Supply Chain Management: An International Journal

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An analysis of supply chain management research by topic

David Swanson

Department of Marketing and Logistics, University of North Florida, Jacksonville, Florida, USA

Lakshmi Goel and Kristoffer Francisco

University of North Florida, Jacksonville, Florida, USA, and

James Stock

Department of Marketing, University of South Florida, Tampa, Florida, USA

Abstract

Purpose – This paper aims to review logistics and supply chain management topics where theories have been applied to better understand the supply chain management (SCM) discipline identity. The purpose is threefold: to identify research topics in logistics and supply chain management where one or more theories have been examined; provide commentary on the theories that have been applied to the various logistics and SCM research topics; and to provide reference material and direction for future research.

Design/methodology/approach – This structured literature review (SLR) examines research papers in logistics and SCM from 1991 to 2015 published in eight leading academic journals. Papers in the data set are grouped by topic and further analyzed in terms of research method, purpose, year and journal.

Findings – This research categorizes papers by the topics that were studied to understand important insights about how these topics have been examined by researchers. Within each topic area, theories that researchers have used to investigate the topics are identified. This method exposes insights such as: how topics have evolved over time, which topics have lost prominence, which topics may be particularly promising for future research and how topics are treated in the literature.

Originality/value – Despite multiple calls for clarification regarding how theory has been used in logistics and SCM, the logistics and SCM disciplines continue to grow without adequate research on how theory has been used to examine SCM topics. This SLR therefore provides a broad compilation of logistics and SCM research that uses named theories and that is organized by SCM topic to better understand the SCM discipline.

Keywords Supply-chain management, Literature, Theories

Paper type Literature review

Introduction

The term "supply chain management" (SCM) first appeared in print about 35 years ago (Oliver and Webber, 1982). As supply chain management (SCM) evolves, disagreement abounds as to whether SCM is a strategy, a process, a business philosophy or just another term for logistics (Gibson *et al.*, 2005; Mentzer *et al.*, 2001). This ambiguity is evidenced by the variety of research in SCM and even the various departments where SCM knowledge is housed in business schools. Some universities house SCM within a combined Marketing and Logistics department (e.g. The Ohio State University, Hanken School of Economics and University of Tennessee). Other universities house SCM in the Management or Business Administration departments (e.g. Miami University and University of Verona) or industrial engineering (e.g. Lund University and Hong Kong University of Science and Technology). Still other universities have formed dedicated

departments for SCM (e.g. University of Arkansas and Michigan State University).

It is only in the past 10 to years that there have been efforts to arrive at a consensus definition of supply chain management (Stock and Boyer, 2009; Gibson *et al.*, 2005; Mentzer *et al.*, 2001) and to try and identify key SCM constructs (Chen and Paulraj, 2004). The quest for the identity of a discipline is of particular interest to applied disciplines, such as those that fall within the domain of Business. Applied disciplines are faced with the question of what falls within their purview and what does not. Hence applied disciplines such as SCM are constantly in flux, with evolving methods of inquiry, evidence and analysis.

The complications and lack of consensus regarding the identity of SCM was first identified in the literature in 2013 (Fawcett and Waller, 2013). This was expounded upon by Zinn and Goldsby (2014) when they noted that SCM lacks a central scientific artifact that is agreed upon by SCM professionals. Is the SCM artifact inventory, supply chain relationships or something else not yet articulated? SCM is not

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the only business discipline to have faced this crisis. Parallels have occurred within Marketing (Bartels, 1974) and Information Systems (IS) (Sidorova *et al.*, 2008). In the quest for the "IS artifact", it was suggested that a review of the important themes within the discipline might inform the central identity of the field (Benbasat and Zmud, 2003, p. 184). While some topics appear to be "hot" or the *topic du jour* at a particular time, others persist as being central to the body of knowledge. Although these topics inevitably evolve in response to environmental stimuli; certain themes may gain or lose prominence over time; shifts in the collective identity can inform us about the growth patterns of the discipline. In the quest for the SCM artifact, we can learn from how the issue has been tackled in other disciplines.

To this end, a structured literature review (SLR) that explores the evolution of theory is relevant and timely. This research examines 492 articles published in eight academic logistics, SCM and management journals from 1991-2015. This study makes several contributions to SCM literature. First, it categorizes articles by the topics that were studied to understand important and useful insights about how these subject areas have been examined by SCM researchers. Within each topic area, the theories that researchers have used to investigate the topics are identified. Named theories are the perspectives by which topics are explored. Topics are defined as the primary subject area of research that was examined using the theory. Topics help to organize theoretical research and define the identity of the discipline. Categorizing the theory-based research articles by this method exposes insights such as: how the topics have evolved over time, which topics have lost prominence or may be particularly promising for future research, how SCM topics are treated in the literature, and the journals where topics are primarily found. Finally, it offers suggestions based on the SLR and identity crises experienced in the Marketing and Information Systems disciplines to anticipate issues upcoming for SCM.

Literature review

The logistics and supply chain management disciplines

Supply chain management and logistics are not new ideas; evidence of principles of logistics and supply chains date as far back as the building of the pyramids. However, it is only in the past few decades that logistics and supply chain management were firmly established as critical business concerns and thereby as business disciplines (Christopher, 2016). They gained prominence in the 1980s when firms realized the benefits of collaborative relationships that spanned organizational boundaries (Lummus and Vokurka, 1999).

The term "supply chain management", while more recent than "logistics", is often seen as a wider concept. In 1998, the Council of Logistics Management determined that the two terms were not synonymous and modified its definition of logistics as a subset of supply chain management. Very often, they are integrated as a single discipline (Lambert *et al.*, 1998). There have been recent scholarly efforts to create consensus around the definitions of the terms (Stock and Boyer, 2009; Gibson *et al.*, 2005; Mentzer *et al.*, 2001) and define key constructs in the discipline (Chen and Paulraj, 2004). However, issues around the identity of SCM still remain. One indication that widespread consensus regarding SCM has not

yet been achieved is the lack of agreement on SCM's focal artifact – inventory or business relationships with customers and suppliers (Zinn and Goldsby, 2014). Another indication is the disparity of where the discipline is found within business schools. SCM is a standalone department at some Business schools or variously housed within Marketing, Decision Sciences, Operations Management, Industrial Engineering and in others.

Identity crises in academic disciplines

The identity of an organization is an unstructured and amorphous concept (Robertson and Arachchige, 2015), so too are the identities of academic organizations and disciplines (Robertson and Arachchige, 2015; Benbasat and Zmud, 2003) and may evolve over time. It is easy to see parallels between the existential crises faced in other academic disciplines and the identity crisis now evolving in SCM, where scholarly activities may sometimes overlap with those of other disciplines. SCM is not excluded from this phenomenon and is presently faced with an ambiguous identity (Zinn and Goldsby, 2014), a concept originally identified by Fawcett and Waller (2013).

One way to define the identity of a discipline is to identify key topics that are unique to that discipline. Even though these topics inevitably evolve in response to environmental stimuli, certain topics may gain or lose prominence over time. Shifts in the collective identity can inform us about the growth of the discipline (Sidorova *et al.*, 2008). Arguably, each discipline, whether explicitly or not, undertakes the task of defining its identity through its key topics and concepts. Marketing faced an "identity crisis" in the 1970s when attempting to broaden its scope, while still differentiating itself from existing fields such as economics (Bartels, 1974). A similar endeavor was undertaken in the field of Information Systems (IS) that suffered an identity crisis due to a lack of consensus on the core set of properties that defined the discipline (Agarwal and Lucas, 2005; Benbasat and Zmud, 2003). By proposing a core set of concepts and phenomena that would fall within the realm of IS, research that failed to address the core properties committed "errors of exclusion", while research that addressed concepts and phenomena beyond the core properties committed "errors of inclusion" (Benbasat and Zmud, 2003). The idea that certain topics are core, while others are niche, is indeed a subjective construct. Academic researchers determine the topics that warrant investigation. By applying the scientific method – through many repetitions of systematic observations, measurement, experimentation and formulation of hypotheses – we build a body of knowledge within a discipline. The starting point of the scientific enquiry is often a theory that predicts and explains the phenomenon under observation. Hence, research topics are inextricably linked to the theories, research methods and analytic techniques that are used to investigate the areas.

Academic journals of a discipline serve as repositories of the body of knowledge for the field. While the question of journal quality remains a subjective one, there is usually a majority opinion of the top journals of a field. Very often, the parent organization or association explicitly identifies these journals. Perhaps as a result of the call for defining the identity of the IS discipline, a "basket" of eight journals was identified as top journals in IS in 2007 and subsequently revised in 2011[1]. One apparent use of such a list is to "provide meaningfulness and consistency to promotion and tenure cases" (AIS website).

A more deep-rooted and enduring view is that these journals represent the state-of-the-art knowledge of the discipline, across topics, methodologies and geographies. Hence, a starting point in identifying key topics unique to a discipline is a review of literature in the top journals of the field.

Structured literature reviews in supply chain management

There have been several literature reviews that categorize literature based on topic areas and/or theories applied to logistics or SCM. This study builds on those streams of research and borrows relevant aspects from those articles. For example, the initial list of topics was borrowed from Defee et al. (2010). Several literature reviews focus on identifying key theories used in the discipline (see for example Stock, 1997; Blancero and Ellram, 1997; Bookbinder and Lynch, 1997; Eckert and Goldsby, 1997; Mentzer et al., 1997; Olavarrieta and Ellinger, 1997; Zinszer, 1997). Defee et al. (2010) categorized their literature review by the type of theory, such as competitive (e.g. the Resource-Based View and core competencies), decision theory (e.g. auction theory and negotiation theory) and marketing (e.g. market orientation and dependence theory). Other literature reviews are bounded within certain subjects, such as reverse logistics (Wang et al., 2017), supply chain alignment (Wong et al., 2012), green supply chain management (Srivastava, 2007) and sustainable supply chain management (Seuring and Müller, 2008). There is other literature that focuses on a particular theory or method. For example, Fayezi et al. (2012) provide a structured literature review of applications of agency theory in supply chain management and Kauppi (2013) provides a review and research agenda for the use of institutional theory in operations and supply chain management research. Besides these single-focus literature reviews, there are more literature reviews that focus on a theory and a topic. For example, Alexander et al. (2014) provides a literature review that examines uses of decision theory in sustainable supply chain management. Also, Muggy and Stamm (2014) provide a review of game theory applications in humanitarian operations.

To summarize, there have been many valuable reviews of literature in SCM. However, they each have certain limitations, such as a limited timeframe and/or limited number of journals examined. This paper builds on the extant research and extends it by adding:

- The inclusion of the most recent years of published literature [this is always a limitation to archival research inasmuch as whenever it is published, it will always be missing the latest published materials].
- A review of eight academic journals that represent the top journals in supply chain management, logistics and operations management. The number of journals examined in this article is broader than previously published studies that have examined similar issues; thus, it minimizes errors associated with missing some potentially important topics.
- An empirical identification of the properties of the SCM discipline through a longitudinal perspective of SCM topics and highlights the changes taking place in the discipline.

An explicit focus is on core research topics in the SCM discipline. While certain topic areas included in earlier research are maintained in this research study, additional key topic areas have been added when necessary to support evolving and new trends, such as the increased emphasis on Humanitarian Logistics. This research then examines the core research topics and trends of logistics and SCM. These important issues provide an interesting and informative conclusion. In summary, this review contributes to the identification of the boundaries and properties of the SCM discipline.

Data and Methodology

The SLR methodology supports an evidence-based management research approach for selecting, classifying and analyzing existing research. Structured review techniques have been developed by researchers working in many fields, including social science, social policy and medicine, to overcome some of the weaknesses, limitations and biases of traditional literature reviews (Tranfield et al., 2003). Articles were examined based on the topical area that was researched and the theory or theories that were applied by the scholars conducting the research. This eliminated subjectivity and assured that the exhibited research was adequately "theory-driven[2]". Our concept of "theory" is in line with the definition by Wacker (1998), which states that a theory must possess conceptual definitions, domain limitations, relationship-building and predictions.

To ensure a robust knowledge foundation, eight academic journals were chosen based on the following criteria:

- Journals that frequently publish logistics and supply chain management articles.
- Journals found to be well represented in previous logistics and SCM literature reviews.
- The ranking of journals in various lists of logistics and SCM journals (e.g. Web of Science©) (Harzing, 2016).

Four of these journals are affiliated with major logistics and/or SCM professional organizations which supports their relevance and importance to supply chain academicians and practitioners. In particular the *Journal of Business Logistics* is associated with the Council of Supply Chain Management Professionals, the *Journal of Supply Chain Management* is associated with the Institute for Supply Management, *Management Science* is associated with the Institute for Operations Research and the Management Science and the *Transportation Journal* is associated with APICS and the American Society of Transportation and Logistics. The other four journals in this literature review include: *Supply Chain Management: an International Journal*, the *Journal of Operations Management*, the *International Journal of Physical Distribution and Logistics Management*, and the *International Journal of Logistics Management*.

Articles from the research periodicals were sourced from Web of Science© (provided by Clarivate Analytics, formerly Thomson-Reuters). Search terms were developed by exploration with the goal of finding the combination of words that yielded the most articles that used named theories within the selected topic topics. The following title, abstract and keyword(s) search terms for the period 1991-2015 were used:

"theory" AND ("supply chain" OR "supply network" OR "supply channel" OR "value chain" OR logistics" OR "transportation" OR "purchasing" OR "inventory")

The search criteria are important for this research to systematically find logistics and SCM research papers that use named theories[3]. The above search resulted in an aggregate 722 articles. An important criterion for bounding the research was the use of a named theory within the selected topics. The use of a named theory served as a filter for demarcating articles that could help identify the core topics. In the absence of a named theory, determining if an article is theory-driven is subjective and not unambiguously determined. A full-text review of the remaining articles was conducted to determine if there was a named theory that was substantially used as the basis of the article. Note that sometimes the word "theory" was located within an abstract or title, but it was not used to identify a named theory. There were also instances whereby a named theory was cited in the research but that theory did not play a further role in the development of the research subject; such articles were removed. Additionally, several papers that identified and analyzed named theories were removed because they were not concerned with a logistics or SCM subject *per se*, but rather they were concerned with improving research methods or theorizing in general. As an example, Halldórsson *et al.* (2015) identified ways by which the theorizing of SCM takes place. If all the above criteria were met the article qualified for the final sample. The inclusion and exclusion criteria for our sample are summarized as follows: (Table I)

A total of 492 papers satisfied the aforementioned criteria and became the core sample of papers for further analysis. To assure the robustness of the research, a cross-examination of each researcher's work resulted in an inter-rater reliability of 94 per cent.

The researchers then coded the primary topics, methodologies and research purpose for each article by following methodology and frameworks used in previous literature reviews (Defee *et al.*, 2010; Brown and Dant, 2008) to maintain methodological consistency and to aid with analysis. Coded classifications were first done based on explicit words mentioned in the document (e.g. "Inventory Management," or "Outsourcing".) If more than one topic was explicitly mentioned, the researchers made a determination of which one was the primary topic. In all instances in the literature that was examined a primary subject for which the theory was used was identified. For example, Prockl *et al.* (2012) use Service Theory and the Resource-Based View to examine different forms of 3PL services and their approaches for fulfilling their value propositions. This article covers several topics including Third-Party Logistics and Outsourcing, Contract and Coordination, Customer Service Strategy and also Performance Management. However, the theory

development was primarily used to increase knowledge of third-party logistics services. Therefore, the major topic was classified as Third-Party Logistics and Outsourcing.

The list of topics developed through an iterative process as the SLR progressed. The initial list of topics was borrowed from Defee *et al.* (2010) and was edited by topics used in similar logistics and SCM literature reviews (Gubi *et al.*, 2003; Nakhata *et al.*, 2013; Stock and Broadus, 2006; Stock, 1988). As research progressed, new topics were added when articles did not clearly fit into one category. Also, some topics, such as Information Technology and Data Analytics, were consolidated if they were deemed to have too few articles to warrant a separate topic.

Supply chain management topics and definitions

The final list of topics and their definitions are provided below. Whenever possible, definitions were provided by established organizations such as CSCMP or APICS.

Contracts and Coordination: focuses on contractual, legal or documentation-related topics. A contract is a legally binding agreement between two or more parties to provide specific products or services. Coordination refers to the processes and activities within and across marketing, sales, product design, finance and information technology (CSCMP, 2013).

Customer Service Strategy: addresses activities between the buyer and seller that enhance or facilitate the sale or use of the seller's products or services (CSCMP, 2013).

Demand Management and Forecasting: recognizes all demand for goods and services to support the marketplace (APICS, 2017).

Human Resource Development: the process for developing and unleashing human expertise through organization development and personnel training and development for the purpose of improving performance (Swanson and Holton, 2009).

Humanitarian Operations, Logistics and Supply Chains: the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as related information, from point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people (Fritz Institute, 2017).

Information Technology and Data Analytics: the use of technology involving the development, maintenance and use of computer systems, software and networks for the processing and distribution of data and inspecting, cleansing, transforming and modeling data with the goal of discovering useful information, suggesting conclusions and supporting decision-making.

Inventory: Components, raw materials, work in process, finished goods and supplies required for the creation of goods and services. It can also refer to the number of units and/or value of the stock of goods held by a company (CSCMP, 2013).

Manufacturing: The process of converting raw materials, components or parts into finished goods that meet a customer's expectations or specifications. Manufacturing commonly uses a man-machine setup with division of labor in a large-scale production.

Network Analysis (Optimization): A process or methodology to make a network as fully perfect, functional, effective or efficient as possible. The use of mathematics may be involved to find the best solution (CSCMP, 2013).

Table I Sample criteria

Inclusion criteria	Exclusion criteria
Published between January 1991 and December 2015	All studies or publications in any language other than English
Published in one of eight selected peer reviewed academic journals	"Grounded theory" is not considered a named theory
Article must contain a "named theory"	General research/theory

Performance Measurement and Metrics: Indicators of the work performed and the results achieved in an activity, process or organizational unit. Performance measures should be both non-financial and financial. Performance measures enable periodic comparisons and benchmarking (CSCMP, 2013).

Product and Process Innovation: A product innovation is the introduction of a good or service that is new or has significantly improved characteristics or intended uses; a process innovation refers to the implementation of a new or significantly improved production or delivery method.

Purchasing and Supply Management (Planning): The process of identifying, prioritizing and aggregating, as a whole with constituent parts, all sources of supply that are required and add value in the supply chain of a product or service at the appropriate level, horizon and interval (CSCMP, 2013).

Quality: The degree to which a set of defined characteristics of a product or service fulfills known requirements. The common element of the business definitions is that the quality of a product or service refers to the perception of the degree to which the product or service meets the customer's expectations. Quality has no specific meaning unless related to a specific function and/or object. Quality is a perceptual, conditional and somewhat subjective attribute (CSCMP, 2013).

Relationships and Collaboration:
- joint work and communication among people and systems – including business partners, suppliers and customers – to achieve a common business goal; and
- a strategy for reducing per unit shipping costs by pooling shipments from multiple sources under an agreement between the shippers and the carriers.

Examples of this method may include shippers who are otherwise competitors in their markets (CSCMP, 2013).

Reverse Logistics: the process of moving goods from their typical final destination for the purpose of capturing value or proper disposal which include remanufacturing and refurbishing activities (Reverse Logistics Magazine, 2017).

Risk Management: The identification, evaluation and ranking the priority of risks followed by synchronized and cost-effective application of resources to lessen, monitor and control the probability and/or impact of unfortunate events (CSCMP, 2013).

Strategy: A specific action to achieve an objective (CSCMP, 2013).

Supply Chain Agility: The ability to rapidly and cost effectively adapt to market changes with no significant negative impact on quality or dependability (CSCMP, 2013).

Supply Chain Integration: the degree to which a manufacturer [focal node] strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organization processes (Flynn *et al.*, 2010).

Supply Chain Resilience: A term describing the level of hardening of the supply chain against disasters (CSCMP, 2013).

Sustainability: the strategic, transparent integration and achievement of an organization's social, environmental and economic goals in the systemic coordination of key inter-organizational business practices for improving the long-term economic performance of the individual company and its supply chains (Carter and Rogers, 2008).

Third-Party Logistics and Outsourcing: Outsourcing all or much of a company's logistics operations to a specialized company. The term "3PL" was first used in the early 1970s to identify intermodal marketing companies (IMCs) in transportation contracts. Up to that point, contracts for transportation had featured only two parties, the shipper and the carrier. When IMCs entered the picture—as intermediaries that accepted shipments from the shippers and tendered them to the rail carriers—they became the third party to the contract, the 3PL. Definition has broadened to the point where these days, every company that offers some kind of logistics service for hire calls itself a 3PL. Preferably, these services are integrated or "bundled," together by the provider. Services they provide are transportation, warehousing, cross-docking, inventory management, packaging and freight forwarding. In 2008, legislation passed declaring that the legal definition of a 3PL is "A person who solely receives, holds or otherwise transports a consumer product in the ordinary course of business but who does not take title to the product (CSCMP, 2013)".

Transportation and Logistics: The process of planning, implementing and controlling procedures for the efficient and effective transportation and storage of goods including services and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements. This definition includes inbound, outbound, internal and external movements (CSCMP, 2013).

Articles were analyzed according to the research method, the research purpose, the year of publication and the type of journal. When coding the Methodology variable, only one methodology was recorded. "Mixed Methods" was a classification used whenever appropriate. Each researcher's classifications were cross-examined and the inter-rater reliability was 96 per cent. Table II includes lists of topics, research methods and research purposes that were analyzed.

Analysis and discussion

This analysis and discussion section provides information for several streams of thought. First, the prominent topics of SCM research are identified, which are used to help define the identity of the discipline. Second, this study provides an analysis of how SCM topics have evolved over time. Third, this research analyzes how these topics are treated in the literature in terms of the most common research methods used and the nature of contributions made. Fourth, the topics are analyzed by the journal where they were published. These discussion topics lead to the "Implications and Conclusions" section of the document which provides a projection of the trends of SCM topics that have either lost favor or are particularly promising for future research.

Prominent supply chain management topics
During the past decade there has been a strong push for more theoretical research in SCM and researchers have answered the call. However, the topics are not equally represented among the research. Some topics have been researched more frequently than others and therefore could be considered more "theoretical" and developing more rapidly (see Table III). The top three topics for applying theoretical research in SCM

Table II Data variables

Topics	Research method	Research purpose
Contracts and coordination	Analytical modeling	Explain data
Customer service strategy	Archival	Framework development
Demand management and forecasting	Case study	General theory development
Human resource development	Conceptual	Hypotheses development
Humanitarian operations, logistics and supply chains	Content analysis	Meta-analysis or literature review
Information technology and data analytics	Experimental design	Model development
Inventory	Literature review	Research questions and propositions
Manufacturing	Meta-analysis	RQ development
Network analysis	Mixed methods	Scale development
Performance measurement and metrics	Qualitative	
Product and process innovation	Simulation	
Purchasing and supply management	Survey	
Quality		
Relationships and collaboration		
Reverse logistics		
Risk management		
Strategy		
Supply chain agility and resilience		
Supply chain integration		
Sustainability		
Third-Party Logistics and Outsourcing		
Transportation and Logistics		

include Relationships and Collaboration, Purchasing and Supply Management and Strategy. It could be argued that these are the most progressive areas of SCM because they have matured to such a degree as to be developing and applying new theories more frequently than research on other topics.

For each of the top three topics, three seminal papers are identified based on the number of citations received. See Table IV. The table includes the number of citations identified by the Web of Science© and by Google Scholar. The highest cited paper in the dataset, with 2,225 citations, was "Supply chain coordination with revenue-sharing contracts: Strengths and limitations" (Cachon and Lariviere, 2005) and was categorized in the topic, Contracts and Coordination.

The topic areas with the fewest articles included Quality, Reverse Logistics and Humanitarian Logistics. There are likely many reasons that these topics have received less research. Probably the most noteworthy is that these topics are not researched by as many scholars or alternatively, are published in sources not examined in this research. Relationships and

collaboration are more mainstream topics in SCM than quality and reverse logistics. Also, Humanitarian Logistics studies have only recently grown in support, a fact that coincides with and may be explained by, the catastrophic natural disasters that impacted the Pacific Rim and the USA in the past decade. Also, articles in Humanitarian Logistics have primarily appeared in the *Journal of Humanitarian Logistics and Supply Chain Management*, which began in 2011. Furthermore, topics like Relationships, Collaboration and Strategy are pervasive throughout many of the topics of SCM. For example, studies in reverse logistics, humanitarian logistics and quality also include relationships and strategy, but the reverse is typically not true. Regardless of why these topics have received the least amount of research in SCM, they are the least developed topics because of it and it can be argued to be the least theoretically mature topics in SCM.

Additional information is provided for the top seven topics of SCM (see Table V). These seven topics characterize the majority of disciplinary research in SCM. Notice that Relationships and Collaboration represent 13 per cent of SCM research and Purchasing and Supply Management represent a similar percentage at 12 per cent. The other dominant topics of SCM include strategy, supply chain integration, customer service strategy, inventory and sustainability, which each represent 6-9 per cent of the total research.

Next, this research provides some of the key theoretical lenses which have been used to develop the seven dominant topics of SCM. The three dominant theories that are used for all seven topics include Transaction Cost Economics, Resource-based View of the Firm and Agency Theory. Beyond those three, there are some other commonly used theories for each topic. For Relationships and Collaboration, researchers have used Prospect Theory and Economic Theory. For Purchasing and Supply Management, the major lenses include Bargaining Theory, Location Theory and General Systems Theory. Strategic lenses include Economic Theory and Real Options Theory. Supply Chain Integration has used Network Theory, Game Theory and Cluster Theory. Customer Service Strategy has used Bargaining Theory. Inventory research uses many theories and none of them represent a majority other than the big three mentioned above. The same is true for Sustainability.

Research methods and purposes

This section provides an analysis of how SCM topics are researched in the literature, in terms of the most common research methods used and the nature of contributions made. It is interesting to examine the most frequent research method used for each topic and to review the primary topics pursued with each research method (see Table VI).

Authors investigating Relationships and Collaboration have primarily used surveys, conceptual approaches and qualitative methods. Given the nature of supply chain relationships and collaboration, issues such as personal relationships among supply chain members and inter- and intra-organizational coordination, the use of surveys to gather information on management sentiments regarding these topics is understandable. Such techniques allow researchers to gain awareness of the most relevant attributes impacting collaboration and coordination within supply chains. On the other hand, topics like collaboration and relationships are not

Table III Articles by topic and year

Topic	1991	1994	1995	1997	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Grand total
Contracts and coordination							2			2	1	1	1	2	1	2	2			3	1	18
Customer service strategy											2	2	2	3	3	2	3	5	2	3	3	30
Demand management and forecasting			1			2	1	3					2			1	1					11
Human resource development													1			1	1	2	3		1	9
Humanitarian operations, logistics and supply chains															2		1	1			1	5
Information technology and data analytics												1	1	1	3	5	1	2	6	2	3	25
Inventory					3	2	2							3	2	3	6	1	4		1	30
Manufacturing	1	1							2		1		1		1	2	1		1	1		12
Network analysis											1	1		1							3	6
Performance measurement and metrics									1	2			1	1	2	2	3	3	5		1	21
Product and process innovation												1		1		1	2	1	2		3	11
Purchasing and supply management					1			1		3		5	7	7	6	4	5	6	4	2	2	57
Quality												1	1	1			2			1		6
Relationships and collaboration									2	1	2	1	3	3	3	8	7	4	12	12	8	66
Reverse logistics																	1	1	2	2		6
Risk management				1								1	1	2	5	1	4	2	5	3	3	26
Strategy									1	1	1	5	1	5	1	1	5	4	4	10	4	44
Supply chain agility and resilience																	1	2	1	2	1	7
Supply chain integration								1				5		1	3	4	4	4	5	5	4	33
Supply chain integration																						
Sustainability												1	1	1	1	1	6	5	2	9	5	30
Third-party logistics and outsourcing												1	3	2	4	4	3	4	1	1	1	19
Transportation and logistics			1								2	2	1	2	2	1	2	3	2	2	2	20
Grand total	1	1	2	2	6	5	7	6	8	11	8	17	29	34	31	42	52	52	55	75	48	492

Table IV Three most-cited articles from the top three topics

Topic	Title	Author and year	Web of Science© citations	Google Scholar citations
Relationships and collaboration	The impact of power and relationship commitment on the integration between manufacturers and customers in a supply chain	Zhao et al. (2008)	156	521
	Transaction cost framework in operations and supply chain management research: theory and measurement	Grover and Malhotra (2003)	143	443
	Governing buyer-supplier relationships through transactional and relational mechanisms: evidence from China	Iu et al. (2009)	110	353
Purchasing and supply management	Supply networks and complex adaptive systems: control versus emergence	Choi et al. (2001)	325	1000
	The relationships between supplier development, commitment, social capital accumulation and performance improvement	Krause et al. (2007)	234	769
	Strategic purchasing, supply management and firm performance	Chen et al. (2004)	211	724
Strategy	Direct-marketing, indirect profits: a strategic analysis of dual-channel supply-chain design	Chiang et al. (2003)	258	829
	Bridging organization theory and supply chain management: the case of best value supply chains	Ketchen and Hult (2007)	125	516
	Knowledge as a strategic resource in supply chains	Hult et al. (2006)	105	343

Table V Top seven SCM research topics

Topic	Articles	(%) of total
Relationships and collaboration	66	13
Purchasing and supply management	57	12
Strategy	44	9
Supply chain integration	33	7
Customer service strategy	30	6
Inventory	30	6
Sustainability	30	6
Total of top seven topics	290	59
Articles for other 15 topics	202	41

easily interpreted by quantitative data or even observation. More in-depth analysis of these topics can use various qualitative methods and organizational behavioral constructs to develop more conceptual as well as pragmatic insights into supply chain relationships.

Another example seen in the tables is that Purchasing and Supply Management is primarily researched by surveys, conceptual approaches and qualitative methods. Historically, purchasing and procurement topics have used these methods for data collection and analyses and will likely continue to be preferred by researchers in the future. Surveying key individuals who are experts in the subject matter in Purchasing and Supply Management allows insight into this topic that cannot be determined otherwise.

Case studies and surveys are used frequently across most of the topics of SCM research. These methods are commonly used for qualitative research topics, of which there are many in SCM research. However, this could also be a product of the training that SCM researchers receive in their doctoral programs. Despite this dominance of survey research in SCM studies, there are four topics which are dominated by different research methodologies. Demand Management and Forecasting and Risk Management research are dominated by Case Study research. The Inventory research topic and Strategy Research are dominated by Analytical Modeling. While these methodological dominances by topic are not necessarily the best methods to use for researching the topic, there is no reason to believe that they will lose ground to other more frequently used research methods. The use of mixed methods is becoming a more common approach to investigating behavioral data across many of the topics.

Other topics which are predominantly researched with one or two primary research methodologies can be seen in Table VI. Sustainability research primarily uses analytical modeling and experimental design. Reasons why Sustainability research is dominated by these methods is not readily apparent. Inventory research frequently uses analytical modeling which is likely a function of the quantitative nature of inventory management that often examines quantity and cost issues. Also consider that analytical modeling is used for Strategy, Purchasing and Supply Management and Supply Chain Integration. Archival research

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Table VI Articles by topic and research method

Topic	Analytical modeling	Archival	Case study	Conceptual	Content analysis	Experimental design	Literature review	Meta-analysis	Mixed methods	Qualitative	Simulation	Survey	Grand total
Contracts and coordination	1	2	4	3					1	1	1	5	18
Customer service strategy	3	6	3	2		1			2	2	2	9	30
Demand management and forecasting	1	1	4				2		1			2	11
Human resource development	2		1						1	1		4	9
Humanitarian operations, logistics and supply chains		2	1							1		2	5
Information technology and data analytics	3	2	3	2		1	2	1	1	1		9	25
Inventory	7	3	6	4		3	1			1	2	3	30
Manufacturing	3	4		2		1	1		1				12
Network analysis						2						4	6
Performance measurement and metrics	4	1	3	2		1	1		1	3	1	4	21
Product and process innovation	2		1	2					1	2		3	11
Purchasing and supply management	9		5	9	1		2		1	7	1	22	57
Quality	1		2						1			2	6
Relationships and collaboration	4		5	11		2	5	2	6	10	1	20	66
Reverse logistics	1					1	1		1			2	6
Risk management	3	1	7	3			1		1	5		5	26
Strategy	13	3	1	8		2	2	3	1			11	44
Supply chain agility and resilience	2										1	4	7
Supply chain integration	8	1	4	1		3	1		1		1	13	33
Sustainability	5	2	4			5	2			1	3	8	30
Third-party logistics and outsourcing	2	2	1	4			1		1			8	19
Transportation and logistics		2	4	3			1	1				9	20
Grand total	74	32	59	56	1	22	23	7	22	34	13	149	492

is used for Customer Service Research and for applications in Manufacturing.

Similarly, researchers can see the primary purposes and outcomes associated with each topic (see Table VII). For example, within a topic like Customer Service Strategy, a particular research method such as Analytical Modeling can be used for different research purposes or objectives. Some purposes include testing hypotheses, developing researchable propositions, building models and developing scales. For research in the topic of Inventory, most research pursues the purpose of developing models, whereas in Relationships and Collaboration and Purchasing and Supply Management, most research results in hypotheses development and testing. In Strategy, research pursues theoretical development, proposition development and hypothesis development.

In sum, scholars investigating the many and varied supply chain-related topics use a broad spectrum of research methods and have multiple reasons for conducting their particular research. The breadth of investigation and topics being examined provide a rich foundation of supply chain research that can serve as building blocks for developing general and specific supply chain topical research and the theory that could be applied to these topics.

Topical articles in supply chain management by journal

This section summarizes topical research by journal. Researchers can use this information to find the most appropriate journal for SCM research. For example, Demand Management and Forecasting research is largely published in *JOM* and *MS* and research in the topic of Logistics and Transportation is largely published in Logistics journals including *JBL, IJLM, IJPDLM and TJ*. Some topics are equally represented in the management, logistics and SCM journals that were examined, such as the topics of Strategy and Information Technology and Data Analytics.

While it may seem that all the Logistics journals are leaning toward publishing all types of supply chain-related research, this analysis shows there are still some primary subjects which garner the attention of each journal. The most notable finding is that journals differ with respect to preferred methods and approaches being used to examine these topics. For example, *JOM* and *MS* tend to publish more quantitative and modelling articles than *IJPDLM* and *JBL*. Therefore, even though any SCM journal may seem appropriate for one's research, there are journals that are "more likely" outlets for a particular research subject. Authors should always consult the journal's website to determine the focus and direction of the journal and when it doubt, contact the editor of the journal. Following is more analysis from Table VIII and Figure 1.

Another noteworthy implication of this finding is that journals do have primary foci which could even be construed as biases toward certain topics, despite broad statements of scope. While journals frequently advertise that any topic is appropriate as long as it is related to logistics and supply chain management, historically accepted research demonstrates otherwise. Whether this is a preference of the editors, reviewers and/or culmination of the types of research that are submitted to each journal is not known for sure. The situation is likely attributable to all of these reasons and more. Researchers should, nevertheless, look more closely into which Logistics,

Supply Chain and Management journals are most appropriate for their particular research.

The SCM research is counted by journal in Table VIII. Since the content of all journal submissions are not known and there is no publicly available knowledge of the "quality" of those submissions, this analysis can only measure what was ultimately published and make inferences about "why" and "how." With that caveat, the data shows that most journals are well represented by topics that span the range of available options in SCM research. For example, *IJPDLM* has research belonging to 18 of 22 topics and *JOM* has research on all but one topic, Humanitarian Logistics. Topics such as Purchasing and Supply Management and Relationships and Collaboration are widely researched and thus are frequent topics for most of the journals. However, *JOM, JSCM* and *SCMIJ* tend to specialize in these topics more than others. The logistics journals including *IJPDLM, JBL, IJLM* and *TJ* are more evenly split among the various topics than the other journals. As expected, *TJ* specializes in Transportation and Logistics. Other than Purchasing and Supply Management, *MS* specializes in Customer Service Strategy and Inventory.

The evolution of supply chain management research

SCM research has steadily grown since the early 1990s. Figure 1 shows a histogram of articles by year that have used a named-theory since 1990. The specific counts for each year and SCM topic are provided in Table III. This research groups that work into three phases of development. The early years until the late-1990s are categorized as the *pre-growth phase* of SCM theoretical research. From the late-1990s through about 2005 is categorized as the *growth period* of SCM theoretical research. Then the most recent 10 years (2006 onward) have shown a large percentage increase in the number of theory-based research articles and are categorized as the *modern period* of research in SCM. These phases were crafted by examining the count of articles by year and the number and variety of research topics that were pursued.

The *pre-growth phase* of theoretical research denotes a time when most SCM studies were driven by practical applications and progressive companies. The first research topics to apply academic theories were manufacturing, demand management and forecasting and transportation and logistics. During this period, researchers and editors were actively calling for more theoretically-based research. These calls answered during the next phase of development.

The *growth period* of SCM research spans a period from the late-1990s until about 2005 and includes more occurrences of theories in published articles. This period is marked by the fact that theory-driven research tripled in volume beginning in 1999. Both the quantity and variety of research expanded. Ten new topics surfaced in this period whereby researchers applied named theories for the first time. This period planted the seeds of growth which developed more fully in the modern period of theory-based SCM research.

The *modern period* of research in SCM is the most recent 10 years of research in the SLR dataset. Therefore, the division between the modern and growth period is 2006. During the modern period a few new topics were introduced for theory application, such as Relationships and Collaboration, Supply

Table VII Articles by topic and research purpose

Topic	Explain data	Framework development	General theory development	Hypotheses development	Meta-analysis or literature review	Model development	Research questions and propositions	RQ development	Scale development	Grand total
Contracts and coordination	3	3	1	5		4	1	1		18
Customer service strategy	2	3		13	3	7		2		30
Demand management and forecasting		5		1		1		2	2	11
Human resource development	1			4		2		2		9
Humanitarian operations, logistics and supply chains				5						5
Information technology and data analytics	1	2	2	14	1	1		3	1	25
Inventory	1	2	6	6	1	11		3		30
Manufacturing	1	1	2	2	1	4		1		12
Network analysis				3		3				6
Performance measurement and metrics	1	3	1	4	2	7		3		21
Product and process innovation		1		7		1		2		11
Purchasing and supply management	2	6	8	30		5		6		57
Quality				2				4		6
Relationships and collaboration	1	5	10	34	1	2		13		66
Reverse logistics		1		4		1				6
Risk management	3	3	3	4		5	2	6		26
Strategy		5	7	11	3	3	12	3		44
Supply chain agility and resilience		1	1	3		1	1			7
Supply chain integration		3		15		3	10	2		33
Sustainability	2	2	2	12		2	3	7		30
Third-party logistics and outsourcing		3		7		1	5	2	1	19
Transportation and logistics		1	2	10	1	3	2	1		20
Grand total	18	50	45	196	13	67	36	63	4	492

Table VIII Articles by topic and journal

Topic	IJLM	IJPDLM	JBL	JOM	JSCM	MS	SCMIJ	TJ	Grand total
Contracts and coordination		1	1	3	1	7	5		18
Customer service strategy	1	2	2	2	2	18	2	1	30
Demand management and forecasting				2	1	8			11
Human resource development	2	2	1	2			2		9
Humanitarian operations, logistics and supply chains		2	2					1	5
Information technology and data analytics	5	2	1	8	4	2	3		25
Inventory		3	1	4		19	2	1	30
Manufacturing	3			2	1	5	1		12
Network analysis	1		2	1	1	1			6
Performance measurement and metrics	2	3	3	7	1	1	4		21
Product and process innovation	1	1	2	2	2	2	1		11
Purchasing and supply management	1	2	2	18	14	11	8	1	57
Quality	1			4			1		6
Relationships and collaboration	6	4	7	21	9	4	13	2	66
Reverse logistics	1	3		1			1		6
Risk management	3	2	4	5	3	4	4	1	26
Strategy	5	6	4	8	6	7	7	1	44
Supply chain agility and resilience	1	1	2	2			1		7
Supply chain integration	3	4	5	14	3		3	1	33
Sustainability	3	6	3	3	5		9	1	30
Third-party logistics and outsourcing		5	3	3	5		2	1	19
Transportation and logistics		6	4	1	2	2	1	4	20
Grand total	39	55	49	113	60	91	70	15	492

Figure 1 Research articles by year
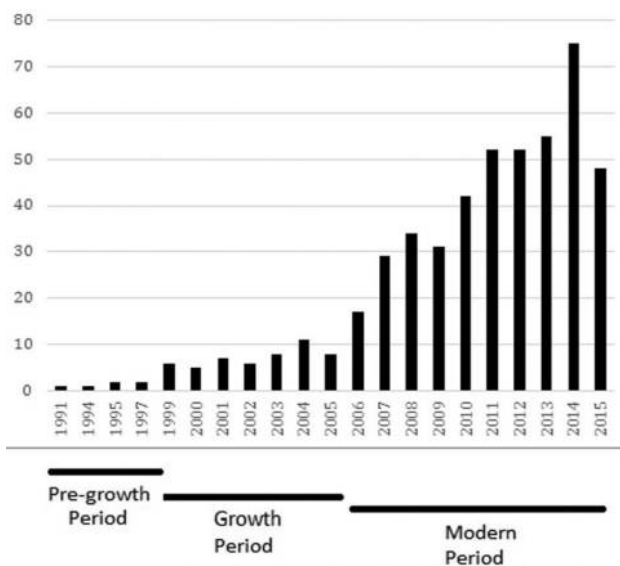
Chain Integration, Strategy, Information Technology and Contracts and Coordination. However, this period is largely characterized by tremendous growth in the number of theory-based studies in SCM and those studies span all of the topics of SCM research. The growth trajectory of the modern period is also clearly evident in Figure 1. The quantity of research in 2015 does not show the magnitude of 2014, but this is anticipated because new research takes a few years to become fully represented in the research databases. It is expected that the volume of work in 2015 will actually be greater than that in 2014 and the upward trajectory of the *modern period* will continue to provide new applications of theory in most of the topics of SCM well into the future. In the next section, the modern period of research is further analyzed to determine trends and anticipate the future of SCM research.

Implications and conclusions

Trends within supply chain management research

Shifts in the collective identity of a discipline can inform us about how it is growing (Sidorova *et al.*, 2008). Arguably, each discipline, whether explicitly or not, undertakes the task of defining its identity through its coverage of key topics and concepts. To ultimately provide suggestions for SCM researchers relating to topics that are being researched more frequently and to identify promising avenues for future research, SCM research during the modern period is divided into the first and past five-year groups. The early period includes 2006-2010 and the later period includes 2011-2015. Next, the percentage increase or decrease from the early period to the late period was calculated. From this exercise SCM research topics were categorized into four groups based on how they trended during the modern period from 2006 onward (see Table IX). The rationale used to determine these groups examined the growth rates of each of the topics and categorized them into groups of reasonably similar growth rates to help discuss their future impacts. Growth rates were calculated as the difference in the number of articles between the first and past periods expressed as a percentage of the first period. The categories were:

Table IX Count of articles (sorted by per cent of change)

Topic	Early modern (2006-2010)	Recent modern (2011-2015)	(%) change
Sustainability	3	27	800
Supply chain agility and resilience	0	7	700
Reverse logistics	1	5	400
Performance measurement and metrics	3	14	367
Product and process innovation	2	9	350
Human resource development	2	7	250
Relationships and collaboration	18	43	139
Supply chain integration	10	22	120
Strategy	13	27	108
Quality	2	4	100
Risk management	9	16	78
Inventory	8	13	63
Customer service strategy	10	16	60
Network analysis	2	3	50
Humanitarian operations, logistics and supply chains	2	3	50
Information technology and data analytics	10	14	40
Transportation and logistics	8	11	38
Manufacturing	3	4	33
Contracts and coordination	6	6	0
Third-party logistics and outsourcing	10	9	−10
Purchasing and supply management	29	21	−28
Demand management and forecasting	2	1	−50

- rapidly growing topics, which have increased from 250 to 800 per cent;
- growing topics, which have increased from 60 to 139 per cent;
- topics that were relatively steady, which have increased from 0 to 50 per cent; and
- declining topics.

These groups were determined by examining the growth rates of each of the topics and categorizing them into groups to help discuss their future impacts.

The rapidly growing topics for theory-based research in the future include Sustainability, Supply Chain Agility and Resilience, Reverse Logistics, Performance Measurement and Metrics, Product and Process Innovation and Human Resource Development. These topics reflect more recent issues and problems that researchers and practitioners are facing. In the near term, researchers can expect an increase in calls for papers and research tracks dedicated to these topics in SCM journals and at SCM conferences. While these topics are all rapidly growing, they are not equal in terms of absolute numbers of research articles for each topic. For example, contributions in the topic of Performance Measurement and Metrics have increased substantially. However, that topic provides a small number of research articles compared to the number of papers related to Sustainability.

The growing topics for theory-based research are Relationships and Collaboration, Supply Chain Integration, Strategy, Quality, Risk Management, Inventory and Customer Service Strategy. These issues have held importance in SCM practice and continue to do so, thus residing in the core of the discipline. These topics are more "mainstream" topics than those that have been classified as rapidly growing topics. For example, this category includes Relationships, Collaboration, Integration, Quality and Customer Service, whereas, the rapidly growing division includes more "niche" topics like Reverse Logistics and Sustainability. Exploration of new ways of analyzing these topics in academia is expected, perhaps through lenses from different disciplines. Also, research methods such as simulation may not have been used to their maximum potential and may provide new justification for theory-based research. While these topics are not growing as prominently as the "hot" topics identified, they are still timely, important and developing areas of the logistics and supply chain management disciplines. There will likely be much continued discussion on these topics in academic outlets.

The relatively flat topics are Network Analysis, Humanitarian Operations, Information Technology, Transportation and Logistics, Manufacturing and Contracts and Coordination. These topics also reside in the core of the discipline, neither gaining nor losing prominence. However, they remain relevant to discussions on SCM. While some of these topics will endure in the core of the discipline, some may decrease in prominence over time. For example, it is likely that technology issues in these core topics will continue to be relevant research issues and thus, published in reasonable numbers. It is possible that the apparent lack of research in these topics is due to specialized journals in the areas where the articles appeared rather than in the eight journals that were selected for this research study.

The declining topics are Third-party Logistics and Outsourcing, Purchasing and Supply Management and Demand Management and Forecasting. These topics may have been important to the industry at a particular time, but have thus far failed to endure, at least from the perspective of academic researchers. Topics such as Demand Management and Forecasting are important areas of interest to practitioners,

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especially in an omnichannel environment. Traditional forecasting approaches may indeed be declining, but demand sensing and the use of social media in big data analytics will likely become more significant and likely topics for academic researchers to investigate in the future. This is not to say that these topics are not important or that they did not play an important part in the development of the discipline.

Identity crises in marketing and information systems

Supply chain managers can learn from the identity crises faced by other growing business disciplines such as the marketing discipline. In the 1970s, marketing had grown so much and in so many different directions that Bartels (1974) provided an historical evolution of the discipline in the *Journal of Marketing*. The article is titled The Identity Crisis in Marketing" and provides supporting evidence. For example, at that time, 95 per cent of marketing professors felt that the scope of marketing should include non-business organizations and 93 per cent believed that marketing was not solely concerned with economic topics. However, the definitions of marketing at the time by the American Marketing Association and that which were published in most textbooks were different.

The field of Information Systems (IS) has also suffered an identity crisis due to a lack of consensus on the core set of properties that defined the discipline (Agarwal and Lucas, 2005; Benbasat and Zmud, 2003). By proposing a core set of concepts and phenomena that would fall within the realm of IS, research that failed to address the core properties committed "errors of exclusion", while research that addressed concepts/phenomenon beyond the core properties committed "errors of inclusion" (Benbasat and Zmud, 2003). It is easy to see parallels between the existential crises faced in IS and the identity crisis now evolving in SCM, where scholarly activities may sometimes overlap with those of other disciplines, like marketing, psychology, sociology, management and finance.

The fact is, as disciplines grow, topics and foci within disciplines change. Academics and professionals concentrate on different topics which they feel are most important and they don't always agree. This has led to divergent perspectives and methods in SCM which is a consequence identified as "conceptual slack" by Halldórsson *et al.* (2015). The supply chain discipline may be facing the beginning of a similar identity crisis, a topic introduced by Fawcett and Waller (2013) and supported in a detailed editorial by Zinn and Goldsby (2014). In editorial, Zinn and Goldsby describe how the logistics discipline has a focal artifact of inventory and an established, universal definition. However, supply chain management does not have an agreed upon focal artifact; some SCM professionals would identify it as inventory, but other professionals are likely to identify relationships with customers, suppliers and logistics service providers as the most important focus of SCM.

Because of the similarities between marketing, information systems and supply chain management, this research provides some "lessons to be learned" from other growing disciplines. First, SCM is evolving to include, much like marketing, not only an economic focus but a focus on social and behavioral aspects (Zinn and Goldsby, 2014). This fact is supported also by this research because topics like Supply Chain Integration, Relationships and Collaboration and Sustainability have

emerged in recent years. Second, as the discipline moves to include more behavioral aspects, the way topics are researched changes as well. In marketing, for example, research about selling has become not just about meeting quotas but also examines the quality of communication (Bartels, 1974). Similarly, topics like Information Systems and Data Analytics are not just about faster data processing and more information. Rather, new research is concerned with the social context in which information technologies are used (Sidorova *et al.*, 2008). This trend is readily apparent in SCM as well. Third, as disciplines grow in different directions, topics remain stranded and still underdeveloped. For example, Bartels (1974) mentions that many problems of physical distribution remained when the marketing discipline largely turned their attention away to other nonbusiness topics. SCM researchers should recognize there is still value in researching topics which have lost favor recently. Topics like Inventory Management, Transportation and Logistics and Manufacturing are still topics which need attention. Fourth, the IS discipline is multidisciplinary, with scholars that have originated from varied backgrounds and have contributed to the challenges of forming a fundamental identity. This problem has been reduced by the identification of core properties and identifying whether theoretical research is appropriate (Benbasat and Zmud, 2003). Since SCM already has an ambiguous scientific artifact (Zinn and Goldsby, 2014), researchers should carefully articulate their research with a central artifact in mind.

Frequency and importance of supply chain management topics

Academic freedom means that the most important aspects of a topic may not be researched. That is to say, if the academy chooses not to research a topic, does that mean it is not important? Furthermore, if academics have chosen not to research important topics they cannot be featured in this or other SLRs. However, logic says important topics should be. Research in organizational management identifies that disciplines are defined by the primary topics that acquire the attention of professionals in the discipline (Albert and Whetten, 1985). Following that logic, SCM is primarily concerned with the seven topics depicted in Table V, and few SCM scholars would disagree on the importance of these topics. However, that may or may not indicate that these topics are the most important from the perspective of the SCM discipline.

Other structured literature reviews similarly provided a subject analysis of theoretical research in SCM by using the frequency of occurrence as their unit of analysis (Brown and Dant, 2008; Defee *et al.*, 2010). Throughout both of these highly-cited articles the frequency of use is implied to be synonymous with importance, but it is not explicitly stated. A higher frequency of use means a higher probability of identifying an important contribution. Also, academicians typically do not pursue research topics or theories that they consider to be non-important. Therefore, the frequency of use could indicate importance. However, researchers should recognize that the frequency of use may also increase for topics that are: easier to research or are otherwise more accessible (e.g. low hanging fruit), have a wider familiarity among researchers or represent a more general and wider ranging scope. Likely, frequency of occurrence could be used as a proxy for

importance as long as these limitations are considered and noted.

As the SCM discipline continues to grow in multiple directions, professionals must take care to articulate the central artifact of SCM, identify and assure the central core topics of SCM are followed and continue to focus on the SCM topics they feel are most important for the development of the discipline.

A future research agenda

First, SCM researchers should be careful not to commit errors of exclusion and inclusion which was done by researchers in IS. In other words, because SCM is an interdisciplinary field, researchers must be careful to address only topics that are central to SCM and not to stray into topics better suited to SCM's reference disciplines like sociology or psychology. Second, as disciplines grow and researchers become excited about exploring new topics, the topics that are "central" properties of the discipline often receive less theoretical development. Central topics in SCM like inventory, logistics and transportation have recently been the subjects of less research, a fact that should raise the attentiveness of the academy, if not some warning flags. As the marketing discipline grew, central topics of that discipline, like physical distribution and pricing, received less focus and were addressed by other disciplines, namely logistics and finance, respectively. Third, this SLR has examined named theories, however there are other sources of theory-based research in SCM which need to be examined in more detail. This includes qualitative theories, such as grounded theory, which seek to develop new theory. Future research could undergo a wider examination of established, prominent or dominant theories in SCM by including research based on grounded theory and other qualitative methods. Also, dissertation research from recent scholars from several disciplines that study SCM (e.g. Logistics, Operations Management and Industrial Engineering) should undergo a similar SLR and be examined for trends, gaps and a general, collective understanding. Fourth, because of the many new and expanding topics of SCM there are ample opportunities for seminal contributions on each of these topics. Examples of these expanding topics include sustainability, agility, reverse logistics and metrics.

Notes

1 Defined by the Association for Information Systems, the Senior Scholars' Basket of Journals can be found online at: http://aisnet.org/?SeniorScholarBasket

2 While models, propositions, and frameworks may also constitute theoretical explanations in research, we restrict the scope of this study to our definition of theory.

3 We use the term "named theories" to denote established or prominent theories associated with disciplines that possess conceptual definitions, domain limitations, structural relationships between concepts, and predictions. Grounded theory, for example, would be considered a methodology, rather than a named theory, in our study.

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Corresponding author

David Swanson can be contacted at: david.swanson@unf.edu