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Trends and Future Directions in Sustainable Development

Sooksiri Wichaisri and Apichat Sopadang*

Excellence Center in Logistics and Supply Chain Management, Department of Industrial Engineering, Faculty of Engineering, Chiang Mai University, Chiang Mai, Thailand

ABSTRACT

This study aims to explore research and to identify research clusters on sustainable development by using bibliometric analysis. The sustainable development field is examined using the selected research articles. A co-citation unit is used to analyze the relationship between cited documents, and then science mapping is used to identify clusters in this relationship. The results show that there are four main distinct clusters, of which the most important concerns sustainable supply chains and logistics management. This cluster is then classified into five bunches of knowledge sources. These bunches illustrate the need for a trend in sustainability issues that includes a social dimension to balance economic and environmental dimensions for long-term development. There are logistics management and lean concepts that can be applied to sustainable development to move toward business sustainability. The future direction of sustainable business concerns economic values, environmental policy and stakeholder engagement for business opportunities. The contribution of this article is to identify trends in sustainable development by means of bibliometric analysis, to develop research in the future.

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Keywords: sustainable development; clustering research; environmental policy; stakeholder engagement; co-citation analysis

Introduction

SUSTAINABLE DEVELOPMENT IS DEFINED AS 'MEET[ING] THE NEEDS OF A FIRM'S DIRECT AND INDIRECT STAKEHOLDERS WITHOUT compromising its ability to meet the needs of future stakeholders' Brundtland (1987). The three pillars of sustainable development are economic, environmental and social aspects, which are collectively known as the triple bottom line (TBL). Elkington (1997) describes TBL as a sustainable perspective to balance economic, social and environmental performance, and to create value for profits, planet and people.

Recently, sustainable development has played an important role in creating long-term benefits. For business investment to survive, decision makers should consider the environmental and social impacts, not only the economic

*Correspondence to: Apichat Sopadang, Excellence Center in Logistics and Supply Chain Management, Department of Industrial Engineering, Faculty of Engineering, Chiang Mai University, Chiang Mai, Thailand.
E-mail sopadang@gmail.com

benefits, of their business processes. The driven issues of business sustainability are economics value, environmental policy and stakeholder engagement. Environmental policy concerns the control of environmental management in order to prove the business section (Hills, 2002). The policy could link to environmental goals that fulfill the business missions (Ketola, 1997). The social dimension is a complex action relating to several criteria of human activity, such as moral, ethical and political dimensions that can measure sustainability at corporate level (Pawłowski, 2007; Santiteerakul *et al.*, 2015). One business opportunity is stakeholder engagement (Moon, 2007). This is related to engagement of employees, customers, suppliers and communities that are affected for win–win outcomes (Boele *et al.*, 2001). The stakeholder concept represents economic and social dimensions, while the product life cycle concept addresses the environmental dimension for performance measurement (Seuring *et al.*, 2003).

Research on sustainable development has blossomed over the past few years. Sustainable development can apply to several issues such as logistics management and the lean concept (see, e.g., Sopadang *et al.*, 2014). There are many published articles on sustainable development. However, a direction for the future in sustainable development research has not been identified. Accordingly, this paper attempts to explore trends on sustainable development by using bibliometric analysis, which is one of the research techniques used to assess and analyze research articles. This technique can describe research distribution and clusters of research using quantitative and statistical analysis (Yang *et al.*, 2012). It will be used to explore the distribution of research articles and evaluate their citation impact through the use of science mapping.

This study aims to explore and cluster research on sustainable development. It consists of four further sections after this introduction. The methodology used in our analysis – science mapping or bibliometric mapping – will be presented in the next section. The research distribution and results related to the distribution of publication years and citation numbers are presented by means of bibliometric mapping. Then, a cluster analysis of the major research domains is described the important keywords for each knowledge source to help understand trends in sustainable development. As the major research domains, the relationship of the selected articles is discussed. Finally section concludes our discussion and suggests topics for future research.

Methodology

This section presents the methodology for exploring and clustering research trends, as illustrated in Figure 1. Bibliometric analysis is a technique to reach the research objectives. Generally, the methodology of bibliometric analysis is purposed by Cobo *et al.* (2011) for application to analysis of scientific domains. There are eight steps, comprising (1) data collections, (2) selection of analyzed units, (3) data processing, (4) normalization process, (5) creating of science mapping, (6) analysis methods, (7) visualization techniques and (8) interpretation. This research will follow the methodology of bibliometric analysis from Steps 1 to 5. These steps can provide an overview of research trends with a science map or bibliometric map, as described in the following paragraphs.

The first step is to collect data related to research articles on sustainable development. Several online databases exist to search for information on scientific works, documents and their citations, in the majority of scientific fields. ISI WOS and Scopus are important databases for bibliometric data, containing information for analysis about journal articles, theses and books. Second, we select our units of analysis to measure the fields of research under

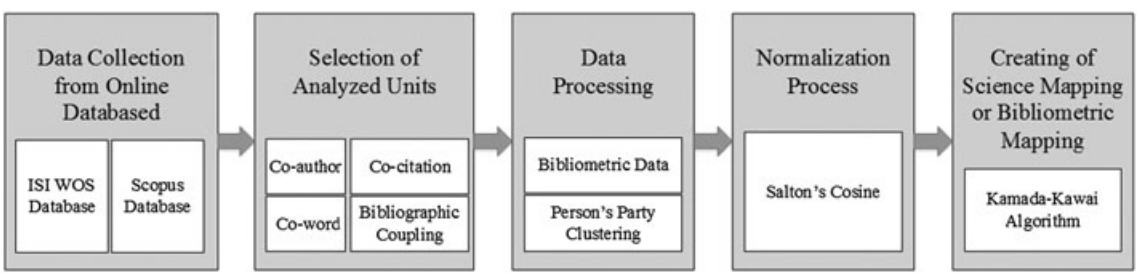

Figure 1. Steps to exploring and clustering research trends

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investigation, usually including journals, documents, cited references, authors and keywords. Four important units are co-author, co-word, co-citation and bibliographic coupling. The co-citation unit of analysis can measure the relationship between cited documents, and this paper will use co-citation in our bibliometric mapping and science mapping analysis.

The next step is to process the bibliometric data – important for good results, in that it improves the quality of the units of analysis from bibliometric databases. Bibliometric data from different databases is organized and normalized, including the clustering of data sets with a similar relationship. Synonymous keywords are used to group the data together, such as sustainability and sustainable development. Datasets are clustered by means of Persson's Party Clustering, which is a type of clustering algorithm (Persson *et al.*, 2009). This algorithm is a single-link non-hierarchical clustering method. The main objective of this clustering is to help perform co-citation analysis, and Bibexcel software can perform Persson's Party Clustering for co-citation analysis. This step clusters articles with a similar relationship, enabling us to explore trends in previous research, including identifying research gaps for future investigation.

Fourth, the normalization process is a necessary step to transform data to normalize the data that is not consistent through different databases. There are several similarity measures such as Salton's cosine and Jaccard's index. Salton's cosine is recommended as a possible alternative for a similarity measure (Salton and McGill, 1983). Salton's cosine, which is the most popular similarity measure, is more effectively measure between a document and query on a scale of zero to one. Following this step, the normalized data can use to create network in the next step.

Finally, a science map network is created by using graph data to explain the relationship between nodes. There are several algorithms that have been developed for automatic graph drawing such as the well-known Kamada–Kawai algorithm (Kamada and Kawai, 1989). This algorithm introduced a perfect approach for graph layout that minimizes systemic stress within a network. This algorithm can be applied to help visualize the co-citation network. Pajek software, a visualization tool for co-citation networks, can be used to draw the science map, and shows links between the research articles. This map makes it easy to understand research trends. Following the proposed methodology, we can explore trends of research articles on sustainable development. Research gaps can also be identified to develop future directions.

Research Distributions

Following the proposed methodology, our first result used the ISI WOS online database for search functions, while the second database source was the Scopus index. These online databases are important sources for collecting articles over the years 1997–2015. The keywords used were *sustainable development*, *lean concept* and *logistics management*. These were chosen as the concepts have an important role to improve business operations and to achieve long-term development for manufacturing in the future. Therefore, recognition of these keywords in firms is of interest. This study scanned the titles and abstracts of journal articles to explore trends in sustainable development.

This procedure collected 677 selected articles with 37 422 references to them as of July 2015, including 481 journal articles and 196 conference proceedings. To observe the distribution of publication years and times cited by other scholars, this study used bibliometric analysis. The co-citation unit was used to measure the relationship between cited documents, for the purpose of clustering research on sustainable development. Persson's Party Clustering and a Kamada–Kawai algorithm were used to conduct bibliometric data and create a science map, respectively. The results of the research distribution and co-citation analysis are described in the following subsections.

Distribution of Articles by Year of Publication

The distribution of articles by year from 1997 to 2015 is shown in Figure 2, illustrating the history of the number of published articles on sustainable issues. Publication in this research field increased from 37 articles in 2005 to 136 articles in 2014. There were 84 articles from January to June 2015 alone, a sign of massive growth in the field of

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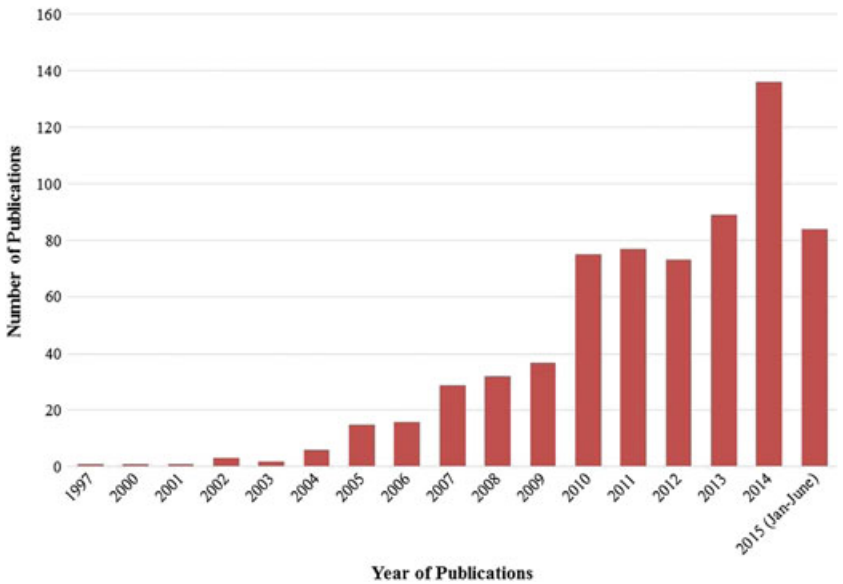

Figure 2. Distribution of articles by year of publication [Colour figure can be viewed at wileyonlinelibrary.com]

sustainable development. 533 articles were published in the field of sustainable development research from 2010 to 2015, representing a rate of increase in articles published by 78.73%. The number of articles published on sustainable supply chain and logistics management is continually increasing.

Frequency Distributions

Following 677 selected articles, the frequencies of citations are listed in Table 1, which shows the number of citations for the top 10 most cited articles. These articles are frequently referenced in research on sustainable development, and represent a source of knowledge for sustainable development. The top 10 most cited articles related to sustainable development in supply chain and logistics management research. These top 10 articles are basic scientific works in understanding sustainable development.

Co-Citation Analysis

Co-citation analysis, which is a common technique for bibliometric analysis, can measure the relationship between cited documents. We applied co-citation analysis to research on sustainable development to display the structure of trends with respect to the relationship between cited references.

Literature referenced	Times cited
Carter CR, Rogers DS. 2008. *International Journal of Physical Distribution and Logistics Management* **38**: 360.	36
Seuring S, Miller M. 2008. *Journal of Cleaner Production* **16**: 1699.	30
Zhu Q, Sarkis J. 2004. *Journal of Operations Management* **22**: 265.	30
Srivastava SK. 2007. *International Journal of Management Reviews* **9**: 53.	29
Florida R. 1996. *California Management Review* **39**: 80.	25
King AA, Lenox MJ. 2001. *Production and Operations Management* **10**: 244.	24
Bowen FE, Cousins PD, Lamming RC, Faruk AC. 2001. *Production and Operations Management* **10**: 174.	20
Hart SL. 1995. *Academy of Management Review* **20**: 986.	19
Dües CM, Tan KH, Lim M. 2013. *Journal of Cleaner Production* **40**: 93.	18
Seuring S. 2008. *Journal of Cleaner Production* **16**: 1699.	18

Table 1. Distribution of literature citations

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The co-citation network is generated using Bibexcel and pajek. Persson's Party Clustering algorithm (Persson, 1994; Persson *et al.*, 2009) was used to cluster datasets, showing the relationship between documents cited in sustainable development research. This clustering algorithm used a single link clustering method from non-similar relationships in different clusters to separate the datasets, which are a similar relationship. The datasets consist of a number of clusters, whose numbers and the links within and between clusters are used to create a network.

The co-citation map is created by a Kamada–Kawai algorithm, as shown in Figure 3. A total of 477 articles are found in the co-citation network that can be classified into four main separate clusters: sustainable supply chain and logistics management, sustainable assessment, sustainable modeling and manufacturing technology. Each cluster indicates a relationship between cited documents via number of frequencies, as shown in Table 2.

Thus, the research field of sustainable supply chain and logistics management is the major cluster in which we can explore research trends in sustainable development. This cluster was subsequently divided into five bunches of knowledge sources by focusing on the relationship between cited documents. The five bunches of knowledge sources are performance of supply chain and logistics management, green supply chain and logistics management, sustainable development, reverse logistics and waste management, and sustainable indicators. Figure 4 shows the articles representing the core of the five bunches of knowledge sources for research on sustainable development.

There are a total of 390 articles of the cluster to analyze knowledge sources. Table 3 presents the frequencies for sustainable supply chain and logistics management clusters that can provide understanding of the core knowledge sources for research on sustainable development. Each knowledge source bunch is analyzed in the next section to understand the relationship between research articles that can explore the trend of sustainable development in the future.

Cluster Analysis of the Major Research Domains

Following the previous results, this section focuses on the five bunches of knowledge sources, which are separated out from the sustainable supply chain and logistics management cluster. These bunches are sustainable development, performance of supply chain and logistics management, green supply chain and logistics

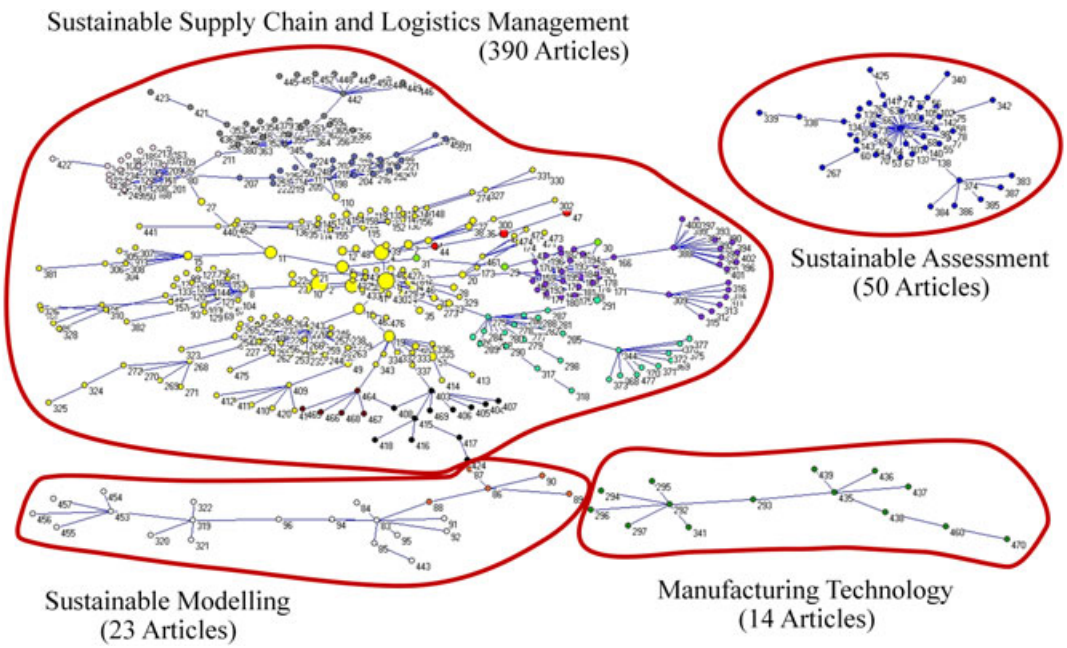

Figure 3. Science mapping of sustainable development issue [Colour figure can be viewed at wileyonlinelibrary.com]

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Cluster	Frequency (number)	Frequency (%)	Main subjects
1	390	81.76	sustainable supply chain and logistics management
2	50	10.48	sustainable assessment
3	23	4.82	sustainable modeling
4	14	2.94	manufacturing technology
Total	477	100.00	

Table 2. Frequencies and main subjects of clusters in co-citation network

management, reverse logistics and waste management, and sustainable indicators. All 390 articles of this group are screened and selected by reading the abstract and the text. The final list of the selected articles, which is included in the appendix, is relevant to research on sustainable development. These articles refer to the details of sustainable development. To investigate knowledge of each research domain, the research methodology (e.g. literature review, model development and assessment) is used for classification via a diagram to explain the previous research. This section describes each bunch of knowledge sources, in order to understand trends in sustainable development.

Sustainable Development

Sustainable development is the largest bunch of knowledge sources, representing the key citations in the growth of knowledge on sustainable supply chain and logistics management, as shown in Figure 5. Carter and Dale (2008), the article most commonly cited, presents a framework of a sustainable supply chain to understand a starting point for moving toward a new theory. This research links with core nodes on the introduction of a sustainable supply chain (Seuring, 2008). There are three groups of articles on sustainable supply chain introduction. The introduction of green supply chain management has presented a conceptual framework and model via literature review (Porter and van der Linde, 1995; Srivastava, 2007). The lean concept is applied to implement improvement of firm performance (Jayaram *et al.*, 2008) and to identify metrics and strategies for firms within the green supply chain

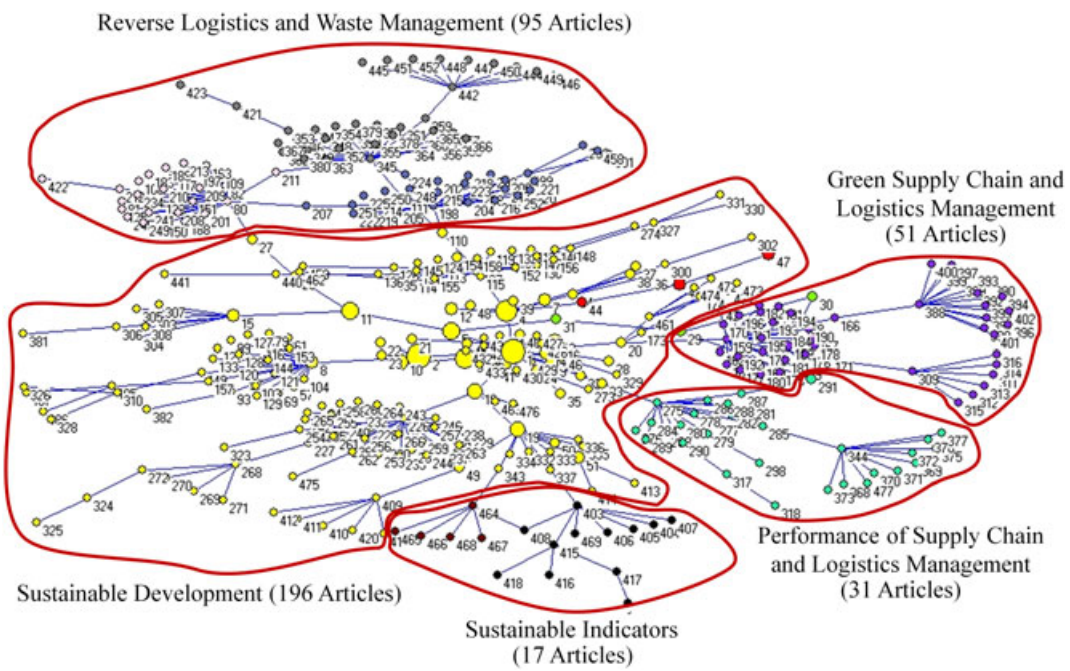

Figure 4. Five bunches of knowledge sources for research on sustainable development [Colour figure can be viewed at wileyonlinelibrary.com]

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Cluster	Frequency (number)	Frequency (%)	Knowledge sources
1	196	50.26	sustainable development
2	95	24.36	reverse logistics and waste management
3	51	13.07	green supply chain and logistics management
4	31	7.95	performance of supply chain and logistics management
5	17	4.36	sustainable indicators
Total	390	100.00	

Table 3. Frequencies and knowledge sources of sustainable supply chain and logistics management clusters

(Kainuma and Tawara, 2006; Gold *et al.*, 2010). The development of a research model relates to designing a research model via information sharing and collaborative practices, green supply chain management practices, environmental operations and statistical analysis (Olorunniwo and Li, 2010). Also, optimization of green logistics for sustainability is applied to create a mathematical model via a decision-making approach for sustainable supply chain and logistics performance, for improvement and implementation in firms (Lambert *et al.*, 2005). These groups have an important relationship with the research on sustainable development.

Accordingly, the research on sustainable development highlights the environmental perspective in manufacturing to improve business performance relating to both costs and profits. The social aspect is also considered, given that social impact is partly due to environmental impact. The above research deals with the lean concept, green supply chain and logistics management through environmental impact.

Reverse Logistics and Waste Management

Reverse logistics and waste management is the second largest bunch of knowledge sources. It focuses on product recovery, waste management and reverse logistics from an environmental perspective. Stock *et al.* (2006) is the core node of research on reverse logistics and waste management involving managing product return for competitive advantage.

The research articles can be classified into two groups: introducing, designing and developing reverse logistics, and product return, as shown in Figure 6. Research on the introduction of reverse logistics and product return involves literature review and examining the relationship between product recovery, waste management and reverse logistics (Daugherty *et al.*, 2002; White *et al.*, 2003). This group also involves designing and developing models related to networks for product return (Beamon and Fernandes, 2004), key factors for decision making in environmental management (Banerjee, 2002) and strategies for reverse logistics and modeling for reverse logistics and waste management (Horvath *et al.*, 2003; Jayaraman *et al.*, 2003; Emery *et al.*, 2007; Alshamrani *et al.*, 2007). These research articles focus on designing networks and models as well as identifying factors impacting on the environmental dimension.

Previous research highlights reverse logistics and waste management, which is a logistics activity, involving product returns in manufacturing. Flows of product returns or product recovery have an environmental impact. Research in this area aims to reduce resource use and waste production, including environmental impacts over the whole supply chain. Research on reverse logistics and waste management is related to sustainable development through focusing on the environmental perspective. These studies work through conceptual frameworks, research networks and mathematical models. They then focus on environmental impacts in supply chain and logistics management, affecting economic and social perspectives.

Green Supply Chain and Logistics Management

Knowledge sources for green supply chain and logistics management are shown in Figure 7. Ilgin and Gupta (2010), which is the primary node, considers the environmental perspective in manufacturing by concentrating on product recovery and remanufacturing among supply chain members. This node links with Srivastava (2007), which presents a classification of research on green supply chain and logistics management through literature reviews.

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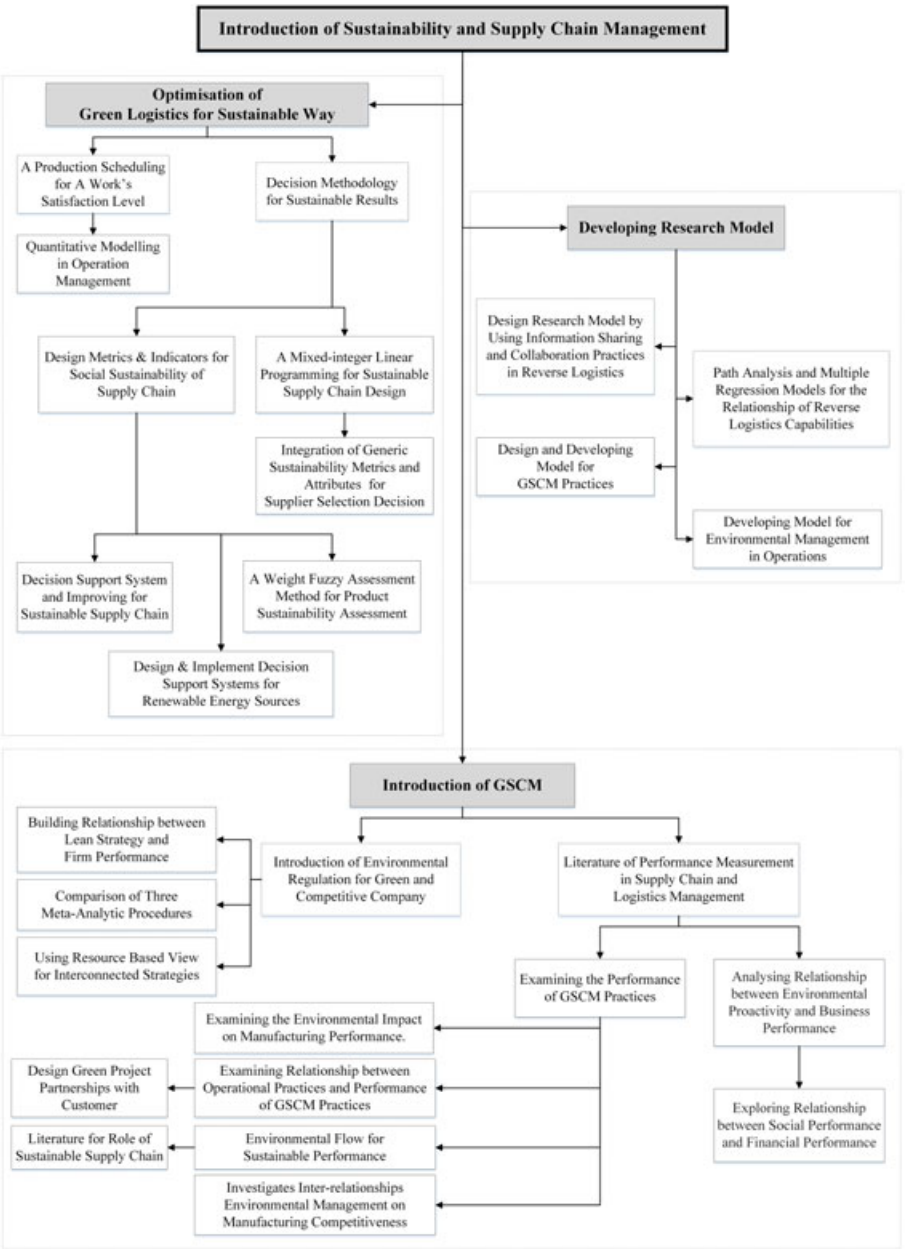

Figure 5. Classification of sustainable development [Colour figure can be viewed at wileyonlinelibrary.com]

Research in this bunch emphasizes introduction and development of models and developing methods for environmental assessment. It presents a literature review of the multiple criteria decision making (MCDM) approach, and a mathematical model for evaluation (Halldórsson and Arlbjørn, 2005). The other group develops methods for environmental assessment such as life cycle assessment (LCA) (Khoshnevisan *et al.*, 2014), artificial neural networks (Kuo *et al.*, 2010), meta-analysis (Golicic and Smith, 2013) and multi-criteria analysis (Handfield *et al.*, 2002; Govindan *et al.*, 2013; Herva and Roca, 2013).

This bunch is a key to an environmental perspective on the supply chain and logistics management. It concentrates on this perspective for development. Previous research used assessment tools, meta-analysis and neural networks to reduce environmental impacts on the economic aspects of supply chain and logistics management. These articles contribute to sustainable supply chain and logistics management for long-term development.

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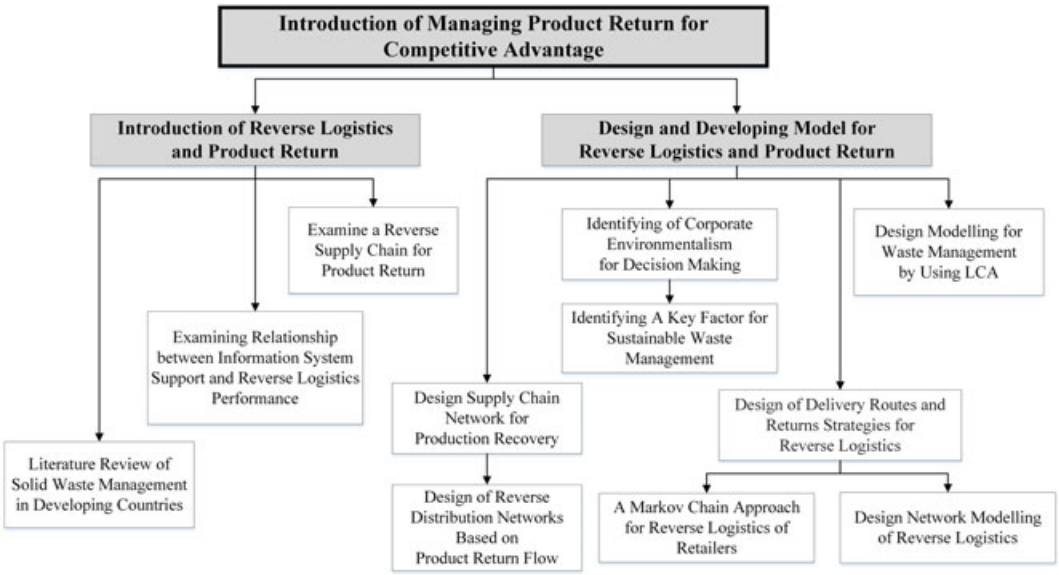

Figure 6. Classification of reverse logistics and waste management [Colour figure can be viewed at wileyonlinelibrary.com]

Performance of Supply Chain and Logistics Management

The knowledge source of research on supply chain performance and logistics management is shown in Figure 8. Research on the framework of supply chain assessment (Lambert *et al.*, 2005) is the core of this bunch, relating to decision making in logistics and supply chain management (Knemeyer and Naylor, 2011).

This bunch can be categorized into three groups of research articles: introducing sustainability advantages for business, examining the relationship between environmental dimension and manufacturing, and developing models for environmental management in operations.

The first group of research deals with the introduction of a sustainability advantage for business. These articles include the social perspective of the triple bottom line (Norman and Macdonald, 2004), identifying supply chain operational performance roles (Golicic *et al.*, 2003) and developing a framework for the environmental–social

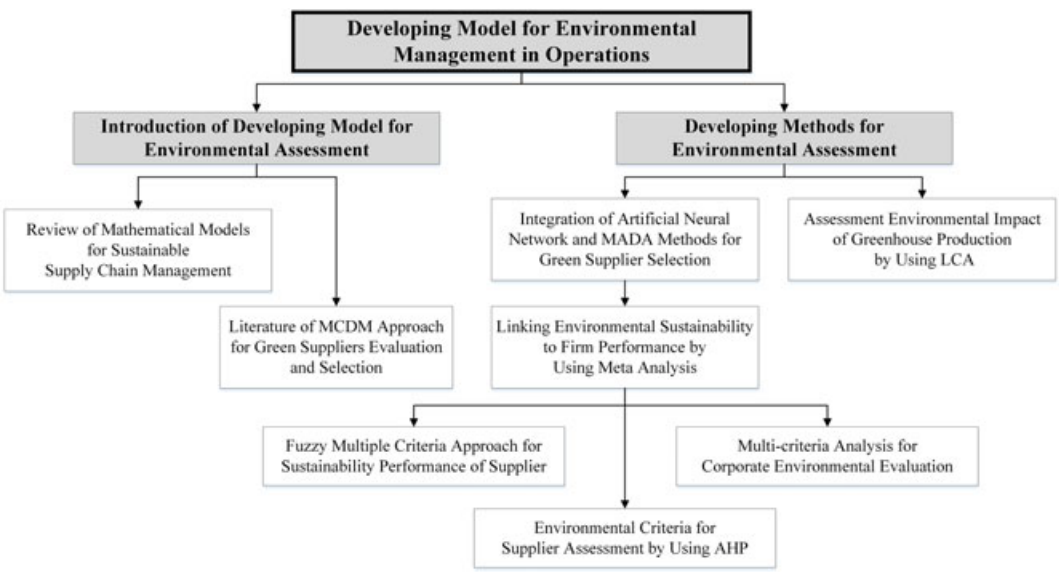

Figure 7. Classification of green supply chain and logistics management [Colour figure can be viewed at wileyonlinelibrary.com]

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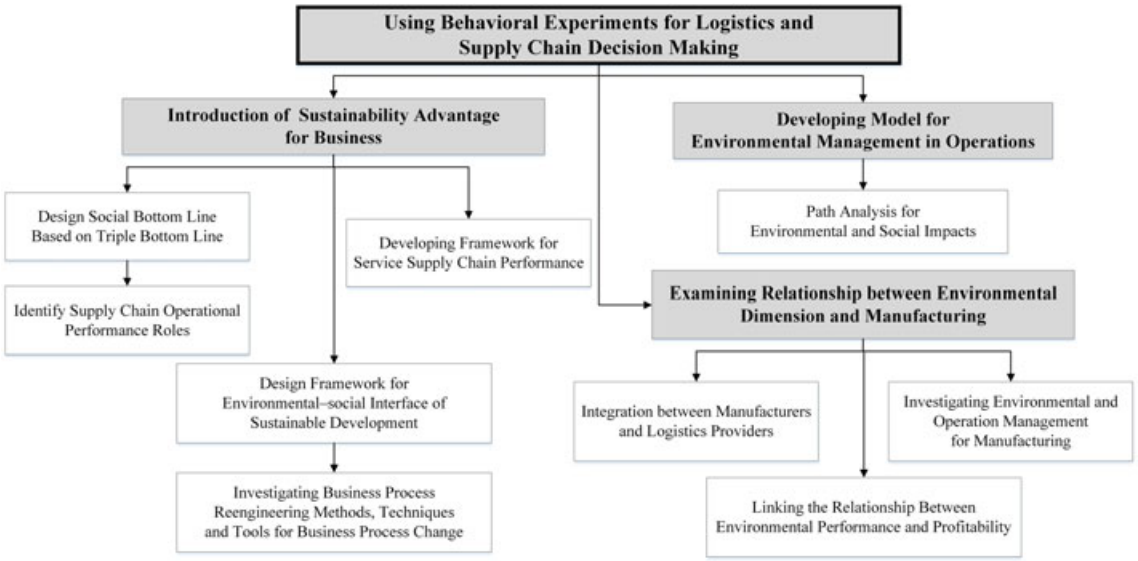

Figure 8. Classification of performance of supply chain and logistics management [Colour figure can be viewed at wileyonlinelibrary.com]

interface and service supply chain performance (Lehtonen, 2004). The second research group examines the relationships involved in integration between manufacturers and logistics providers (Mortensen and Lemoine, 2008), relationships between environmental performance and profitability (Russo and Fouts, 1997) and investigating environmental and operation management for manufacturing (Kettinger *et al.*, 1997; Klassen and Whybark, 1999; Vachon and Klassen, 2006b). Finally, an article on using path analysis (Pullman *et al.*, 2009) features in the group of developing models for environmental management in operation.

This bunch includes research on performance of supply chain and logistics management from economic, environmental and social perspectives. It is important to note that the social aspects of sustainability are relatively neglected in the research on supply chain and logistics management.

Sustainable Indicators

The research bunch on sustainable indicators is the smallest bunch of knowledge sources. It proposes metrics and indicators to assess sustainable methods.

Bond and Morrison-Saunders (2009) describe sustainable appraisal as integrating assessment of the environmental, social and economic perspectives on decision making. This bunch presents research on sustainable indicators, which are a key component of sustainable assessment. There are several methods for sustainable measurement that lack the clear and simple framework of sustainable indicators (Hildén and Rosenström, 2008). This research is divided into examples of environmental practices for organizational environment (Epstein, 2003) and the relationship between risk management and CSR, as shown in Figure 9. For this latter group, sustainable indicators involve social and environmental dimensions of sustainability (Berry and Randinelli, 1998; Bebbington *et al.*, 2008). Research on sustainable indicators aims to fully assess sustainable supply chain and logistics management for long-term benefits in the future.

Discussions of Trends on Sustainable Development

Following the previous section, the final list of selected articles is published during the 1952–2015 period. As concerns research trends, the above-mentioned articles based on our classification consider sustainable perspectives on three dimensions (economic, environment and social), and the interfaces between these perspectives. To classify

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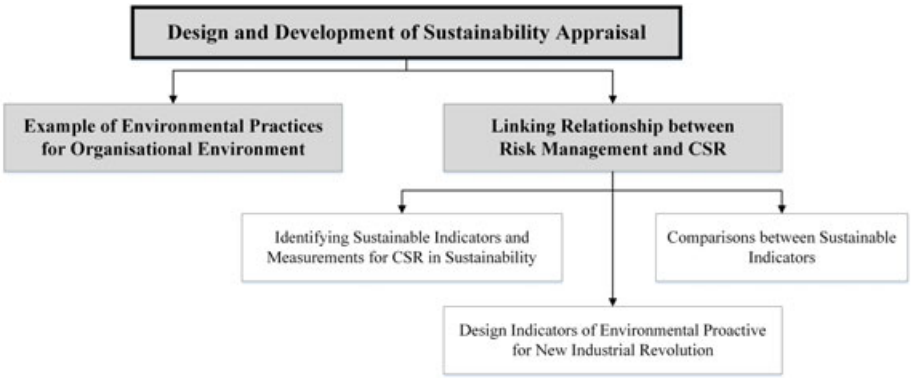

Figure 9. Classification of sustainable indicators [Colour figure can be viewed at wileyonlinelibrary.com]

the trends on sustainable development, the articles are determined by examining the keywords in the title, the abstract and the full paper. The keywords focus on three sustainable dimensions.

The trend in sustainable development can be divided into five periods, as shown in Figure 10. Each period shows the number of research articles concerning sustainable perspectives. First, the articles published during the period 1952–1999 highlight the economic dimension via costs and time. The environment and social dimensions are considered less. The interface of economic and environmental aspects consists of examining environmental and economic impacts together. There are no research articles involving sustainable perspectives in this period. For this period, published research emphasizes the economic dimension directly to improve business operations through logistics management. Logistics management is the key business processes to guide implementation. It is defined by the Council of Logistics Management (1998) as the 'process of planning, implementing, and controlling flow and storage of goods, services and information from origin point to customer point according to customer requirements'.

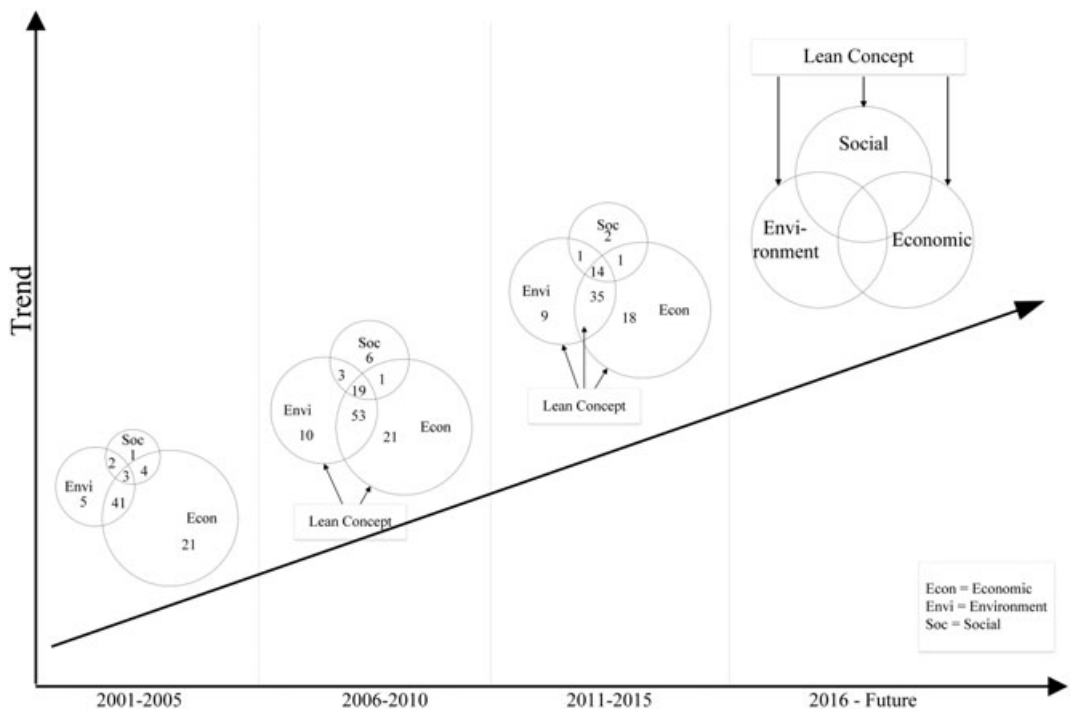

Figure 10. Trend of sustainable development

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Next, the articles published during the period 2000–2005 still focus on the economic dimension. However, research articles on the green supply chain and logistics management are increasing in number, thus bringing environmental and economic aspects into play. The social dimension is less commonly considered. This period shows environmental issues being given more importance for competitive advantage. In such an approach, business processes are planned and physical and information flows are controlled in relation to sustainable perspectives. Sustainable logistics management refers to the organizations' capability by focusing business processes. A business can implement sustainable logistics to create opportunities, economic growth, wealth creation and jobs while also decreasing environmental impacts.

In the 2006–2010 period, both environmental and social dimensions are explored in growing numbers of research articles on sustainable logistics management. Sustainable perspectives are explored more in the research, in order to improve business operations for sustainability. In addition, the lean concept as a tool and technique is applied to logistics management for waste reduction in manufacturing, affecting cost-effectiveness. It is used to classify types of waste affecting the economic and environmental dimensions. The social dimension is considered more in these research articles, although less so than the other dimensions. Finally, in the 2011–2015 period, the three dimensions are treated the same as in the previous period, except that the lean concept is also applied to the interface of economics and environmental aspects.

Over 1995–2015, most sustainable development research has concentrated on the economic dimension to improve business operations and manufacturing performance. Environmental impacts in business and manufacturing are also considered. However, the social dimension is not directly dealt with in regard to organizations, but only as part of environmental impact. The interface of economic and environmental aspects is used to increase competitive advantage by considering economic and environmental impacts at the same time. Similarly, the intersection of social and environmental aspects involves social impacts that are caused by environmental impacts. One example is air pollution affecting health and safety in the community.

Conclusions

In this paper, the proposed methodology can help to explore and identify the research trend of sustainable development. It can support clearer focus on identifying research gaps to give future research directions. We need to explore research trends and to identify clusters in order to strengthen research on sustainable development in the future through a bibliometric analysis. The results of science mapping show the relationship between cited articles with four separate clusters: sustainable supply chain and logistics management, sustainable assessment, sustainable modeling and manufacturing technology. Sustainable supply chain and logistics management is the largest cluster, and has a relationship between sustainable development and logistics management. Moreover, the lean concept as a lean tool is used to analyze and improve business processes via sustainable perspectives. However, a gap in research is found in that not all three sustainable perspectives are considered for business implementation.

The science mapping based on the research articles also leads to the conclusion that the research on sustainable development is developing a research model via optimization and performance assessment for a sustainable path. The research does not point to only the economics dimension. To design a model for sustainability, there are both economic and environmental dimensions for implementation. The environmental dimension is examined together with the economics dimension via environmental practice, which highlights the environmental control measure and strategies. However, the social dimension of the research on sustainability concerns the social indicators that play a part in performance measurement. The social indicators are defined according to corporate social responsibility (CSR) to measure social responsibility of businesses. To implement social sustainability, the businesses highlight community investment to support community activities such as charity and philanthropy that are not directly business opportunities. It only builds the corporate image of their businesses, however; society cannot obtain the long-term benefits. The social dimension is related to employees, suppliers, community and customers. The social issue is less concentration overall of the stakeholder to business implementation for sustainability.

The research on sustainable development can help the businesses to establish their business strategies that are a starting direction for future development. Accordingly, the businesses need to draw up the sustainability goals by

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balancing all three sustainable perspectives in order to improve organizational performance, together with environmental and social impacts. The sustainable development issue contributes to the survival of business in the future. Businesses should make decisions via the economic values, environmental policy and stakeholder engagement simultaneously. The strategies concern the business policy that can make a decision to move toward sustainability for their businesses. There are two main important policies that are denoted business implementation. (1) The environmental policy, according to the environmental goals of the businesses, is related to eco-friendly products. This refers to green materials and technologies that are not harmful to the environment, society and customer health, including reduction of manufacturing costs. Moreover, the products can return end-of-life products for easy recycle or disposal. (2) Stakeholder engagement as social policy can support society. Businesses have to support people who live close to the place of work for their quality of life by the local hiring policy. This policy affects the knowledge transfer and job creation that create their corporate image, leading to business opportunities.

Consequently, there are initially two recommendations for their business that are defined by following the mentioned business policies. First, following environmental policy, the businesses have to make a suppliers' environmental assessment to select green materials from suppliers. The businesses should provide the knowledge transfer to support the suppliers relating to green material requirements. In addition, the businesses have to produce an environmentally friendly product by green technologies such as renewable resource consumption and reduction of amount of waste and pollution. To recycle or dispose of the returned products, the businesses have to manage the reverse logistics activity, which cannot have harmful environmental impacts. Second, for local hiring policy, the businesses have to transfer knowledge to the local communities, such as scholarship and education training programs. Then, the local people are employed, increasing their quality of life, and can support the business for long-term development.

As a final point, businesses need to make a huge contribution to economics, environmental and social development. There is an imperative for change to business sustainability to be a business leader in the future.

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Appendix. A. Classification Results

Research domain	Articles
Sustainable development	Abreu and Camarinha-Matos (2008), Aguinis *et al.* (2008, 2011), Bai and Sarkis (2011), Berney (1991), Bertrand and Fransoo (2002), Carter *et al.* (2000), Carter and Dale (2008), Chaabane *et al.* (2012), Fraj-Andrés *et al.* (2009), Frooman (1997), Georgopoulou *et al.* (1998), Geyskens *et al.* (2006), Ghadimi *et al.* (2012), Gold *et al.* (2010), Gonzalez-Benito and Gonzalez-Benito (2005), Gonzalez-Torre *et al.* (2004), Griffin and Mahon (1997), Gunasekaran and Kobu (2007), Hammond *et al.* (1995), Hart (1995), Hassini *et al.* (2012), Hult *et al.* (2008), Hutchins and Sutherland (2008), Jack *et al.* (2010), Jayaram *et al.* (2008), Kainuma and Tawara (2006), Kannan *et al.* (2013), Lambert *et al.* (2005), Mansoornejad *et al.* (2013), Muduli *et al.* (2013), Olorunniwo and Li (2010), Peng and Lih (2008), Porter and van der Linde (1995), Pullman *et al.* (2009), Russo and Fouts (1997), Sarkis *et al.* (2011), Sbihi and Eglese (2007), Seuring (2008), Sheu *et al.* (2005), Srivastava (2007), Sroufe *et al.* (2000), Tang and Zhou (2012), Theißen and Spinler (2014), Vachon and Klassen (2006b), Vachon and Klassen (2008), Wu and Chang (2004), Yang *et al.* (2010), Yura (1994), Zanoni and Zavanella (2012), Zhu and Sarkis (2004), Zhu *et al.* (2012)
Reverse logistics and waste management	Alshamrani *et al.* (2007), Banerjee (2001, 2002), Beamon and Fernandes (2004), Daugherty *et al.* (2002), Emery *et al.* (2007), Horvath *et al.* (2003), Jayaraman *et al.* (2003), Joseph (2006), Srivastava (2008), Stock *et al.* (2006), White *et al.* (2003)
Green supply chain and logistics management	Brandenburg *et al.* (2014), Golicic and Smith (2013), (Govindan, Khodaverdi and Jafarian, 2013, Govindan, Rajendran, Sarkis and Murugesan, 2013), Halldórsson and Arlbjørn (2005), Hollos *et al.* (2012), Handfield *et al.* (2002), Herva and Roca (2013), Ilgin and Gupta (2010), Khoshnevisan *et al.* (2014), Kuo *et al.* (2010)
Performance of supply chain and logistics management	Golicic *et al.* (2003), Harland (1997), Kettinger *et al.* (1997), Klassen (2001), Klassen and Whybark (1999), Knemeyer and Naylor (2011), Lehtonen (2004), Mortensen and Lemoine (2008), Norman and Macdonald (2004), Pullman *et al.* (2009), Russo and Fouts (1997), Vachon and Klassen (2006a), Willard and Elkington (2002)
Sustainable indicators	Bebbington *et al.* (2008), Berry and Randinelli (1998), Bond and Morrison-Saunders (2009), Epstein (2003)

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