sustainability developments and the focus of sustainability elements that are given priority vary significantly [96]. Most of the current practices including tools and strategies in managing sustainability focus on environmental issues in the procurement process [97].

Most articles of GS practices trying to achieve environmental goals focus on both upstream and downstream integration. For example, Theyel (2001) [58] proposes that firms that collaborate with customers tend to collaborate with suppliers in meeting environmental requirements. The collaboration or integration with customers and suppliers is believed to have the positive influence on sustainable performance, especially environmental performance [51,98–100]. Besides supplier integration, studies on upstream GS practice also include quality management of suppliers, lean supply, and supplier selection with life cycle consideration [47,101]. Another stream of GS practice in this cluster is focused on internal practice and processes e.g., GS strategy, sustainable purchasing portfolio, and sustainability initiatives of subsidiaries [61,97,102,103].

The third sub-theme is consequences of GS. Several studies find that GS practices, both internally and externally orientated ones, have a positive impact on firm's environmental and social performance [63,104–106]. Studies also highlight the importance of mediating factors between GS practice and sustainable performances. For example, Giuliani and Macchi (2014) [107] propose that there is no simple relationship between MNCs and their sustainable impacts but there are some mediating factors including external (i.e., related to the host country and the industry) and internal (at corporate/parent or subsidiary levels) conditions. Finally, there is also an interesting study in this sub-theme, which focuses on the interrelationship among the three aspects of sustainable performances. Pullman et al. (2009) [63] suggest environmental performance and social practice improve operational performance, which in turn improves financial performance.

#### 4.2. Cluster 2: Social Sustainability/Ethical Sourcing Practice

Cluster 2 is the largest cluster containing 47 articles, all of which are focused on social sustainability-related issues. This cluster is thus labelled as social sustainability/ethical sourcing practice. Articles in this cluster concern also three sub-themes including driving forces, approaches and impacts of ethical sourcing.

The first sub-theme is driving force of ethical sourcing. External pressures are believed to be the major drivers of ethical sourcing e.g., public pressure [65], external stakeholder pressure [24,108–110], coercive and normative pressures [111], and legal pressure [112,113]. Trusting relationship/cooperation with supplier is also suggested as an important factor fostering ethical sourcing behaviour [67,108,111,114]. In addition, Frenkel (2001) [115] and van Tulder and Kolk (2001) [116] highlight the importance of institutional supports in improving employment relations and labour standards. Hemingway and Maclagan (2004) [117] and Park and Stoel (2005) [68] propose the implementation of social sustainability by corporations could be associated with the personal value of managers. There are also other factors considered to have influence over ethical sourcing practice e.g., corporate culture, ethical orientation, labor-intensive production and traditional technologies, differences in cost levels between sourcing and recipient areas, buyer's market, short deadlines, low predictability of ordering processes, low levels of transparency and communication barriers [109,118,119].

The second sub-theme is ethical sourcing approaches. Studies show that MNCs claim their ethical sourcing behaviour at their suppliers' factories in developing countries, but suppliers tend to deceive the monitoring organisations by decoupling the formal monitored part from the actual operational part of their organisation [120]. The majority of articles in this cluster are in line with the research stream focusing on the approaches of supplier management to increase compliance with MNCs' codes of conduct. Hughes (2005) [121] proposes three contrasting modes of organisation

for supplier management towards ethical sourcing i.e., monitoring, coordination and collaboration approaches. Most studies in this cluster support the idea of coordination and collaboration approach, as they believe with these approaches suppliers' compliance with codes of conduct could be more sustainable [50,122–124].

Other studies propose that the collaborative way is more effective in increasing supplier compliance and improving social sustainability performance [67,125,126]. However, Locke et al. (2009) [127] note that monitoring and collaboration approaches are complementary instead of alternatives to improving social performance. Furthermore, besides the external activities, articles in this cluster also focus on the internal activities of ethical sourcing e.g., purchasing decisions [66], institutional designs [128], direct sanction [64], internal governance approach [129], employment relations [129] and internal strategy [130].

The third sub-theme is impact of ethical sourcing and the number of articles is very limited. Only Evers et al. (2014) [131] and Lee and Gereffi (2015) [132] point out the ethical sourcing activities play an important role in shaping economic and social upgrading for emerging economics. In addition, Klassen and Vereecke (2012) [126] outline the positive relationship between ethical supplier management and social performance improvement such as mitigating social risks, creating new opportunities and improving firm performance.

#### 4.3. Cluster 3: Sustainability Certification Adoption and Auditing

Cluster 3 is composed of 23 articles examining certification adoption and auditing of environmental and social sustainability in GS practice, this cluster is labelled as SGS certification adoption and auditing, which consists of two sub-themes of certification adoption and auditing.

The driving forces of certification adoption and auditing include the internal factors such as middle managers' skills [71], coordination with suppliers [42], purchasing volume [69], internal sustainable orientation [69] and benefits from new products [74]; and the external factors i.e., customer pressure, regulation, external stakeholders, and national context [75,133,134]. In particular, Rao (2005) [39] concludes the major driving forces as sustainability orientation and economic motivators i.e., the former consists of improving the environment performance and relationship with the community, enhancing/capturing the environmental knowledge, productivity and quality of employees, and enhancing brand image; the latter includes obtaining capital, avoiding potential export restrictions, increasing market share, improving financial performance and reducing operating costs. Another interesting study is by Prado and Woodside (2015) [135], who compare the certification adoption and non-adoption of international-supplier ethical standards and find that causal conditions leading to rejection are not the mirror opposites of causal conditions leading to adoption.

The first sub-theme in this cluster is certification adoption. The environmental issues are becoming increasingly important and green practice of corporations has emerged as a trend for manufacturing enterprises. In this process, various types of environmental criteria are added into organisational global sourcing decisions [42,71]. The greening process of GS refers to using buyers' purchasing policies and practices to increase suppliers' certification adoption and compliance to regulation auditing [38,69,73,74]. Some studies show that greening the different phases of the supply chain leads to an integrated green supply chain [39]. Therefore, certification adoption approach to enhancing environmental performance should go beyond the organisation's operation boundaries and be extended throughout the supply chain [133]. Corbett (2006) [136] concurs with this view and indicates that part of the global diffusion of ISO 9000 did move upstream in global supply chains. Darnall et al. (2008) [133] also propose that certification adopters might have a greater propensity to expand their focus beyond their organisational boundaries. Similarly, Young (2015) [137] proposes using certification approaches for conflict minerals in responsible sourcing of metals and concludes that downstream manufacturing industries are governing at a distance for the management practices of upstream raw material producers. Nawrocka (2008) [72] investigates this issue from the perspective of small companies and suggests that if end-product manufacturers do not exert more influence on their

suppliers, other measures such as legal or voluntary measures (in this case Restriction of Hazardous Substances (RoHS) and ISO 14001, respectively) will only partially affect the green reforms in the supply chain.

The other sub-theme in this cluster is regulation auditing. Poor working conditions in global supply chains have led to private initiatives that seek to regulate labour practices in developing countries [134]. Private regulation i.e., corporate codes of conduct are integrated into supplier-auditing processes in the hope of ensuring sustainability throughout the supply chain. However, the effectiveness of private regulation is debated when being applied in auditing suppliers across the globe [134,138]. Egels-Zandén and Lindholm (2015) [139] propose that private regulation of sustainability improves worker rights overall but bears little significance for specific worker rights e.g., freedom of joining labour unions and discrimination. Particularly, the private regulation of buyers can be interpreted in different ways based on geographical contexts with negotiable possibility, but sustainability is in danger of being partially compromised or even completely undermined when efficiency and contractual agreements set the agenda for audits [138]. To address this, Posthum and Bignami (2014) [140] claim that private regulation and public action can play complementary roles in the promotion of sustainability in global value chains. Lund-Thomsen and Lindgreen (2014) [141] and Distelhorst et al. (2015) [134] also propose using the local public regulation in developing countries to improve the sustainability auditing of suppliers.

#### *4.4. Cluster 4: Modeling Method for Green Supplier Selection of GS*

Cluster 4 is the smallest major cluster consisting of 18 articles, which are focused on the modeling method for green supplier selection of GS. This cluster is labelled as such. Articles in this cluster tend to use three main modelling methods: fuzzy method, optimization model and life cycle analysis.

The fuzzy approach is proposed for evaluating environmental performance of suppliers and supporting the selection of the best green suppliers [71,78,80,142]. For example, Govindan et al. (2013) [27] identify a fuzzy model based on triple bottom line approach for supplier selection operations. Dou et al. (2015) [143] propose a portfolio evaluation model for environmental supplier development programs that consider three types of supplier performance: traditional operational factors, traditional environmental factors and low carbon management factors.

The optimization model is usually built up for environmental trade-offs considering a variety of factors. In this sub-theme, articles focusing on optimization model include Pareto-optimal solutions, multi-objective optimization, game theory, and optimization model [76,144–146]. Yeh and Chuang (2011) [76] present a set of Pareto-optimal solutions for solving the four conflicting objectives such as cost, time, product quality, and green appraisal scores. Andriolo et al. (2015) [144] explore a new transport allocation model using a multi-objective optimization approach, in which two partners are collaborating to share transport routes and processing units. Huang et al. (2016) [145] develop a game theory model to simultaneously examine the effects of product line design, supplier selection, mode of transport choice and pricing strategy on profitability and greenhouse gas emission reduction performance. Trapp and Sarkis (2016) [146] establish an optimization model that addresses supplier selection, supplier development, and sustainability considerations simultaneously.

Finally, life cycle analysis (LCA) is commonly used for assessing environmental impacts associated with all the stages of a product's lifecycle. Noci (1997) [40] and Nagel (2003) [79] propose LCA measures for assessing a supplier's environmental performance and facilitating supplier selection. Gemechu et al. (2016) [147] broaden the scope of LCA through proposing a new method of calculating the geopolitical supply risk to assess the environmental performance under the conditions of political instability and market concentration. Rezaei (2016) [148] proposes a supplier selection life cycle approach integrating traditional and environmental criteria using the best worst method.

#### 4.5. Cluster 5: Interrelationship of Three Aspects of Sustainability

Cluster 5 consists of 20 articles focusing on the effects of environmental and social sustainability on economic sustainability in GS, thus this cluster is labelled as interrelationship of three aspects of sustainability. There are mainly four sub-themes in this cluster: relationship between environmental and economic sustainability, between social and economic sustainability, between environmental and social sustainability and relationship between environmental, social and economic sustainability.

First, several studies in this cluster propose that there is a positive relationship between environmental sustainability programs or green purchasing activities and firms' economic performance in terms of both financial and operational performance [83,115,149–151].

Second, studies on social and economic sustainability show a slight difference as the social sustainability practices only can help to improve firms' operational performance but do not pay off in terms of financial performance [41,44].

Third, the environmental dimension of sustainable GS has a significant and positive relationship with social performance of the firm [151,152]. Lee (2016) [152] proposes that environmentally and socially responsible SCM are positively related to relationship commitment, which further positively affects each dimension of supplier performances i.e. environmental, social and operational performance. Younis et al. (2016) [151] indicate that the environmental practice exerts a positive influence on social performance. Specifically, green purchasing plays a role in improving the economic performance, while reverse logistics practices are found to impact the social performance (i.e., improved corporate image, social commitment, preserve the environment and enhanced employee job satisfaction) of the firm positively (ibid).

Fourth and last, studies on purchasing social responsibility or CSR demonstrate that environmental and social-related activities can directly or indirectly lead to firms' economic performance improvement [22,87,153]. This positive linkage relies upon the potential competitive advantages generated from social and environmental performance improvements [154,155]. Meanwhile, Wiengarten and Longoni (2015) [156] highlight the importance of supply chain integration, which positively affects firms' performances. Specifically, coordinative integration has positively impact on several operational and sustainability performance dimensions, whereas it provides significantly higher benefits mainly on the flexibility and sustainability performance dimensions. Particularly, Dabhilkar et al. (2016) [157] investigate this issue based on the different purchasing categories and indicate that sustainability programs affect supplier compliance in all the four categories in Kraljic's purchasing portfolio model except for the bottleneck category; and for noncritical category, there is a significant trade-off between the low cost and the high social and environmental supplier compliance. The alignment of sustainability objectives between the corporate and supply function levels only leads to an improvement of the financial performance for the strategic category (ibid).

#### 4.6. Methodologies, Theories, Industry Sectors and Disciplines for the Reviewed Articles

This section provides a summary of features for each cluster based on industry sector, theoretical framework, research method and discipline in order to identify research gaps. For the industry sector, Cluster 1 presents results obtained from a manufacturing industry context, including automotive, utilities, chemical, energy and appliance among others. Articles in Cluster 2 are mainly based on labour-intensive industries such as apparel, textile, food, retailing, toy, wood and floriculture. Clusters 3 and 4 are similar to Cluster 1 and are dominated by the manufacturing sector. This is because articles in these two clusters also focus on environmental issues to investigate certification adoption and supplier selection respectively. Cluster 5 contains papers focusing on both the manufacturing sector and labour-intensive industries.

In terms of the research methods used, papers in Cluster 1 mainly adopt survey questionnaires and structural equation modelling (SEM). Articles of Cluster 2 tend to adopt qualitative approaches such as case study and conceptual model building with some empirical case examples. Contributions of Clusters 3 and 5 show a mixed approach of quantitative and qualitative methods including case

study, survey and conceptual framework building. It is worth mentioning that in Clusters 2, 3 and 5, a few recent studies started adopting the secondary data analysis method to investigate SGS problems e.g. civil society database [111], factory audits [139], public documents [137], and enterprises' websites, annual reports and public articles [115]. Particularly, all articles in Cluster 4 are based on a modelling method.

Finally, disciplines of the five clusters are mainly concentrated on OM/SCM and CSR. Specifically, papers of Clusters 1, 3 and 5 are mostly contributed by OM/SCM journals. Cluster 2 is dominated by CSR and general management journals.

## 5. Future Research Directions

The results of co-citation and content analysis, suggest several implications for future investigations in the field of SGS research. This study now highlights eight major implications for future research, which are summarised in Table 7.

**Table 7.** Identifying research directions in SGS research.

| Category              | Gap/Issue   | Research Direction  |
|-----------------------|---|---|
| Discipline base       | Social issue lack OM <sup>1</sup> /<br>SCM <sup>2</sup> works | Investigating socially sustainable practices from an OM/SCM point of view   |
| Research method       | Dominated by case and survey                                  | Using secondary data sources for the sustainable impacts analysis of global sourcing.   |
| Industry sector       | Focus on manufacturing and labor-intensive industry           | Examining SGS <sup>3</sup> issues in service sectors  |
| Geographic aspect     | Comparison of differences between sourcing countries          | Comparing the differences of SGS issues and cultural distance between countries   |
| Unit of analysis      | Focus on focal firm and supplier                              | Extending research focus into both multi-tier supply chain and multi-stakeholder outside the supply chain                       |
| Theoretical framework | Limited in interrelationship                                  | Exploring interrelationships among the three dimensions of sustainability   |
| Longitudinal/snapshot | Little longitudinal study                                     | Adopting longitudinal view while investigating the evolution and changes of SGS projects as well as their impact on performance |
| Underpinning theory   | Dominated by four theories                                    | Using diverse theories to investigate SGS issues or combine different theories together to explore research topics in this area |

<sup>1</sup> OM: operations management, <sup>2</sup> SCM: supply chain management, <sup>3</sup> SGS: sustainable global sourcing.

First, social sustainability/ethical sourcing (Cluster 2) is the least understood and published in the OM/SCM literature. This is evidenced by the fact that non-OM journal outlets at the top journal list published on this topic. Initial studies have been conducted based on specific disciplines, such as development studies and politics [25,127,130,158]. Even though these studies use the terminology of global SCs, little is linked to SCM theories. This leaves a fertile ground for OM/SCM researchers to explore, as the issues are highly relevant to SGS and global SSCM. A recent study by Huq et al. (2014) [114] is one of first attempts in this respect. They investigate socially sustainable practices from an OM/SCM point of view, revealing how developing country suppliers have implemented the social compliance programs promoted by MNCs and found that most prior research on this subject only uses qualitative methods (ibid). Thus, Future research may be focused on this unexplored area by using quantitative approach.

Second, the majority of these articles adopted surveys or case studies or conceptual development (there are only 20 modeling papers). There is a possibility of social desirability response bias, which can occur in the data collection of ethics research [159]. This bias refers to the individuals' tendency to present themselves favorably in light of current social norms and standards [160], i.e., survey

respondents or interviewees would respond to questions about their sustainable matters in an overly positive or negative way, thus potentially causing the bias. For this reason, a secondary data analysis method is recommended. Secondary data is defined as quantitative or qualitative data that has been collected by someone, not the researchers themselves, for a different purpose than its intended use in research [161]. Some examples of secondary data include existing literature, census data, governmental information, financial reports data, CSR/Sustainability reports and records [162]. Particularly, secondary data is effective in the OM/SCM fields to address some research areas such as sustainability, financial performance and literature analysis among others [161]. With this method, the authors believe that the human participant bias and researchers preconception can be successfully managed. Recent SGS studies have already used the secondary data method, as mentioned earlier [115,137,139]. Therefore, in addition to survey and case studies, future research could consider alternative methods such as secondary data sources investigating the impact of GS on sustainability.

Third, research on SGS issues mainly focuses on the manufacturing sector. This is an unsurprising result as environmental problem such as waste, pollution and recycling are usually identified easily within manufacturing industries; social issues such as child labour and sweatshops are also identified within labour-intensive industries e.g., clothing. However, it should be noted that environmental problems and social issues are also equally important in-service sectors. For example, energy efficiency in the transport and logistics service industry and child labour in service sectors of emerging countries. Environmental aspects of transport and logistics have become a more serious concern since products are now being moved over far greater distances and this trend is forecast to continue. In the UK, for example the percentage of goods moved by road transport accounted for almost 76% of total domestic tonne-kilometres in 2016, an increase from 73% in 2015 [163]. It is clear that greater efforts need to be made to improve energy efficiency in the transport and logistics service industry and mitigate the negative impact on the environment [164,165]. Another example was the child labour problem in Mexico. The 2011 survey of modulo infantil de trabajo (MTI) (translated as the child labour module) conducted by the Mexican government shows that the employment rate of children in service sectors accounts for more than 50% of the workforce, more than five times larger than that of the manufacturing sectors (9.5%) [166]. This situation clearly indicates that social issues in service sectors should not be underestimated in SGS research [167]. Therefore, the authors suggest that there is great potential for addressing SGS issues in these sectors in the future research.

Fourth, comparative studies of SGS research have been under-explored. The authors found that very little research addresses the comparison of SGS practice between countries or regions. There are only 8 out of the 136 papers exploring SGS at a country level [49,104]. Although country-specific characteristics have been can be identified as contingency factors [168], this element could constrain the generalizability of studies. Prior studies, regarding this aspect, are limited to purchasing managers or suppliers [49,70,109,152]. Future studies could explore this issue by conducting a comparative study of SGS between home countries and host country, since national cultures and local characteristics could influence both sustainable practice implementation and the way of responding to compliance [94,109]. Helin and Babri's (2015) [138] study was one of the first efforts in this respect and investigates the different ways of translating codes of conduct into different geographical contexts. More SGS studies at a country level need to be done.

Fifth, most previous research in SGS has tended to focus on focal companies in developed countries adopting a focal companies' or buyers' view but very little has been done on suppliers in developing countries. 76 out of the 136 papers adopt a focal company's view whereas 30 studies focus on supplier companies. The remaining papers are conceptual development and modelling ones without indicating context of research. It is argued that there is a need for more research on sustainable issues from the view of a whole chain, or multi-tier SC. This could even be explored from multiple stakeholders' view outside the SC. The authors are aware that environmental/social problems can occur not only in the tier 1 suppliers but also in sub-tier suppliers, e.g., extreme upstream suppliers, and in the downstream, e.g., retailers [169]. The authors also suggest that future research needs to

go beyond first-tier suppliers and immediate customers, e.g., retailers, and investigate the whole multi-tier SC. Some recent studies have already made an effort in this regard: Fayet and Vermeulen (2014) [153] investigate sustainable standards for smallholder farmers in the Indian multi-tier cotton SC. Bregman et al. (2015) [170] examine the relationship between the ethical judgment of firms engaged in GS and consumers' intentions to purchase a firm's products; Wilhelm et al. (2016) [171] discuss the double-agency role played by first-tier suppliers in managing sustainability in three-tier SCs, i.e., first-tier suppliers need to first fulfil focal companies' sustainability requirements as an agent, then implement the requirements in their suppliers' operations as a principal.

For the involvement of multiple stakeholders, the authors have found through the content analysis that this field has started to emerge through considering non-SC stakeholders such as the government, industry associations and NGOs [114,172]. This trend is very encouraging for future investigations as SGS has been traditionally focused on the supply chain or supply networks. Therefore, the authors suggest future research could take a broader view beyond supply chain boundary when it comes to investigating sustainable issues in GS. For example, this can be related to supplier development programs implemented by NGOs for poverty alleviation, which considers both supply chain members and non-supply chain stakeholders [173].

Sixth, Cluster 5 has raised a theoretical issue of the interrelationship among the three dimensions of sustainability, however research is still limited in this respect. In this study, it is found that many articles focus on the relationship between GS practice and environmental performance, and the relationship between green and/or social initiatives and economic performance. It can be seen that research has still overlooked the interrelated relationships considering all the three aspects together and decision making with regards to the tradeoffs of the three. Only Pullman et al. (2009) [63] and Sancha et al. (2015) [111] examine the relationship among the three aspects of environmental performance, social practice and operational and financial performance. Prior studies focus on different consequences of GS, but little is known about the interrelationship among the three dimensions of sustainability, especially when considering all these three aspects as performances. It is believed that there is a great potential for targeting this trend in future SGS studies.

Seventh, in this study, most empirical (survey) researches are found to be based on cross-sectional data, but little research has been conducted in the form of longitudinal studies, e.g., the dynamic evolution of SGS practices over time as well as their impact on performance in the long term. A benefit of a longitudinal study is that researchers can observe developments or changes in the characteristics of the targeted issues of SGS and can extend beyond a single moment in time and establish sequences of events, conducive to theorization [174]. Based on the literature review and empirical experience, Gosling et al. (2016) [175] find that both corporate sustainability and SC sustainability initiatives evolve over time and display dynamic features, e.g., changes in supplier governance mechanisms, SC learning content complexity and supply chain leadership style. This is an interesting area for future research and it is suggested that more studies could adopt longitudinal view while investigating the evolution and changes of SGS projects in addition to their consequence. Such efforts should help advance our existing understanding on SGS.

Eighth, four theories have been found to underpin SGS as a research field. The resource based view (RBV) is used in several studies to connect different business practices to firms' competitive advantages, which can further generate sustainable performance improvement [22,89,122,156]. Second, transaction cost economics (TCE) perspective is adopted in framing choices for make or buy decision and investment within inter-organisational relationships. TCE is also an efficient mechanism for describing the coordination costs and transaction risks of inter-organisational activities, which may lead to a direct or indirect impact on sustainable performance improvements in the SC [46,47,51,114]. Third, Institutional theory is adopted to investigate the internal and external factors which influence the adoption of sustainable initiatives in the GS process [92,108,111,113]. Finally, stakeholder theory is employed by several studies to help understand the dynamics between stakeholders and the roles they play in SGS implementation [41,109,118]. There are also other theories that have been adopted

by various researchers to explore SGS issues, e.g., agency theory [64,75], social network theory [104], resource dependency perspective [85], self-determination [103], and game theory [176].

It may be valuable for future studies to adopt other theories in addition to those mentioned here to investigate SGS issues [177], configurational theory [137], and contingency theory [90]; or combine them to explore issues in SGS [61,64,111].

## 6. Conclusions

In this study, the literature on SGS was reviewed with both bibliometric and content analyses. It can be seen that SGS has been identified as an important research field. In this paper, bibliometric and citation and co-citation analysis tools were adopted to perform SGS literature review, analyze the evolution of this research topic and identify new trends. Furthermore, a content analysis has been conducted, which includes the latest articles (between 2014 and 2017), to provide the most recent insights into each theme/cluster of this field and complement the co-citation analysis. Based on the findings, eight actionable directions for future research are proposed. In essence, we have mapped out the whole knowledge structure and provided eight future research directions for SGS.

The methodological originality of this study lies in that it may be the first literature review of SGS researches that has applied both bibliometric and content analyses. This dual approach allows for a comprehensive and systematic investigations in the field of SGS in a more scientific and realistic way.

In addition to these academic contributions, this study does have its limitations. For example, the primary reason for choosing a combined approach is to analyze the literature in a more objective way, limiting the researcher's bias. Despite these efforts, there is still a subjective perception of the approach taken, especially in the selection of the most relevant papers for final review. Nevertheless, the authors believe that including more researchers in the selection process could reduce the subjective bias to some extent.

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