



Supply Chain Management: An International Journal

Competence in supply chain management: A systematic review

Pernilla Derwik, Daniel Hellström,

Article information:

To cite this document:

Pernilla Derwik, Daniel Hellström, (2017) "Competence in supply chain management: A systematic review", Supply Chain Management: An International Journal, Vol. 22 Issue: 2, doi: 10.1108/SCM-09-2016-0324

Permanent link to this document:

<http://dx.doi.org/10.1108/SCM-09-2016-0324>

Downloaded on: 28 May 2017, At: 13:32 (PT)

References: this document contains references to 0 other documents.

To copy this document: permissions@emeraldinsight.com

The fulltext of this document has been downloaded 24 times since 2017*

Users who downloaded this article also downloaded:

(2016), "Supply chain readiness, response and recovery for resilience", Supply Chain Management: An International Journal, Vol. 21 Iss 6 pp. 709-731 <http://dx.doi.org/10.1108/SCM-12-2015-0463>

(2017), "Business process management and supply chain collaboration: effects on performance and competitiveness", Supply Chain Management: An International Journal, Vol. 22 Iss 2 pp. - <http://dx.doi.org/10.1108/SCM-01-2017-0008>

Access to this document was granted through an Emerald subscription provided by emerald-srm:235211 []

For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.

COMPETENCE IN SUPPLY CHAIN MANAGEMENT: A SYSTEMATIC REVIEW

ABSTRACT

Purpose

This paper presents an integrated view of the literature published on all aspects and facets of competence in supply chain management (SCM) and furthermore provides a framework for classifying and analyzing literature to facilitate further study, practice, and research.

Design/methodology/approach

A systematic literature review identified 98 peer-reviewed scientific journal publications on the subject of competence in SCM.

Findings

This review identifies and classifies the key content of the subject based on *whose* competence (level of analysis) and the *type* of competence (competence element), resulting in a framework that brings together aspects at the individual and organizational level, and of the functional, relational, managerial, and behavioral elements of competence from the SCM literature. It furthermore displays the timeliness and wide-ranging character of the subject, as presented by the evolutionary timeline and the main research streams.

Research limitations/implications

Although competence in SCM is a key to business success, the subject is ambiguous and an explicit need exists for more research. This paper provides a foundation for future examination of and theory building in this subject. It also alerts researchers to complementary studies outside of their own “customary” domains.

Practical implications

This paper can support managers in their pursuit to secure competence in SCM and thereby improve outcomes on both individual and organizational level. It can furthermore assist in the development of relevant programs and training sessions.

Originality/value

To the best of our knowledge, this work represents the first systematic literature review on the subject of competence in SCM. In addition, it proposes a taxonomy for mapping and evaluating research on this subject.

Keywords: SCM competency, systematic literature review, supply chain management, organizational behavior, competences

Article classification: Literature review

1. INTRODUCTION

Competence is often portrayed as a combination of components, such as knowledge, skills, abilities, capabilities, and resources (Athey and Orth, 1999; Prahalad and Hamel, 1990; Sanchez, 2004; Teece et al., 1997). In supply chain management (SCM), competence is a key factor in achieving superior performance and competitiveness. Bowersox et al. (2000) conclude that supply chain competency leads to business improvements both operationally and financially. Moreover, the top 25 companies identified as having excellent competence in SCM in the annual research reports by AMR Research/Gartner (Gartner, 2007-2010) obtained substantially higher financial performance than their competitors (Aquino and Draper, 2008; Ellinger et al., 2011; Ellinger et al., 2012).

Although a consensus exists on the importance of competence in SCM for successful business performance, scholars vary considerably regarding the scope and meaning of the subject. In the SCM literature, competence is embraced from a variety of views and its content remains relatively incoherent. For example, Bagchi (2001) defines supply chain competence as an outcome of physical, institutional, and technology diffusion factors, whereas Ngai et al. (2011) refer to competence as a “framework for technological, production, and management expertise supporting supply chain capabilities.” Others view competence from a strict professions’ point of view, debating the vast assortment of competence that supply chain managers need (Christopher, 2012; Cottrill, 2010; McCarter et al., 2005; Myers et al., 2004; Van Hoek et al., 2002). From an educational standpoint, stakeholders (i.e., faculty, students, and practitioners) have voiced a considerable range of views on the meaning and importance of competences in SCM (Sauber et al., 2008). Scholars also point out a shift in modern supply chains toward a more relation-based strategy (Shub and Stonebraker, 2009), which has led to calls for more research on additional aspects of competence in SCM, such as the connection between human resource management (HRM) and SCM (Ellinger and Ellinger, 2014; Hohenstein et al., 2014; Shub and Stonebraker, 2009). Based on the incoherent view of competence in SCM, and the explicit need and call for more research, we conclude that the subject itself needs to be explored further. We therefore contend that, to achieve a coherent view of competence in SCM, a systematic review of the relevant literature is needed. To the best of our knowledge no such review yet exists.

The purpose of the present paper, therefore, is to present an integrated view of the literature published on all aspects and facets of competence in SCM and to provide a framework for classifying and analyzing literature to facilitate further study, practice, and research. We examine the field of competence in SCM not so much to advance theory but to propose a taxonomy for mapping and evaluating research on competence in SCM. The focus is thus to identify what constitutes competence in SCM. The research questions are the following:

- How can literature on competence in SCM be classified?
- What aspects and facets of competence in SCM have been addressed in the field?

The following section details how the systematic literature review was conducted. This is followed by a description of the landscape of competence in SCM, including research streams, an evolutionary timeline, and the methodologies used. In section 4, a two-dimensional framework is presented that addresses the aspects and facets of competence in SCM that are found in the literature. This is followed by a discussion and implications for further research. Finally, the conclusion summarizes the main results of this work.

2. METHODOLOGY

This paper presents a systematic literature review following the three-stage approach outlined by Tranfield et al. (2003). The approach was previously used in other rigorous SCM reviews, such as that by Delbufalo (2012) and Kamal and Irani (2014). The first stages are presented in the following two subsections, and the last stage is presented in sections 3 and 4.

2.1. *Planning the review*

A research protocol was developed in line with the research aim and objectives presented in the introduction. Consistent with the broad scope of the review, we recognize competence in SCM as any personal and organizational attribute that supports the “ability of supply chains to respond to customer demands with low cost, high-quality products and services” (Bowersox et al., 2000). From this perspective, competence is thus considered not only in terms of the final outcome, but also in terms of the process leading to that outcome. Regarding the boundaries of the supply chain, we conclude that, despite existing well-used multi-tier supply chain definitions such that of Lambert and Cooper (2000), several scholars have identified a lack of true multitier supply chain use in research (Kembro et al., 2014; Tachizawa and Wong, 2014). Therefore, in the present review, we include not only publications with a multitier perspective, but also those with a dual (upstream or downstream) or focal-firm perspective. Considering the above objectives and conceptual framing, a list of criteria was established to select and evaluate which publications to include. These criteria read as follows:

- 1 The EBSCO, Science Direct, Scopus, and Web of Science databases were used in the literature search to capture as many publications as possible from as many research disciplines as possible (e.g., management, economy, engineering, sociology, and psychology).
- 2 To enhance quality control as suggested by David and Han (2004), only published peer-reviewed scientific journal publications were considered. Thus, books, book sections, conference proceedings, and trade journals were excluded.
- 3 No time restrictions were applied.
- 4 Only publications in English were considered.
- 5 Both empirical and conceptual publications were considered to capture the full range of competence in SCM.
- 6 The initial subject screening was based on “competence in SCM” as the key subject term throughout the selection process, including title, abstract, and keywords. Thereafter, this same subject term was used for the entire selected paper.
- 7 The final screening for substantive relevance consisted of reading the remaining publications in their entirety. This aligned the selected publications with the scope of this literature review, with the goal being to capture the core of competence in SCM.

2.2. *Conducting the review*

The seven criteria presented above were strictly applied to ensure an effective and reproducible database search (Fink, 2014; Booth et al., 2012) and to avoid personal preferences and selectivity (Bennett et al., 2005). The retrieval process is presented in Figure 1 and starts by entering the search terms in the fields “title,” “abstract,” and “keywords.” The search terms were modified to “competenc*,” “supply chain,” and “manage*,” to cover variants such as “competency” and “managerial.” Each search term was entered as a single string joined by the AND operator to maximize the target range of management in supply chains and thereby include not only SCM but also, e.g., supply chain risk management, supply chain performance, and knowledge management. This process yielded 2225 publica-

tions. After application of criteria 2–5, 880 publications were excluded, leaving 1345 publications. After removing duplicates, 659 publications remained for further investigation. All 659 publications were screened for substantive content following criterion 6, leaving 110 publications. The next step was to read the publications in their entirety (criteria 7) and ensure that they were aligned with the core of competence in SCM; this process yielded 95 publications. In addition, we cross-checked all selected publications (Booth et al., 2012), adding references from all publications retrieved that met the inclusion criteria 2–7 above. This added three more publications, which indicates that the bulk of the literature on the subject was found in the first round of searching. The publications were retrieved in April, 2016, and the 98 publications retrieved were considered sufficient to present an adequate overview of the field (see Appendix I for bibliographic details).

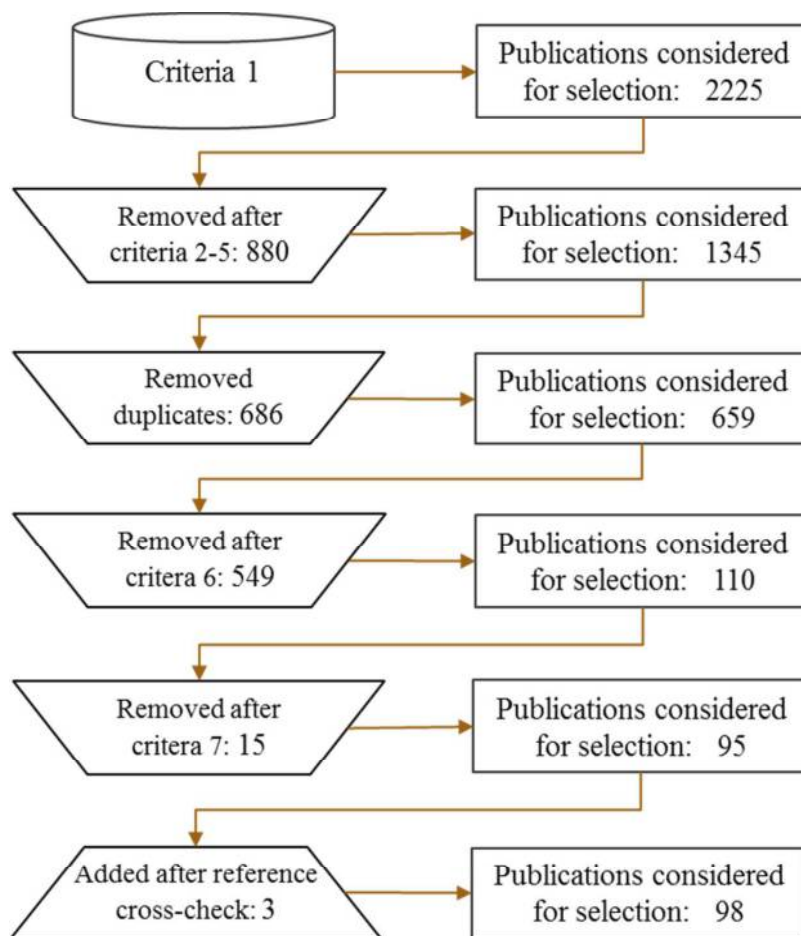


Figure 1 - Flowchart of publication-retrieval process

Inspired by content analysis (Stemler, 2001; Seuring and Gold, 2012), we categorized and structured the selected publications by using an analytical scheme (matrix). For the descriptive analysis, the following information was provided for each publication: author(s), year, journal, industry, and methodology. For the thematic analysis, an interpretative synthesis was applied based on the core content of the publications and the questions driving their research. Cross-study concepts were identified and iteratively translated into categories

inspired by existing frameworks in the literature. The advantage of this method is its ability to synthesize multiple qualitative studies, whereas the challenge is to strengthen replicability, because the coding relies on the researcher(s) (Rousseau et al., 2008). We held cross-coding meetings to discuss potential discrepancies. Disagreements were resolved by discussions leading to interactions that led to consensus. A pivotal summary helped to analyze and interpret the data.

3. THE LITERATURE LANDSCAPE

The review found the literature on competence in SCM to be fragmented and diversified. The 98 selected publications were published in 51 unique research journals (see Appendix II), with only 8 research journals publishing more than two publications. The same fragmented pattern appears for authors: The total number was 229 but only 25 contributed to more than one publication (see Appendix III). The following sections present the research streams found in the literature, an evolutionary timeline for the publications, and the methodologies used.

3.1. Research streams

The publications covered a wide range of areas that fall under the complexity of supply chains. To present the selected literature in a structured way, we derived and consolidated a number of research streams based on previously published systematic literature reviews on SCM. Croom et al. (2000) and Burgess et al. (2006) present comprehensively their content-oriented findings on the components of SCM literature, whereas Hohenstein et al. (2014) identify research streams in literature on HRM in SCM. An iterative matching of the selected literature resulted in the following research streams: (1) business results and outcomes, (2) strategic management, (3) process improvement orientation, (4) logistics, (5) education and training, (6) organizational behavior and, finally, (7) relationships. Although disagreement exists regarding overlap and interaction between the research streams, the features of the selected publications are sufficiently distinctive to be treated as single themes, so they appear in the research stream that best fits their topic (see Table 1).

Selected publications in the research stream *business results and outcomes* focus on financial performance and other customer-related outcomes based on an excellent level of competence. The research stream *strategic management* includes publications with a focus on competence for higher-level decisions, such as strategic sourcing and the protection of core competences. Publications in the research stream *process improvement orientation* focus on competence in processual arrangements, such as lean and just-in-time that facilitate operations, agility, and interactions within and between organizations. The research stream *logistics* includes publications that focus on competence to achieve logistics service quality and emerging issues such as fourth party logistics (4PL) and reverse logistics. The research stream *education and training* includes publications that cover competence development in both academia and industry. Publications in the research stream *organizational behavior* focus on HRM, organizational learning, and employee-competence profiles. Finally, the research stream *relationships* includes publications focusing on collaborative competences and the nature of relationships between stakeholders from different departments and organizations.

Table 1. Research streams that appear in literature reviewed

Research stream	Publication reference numbers (see Appendix I for bibliographic details)	Count
Business results and outcomes	7,8,10,22,23,24,30,40,50,81	10

Strategic management	1,2,5,11,18,20,25,48,49,51,56,63,65,93	14
Process improvement orientation	3,13,14,26,29,31,33,34,43,52,54,57,60,62,73,74,75, 76,78,79,86,94,95,97	24
Logistics	16,27,42,69,71,90,92	7
Education and training	6,9,55,61,67,77,82,84	8
Organizational behavior	15,17,19,21,28,36,38,39,41,44,47,53,58,66,68,70,80, 83,87,88,89	21
Relationships	4,12,32,35,37,45,46,59,64,72,85,91,96,98	14
Total		98

3.2. Evolutionary timeline of literature

The review found that competence in SCM is a new and emerging area that is garnering increasing interest from researchers. Figure 2 presents the evolutionary timeline, showing that competence in SCM began to gain academic attention in the beginning of this millennium and is continuously growing. The publication rate was quite low the first six years (2000–2005), with 1–5 publications per year. In the following years (2006–2014), the publication rate increased to 5–12 publications per year. An explanation for this interest in the last decade may be that SCM has matured, both in research and in practice, thereby highlighting the need for competence in SCM.

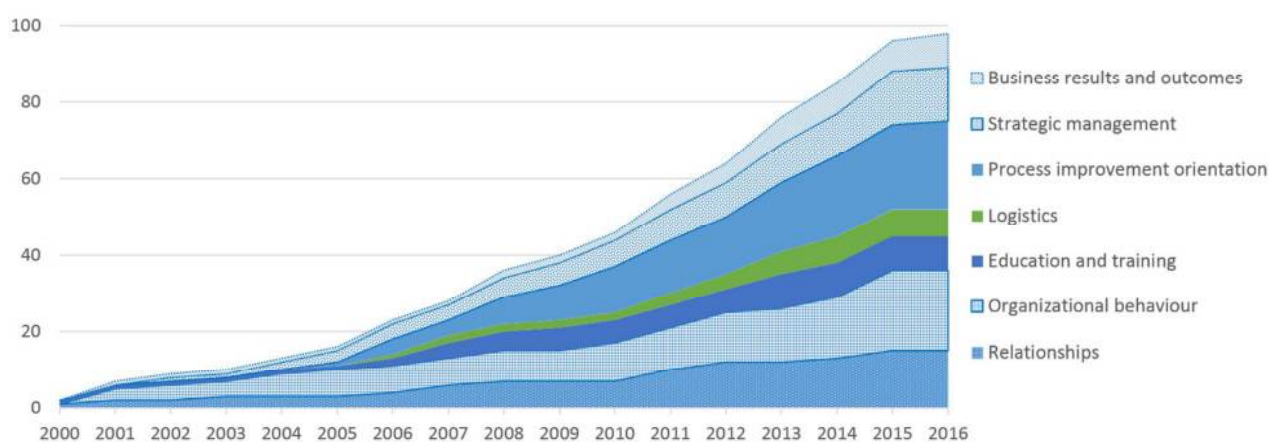


Figure 2. Evolutionary timeline of literature reviewed (accumulated)

3.3. Methodologies used

The review demonstrates that competence literature in SCM embraces a diversity of methodological approaches. As can be seen in Table 2, both qualitative and quantitative approaches have been used as well as a combination of these approaches, along with conceptual papers. This variety indicates a broad examination and coverage of the research subject. However, the unbalanced distribution of publications among the methodologies used suggests a limited perspective on the phenomena under investigation. This is in line with the narrow methodology focus that has been criticized by several SCM scholars (Mangan et al., 2004; Näslund, 2002; Golicic and Davis, 2012).

A majority of the selected publications have a quantitative research approach. Out of these, the statistical sampling method dominates; it uses surveys (primary data) and databases

(secondary data), although with somewhat different purposes. Fourteen publications use sampling primarily to map and measure the importance of various competences, while another eight publications use it to compare the relationship between aspects such as flexibility, customer service, and financial results to different levels of operational competence. Statistical sampling is also used to test hypothesis models. These models include variables such as operational routines, integration, logistics service quality, and organizational performance.

Approximately one out of five of the selected publications have a qualitative research approach. The ten case studies provide an in-depth understanding of cooperation and competence development in a variety of contexts, and of the challenge of protecting core competences. The majority has a single case design, and the data were collected from interviews, site visits, and focus groups. The seven publications using case-based testing use case(s) to validate proposed instruments or hypotheses. One publication uses experts in a Delphi-based approach to develop a competence model for effective supply value chain management (Kayakutlu and Büyüközkan, 2010).

Fourteen of the selected publications are conceptual and offer insights into a number of areas ranging from human behavior to business processes. Only three publications (Gammelgaard and Larson, 2001; Ferrer et al., 2011; Mangan and Christopher, 2005) use a multi-methodology approach, applying a combination of survey and case-study research. Literature reviews are notable in their absence.

Table 2. Methodologies used in literature reviewed

Methodology	Publications reference numbers (see Appendix I for bibliographic details)	Count
Quantitative		63
Numerical	42,94	2
Statistical sampling—mapping	9,17,19,29,39,47,61,66,80,81,82,87,88,89	14
Statistical sampling—comparison	8,11,22,23,34,35,56,67	8
Statistical sampling—hypothesis testing	1,4,7,10,13,14,15,16,20,24,25,30,31,32,40, 41,45,46,48,50,54,57,58,64,69,72,73,74,76, 78,79,83,84,85,86,91,96,97,98	39
Qualitative		18
Case study	5,6,27,37,51,62,63,75,77,92	10
Case-based testing	2,3,43,49,59,60,65	7
Delphi-based	44	1
Conceptual	12,18,21,33,36,38,52,55,68,70,71,90,93,95	14
Multi-methodology	26,28,53	3
Total		98

4. FRAMEWORK

The main challenge in setting up a framework is to address the many different aspects and facets of competence in SCM found in the literature. We contend that a two-dimensional approach to literature content analysis allows us to address both the level of analysis and the elements of competence, and to create a foundation for further discussions about the interaction between the two.

4.1. Dimension one—level of analysis

The literature reviewed herein addresses the competence of several stakeholders. To understand which stakeholder(s) the literature addresses, the publications are classified according to the level of analysis, referring to on *whose* competence the literature focuses. We identified three levels, although not all are equally present in the literature:

1. individual level—considers competences related to individuals;
2. intra-organizational level—relates to competence in and between different functions of an organization;
3. inter-organizational level—relates to competence between organizations.

A diverse group of stakeholders appears in each level of analysis. This was expected because of the emerging and encompassing area of competence in SCM. As shown in Table 3, the individual level is considered in approximately one third of the publications, with almost one third of these focusing on other-than-supply-chain professionals. More than half of the publications treat the intra-organizational level, dealing with a variety of organizations and departments. The inter-organizational level is covered in approximately one fifth of the publications, of which more than a third are related to the manufacturing industry. A few stakeholders appear to exist on both the intra- and inter-organizational level; e.g., small and medium sized enterprises (SMEs) and logistics service providers (LSPs). However, on the intra-organizational level, the competence studied is attached to a department or a company, whereas in the latter case it is attached to the network between multiple companies. Note also the limited overlap in the literature between the levels, which indicates that most publications discuss a single level of analysis. This is consistent with the findings of Croom et al. (2000) in their critical review of SCM literature, where they point out the limited links in research between competence on individual, organizational, and supply chain level.

Table 3. Levels of analysis in literature reviewed

Level of analysis	Publication reference numbers (see Appendix I for bibliographic details)	Count
Individual		29
-Supply chain professionals	1,4,17,19,21,24,28,38,47,53,58,61,66,68,70,80,82,89	18
-Logistics employees	87,88	2
-Purchasing professionals	48	1
-Agribusiness managers	55	1
-Humanitarian logisticians	9	1
-Students	6,67,77	3
-Employees in general	44,72,84	3
Intra-organizational		56
-HR department	21	1
-Purchasing department	12,13,35,48,63	5
-Seller/market department	72	1
-Retail companies	54	1
-Manufacturing companies	4,7,11,20,25,29,30,31,34,41,43,46,49,50,62,73,74,76,79,81,86,97	22
-Contracted manufacturer	51,65	2
-LSP	14,15,16,92	4
-SME	3,40,52,78,91	5
-Companies in general	8,10,18,22,23,39,44,45,56,57,60,71,90,93,98	15
Inter-organizational		23
-Manufacturing industry	4,37,46,64,72,96	6

-Manufacturing vs. retail industry	69	1
-LSP	26,27	2
-SME	2,5	2
-Retail industry	42,59	2
-Pharma industry	75	1
-General industry	32,33,36,57,60,83,85,94,95	9
Total		108*

Note:* Although 98 publications were reviewed, 8 publications involved more than one level of analysis and were thus placed in multiple categories.

4.2. Dimension two—elements of competence

The second dimension refers to the *type* of competence on which the literature focuses, where existing literature supports the conceptualization of competence in SCM as a multidimensional construct. The classic supply chain competency framework by Bowersox et al. (2000) includes three contexts: operational, behavioral, and planning and control. In parallel, Sangari and Razmi (2015) propose classification according to managerial, technical, and cultural competences in SCM. Other researchers choose a two-dimensional approach, such as Tokman et al. (2011) and Zacharia et al. (2011), both of whom look at operational and relational dimensions of outcomes in their research on supply chains. Inspired by the research above, we derived an extended version with four elements of competence. These were considered adequate to cover the wide range of competences included in the selected publications, and, although an argument may be made that overlap and interconnections exist between the elements, the features of the latter are sufficiently distinctive to be treated as individual elements. Note that competence in SCM is not defined by any element in isolation but rather by a combination of elements.

The elements are described as follows: (1) *Functional competence* deals with competence directly related to existing SCM business functions and company processes, such as sourcing, manufacturing, and distribution. Functional competence can be studied on the operational, tactic, and strategic level. (2) *Relational competence* deals with relational competences between all possible stakeholders, such as employees, customers, suppliers, partners, managers, and departments. (3) *Managerial competence* includes all competences related to more general management aspects of competence in SCM, such as implementation of new structures or business segments, control and evaluation, resource management (people and cost), and overall strategy development. (4) *Behavioral competence* relates to built-in or developed attitudes and characteristics tied to the stakeholder, such as creativity or change orientation. Table 4 shows how the elements are distributed in the publications.

Table 4. Elements of competence in literature reviewed

Elements of competence	Publication Reference numbers (see Appendix I for bibliographic details)	Count
Functional	2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,21,22,23,24,25,26,27,28,29,30,31,32,34,35,36,37,39,42,43,45,46,48,50,51,52,53,54,55,56,57,59,60,61,63,64,65,69,71,72,73,74,75,76,77,78,79,80,81,82,85,86,87,88,89,90,92,93,95,97	76
Relational	3,4,6,8,9,10,13,17,19,20,21,24,25,26,28,32,35,36,37,38,39,40,41,44,45,46,47,48,49,50,53,55,56,57,58,59,61,64,65,66,67,68,70,72,73,74,75,78,80,82,83,85,87,88,89,90,91,92,93,95,96,97	62

Managerial	1,2,3,6,8,9,11,13,14,17,18,19,20,21,22,23,26,27,28,31,32,33,34,35,36,38,39,40,41,44,45,46,47,48,53,55,56,58,59,60,61,62,63,64,65,66,68,70,72,76, 78, 80,81,82,83,86,87,88,89,90,91,92,94,95,96,98	66
Behavioral	1,4,6,9,10,13,17,18,19,20,21,22,28,29,32,36,38,40,44,47,48,52,58,59,60,61,64,66,68,69,70,72,73,76,78,80,82,83,84,87,88,89,90,95,98	45
Total		249*

Note:* Although 98 publications were reviewed, many publications involved more than one element of competence and were thus placed in multiple categories.

In contrast to the level of analysis, the average number of elements per publication is close to 2.5, which means that the literature reviewed encompasses several elements when discussing competence in SCM. However, while merely one of five publications includes all four elements, half of the publications cover only one or two elements. This strengthens the view of competence in SCM as being a complex and encompassing area on which no consensus exists within the research community.

4.3. Two-dimensional content analysis

To present an integrated view of the literature, with a focus on competence itself, the three levels of analysis and the four elements of competence are combined in a matrix (see Table 5). Based on the content contained in the framework, the subsections that follow offer insights into the aspects and facets found in the literature reviewed.

Table 5. Framework presenting aspects and facets of competence in SCM literature

Element of competence	Individual	Intra-Organizational	Inter-Organizational
Functional	Logistics procedures Sales and operations planning (S&OP) procedures Technique and technology knowledge	Supply management Production management Logistics service management Demand management Product development management ICT ability Supply chain alignment management	Logistics service capability Business capability System connectivity and compatibility
Relational	Communication Teamwork Cultural and cross-functional awareness	Relationship management Relationship integration	Relational capital Structural capital Cognitive capital
Managerial	Business analysis Business management People management Company and industry experience	Business intelligence Business strategy Resource management Business execution	Information management Business management
Behavioral	Self-management Self-motivation Empathy Leadership Creativity Cognitive skills	Change and learning orientation Collaborative orientation	Cultural orientation

4.3.1. Functional competence in supply chain management

Being the core of SCM, functional competence is the most-studied element in this review, and the literature reviewed also covers competence in relation to most of the functions and processes embraced under the SCM umbrella. On the *individual* level, the literature deals with (i) aspects of logistics procedures, ranging from customs procedures to multimodal transports and reverse logistics (Thai and Yeo, 2015), and (ii) sales and operations planning procedures, covering everything from supply to production and demand management (Sauber et al., 2008; Shou and Wang, 2015). The literature further includes aspects on techniques and technology knowledge (Gammelgaard and Larson, 2001), including computer literacy (Okongwu, 2007) and ability to process data (Shou and Wang, 2015).

At the *intra-organizational* level, nine out of ten publications include the functional competence element, and the literature reviewed deals with a wide range of aspects. Literature on supply management aspects discuss how to deal with supply and supplier management (Kern et al., 2011), including how to use the power relation between buyer and seller (Cox, 2001). Production-management literature deals first of all with efficiency and flexibility aspects (Ngai et al., 2011; Schoenherr and Narasimhan, 2012) but also with process development to increase process stability, reduce variances, and thereby increase quality (Kim and Wemmerloev, 2015). Literature on logistics management deals with competence relating to capacity issues and the range of logistical offers (Ding et al., 2012), along with inventory management (Jasemi et al., 2014). It also deals with competence in delivery and returns management, including fast and correct deliveries to customers (Halley and Beaulieu, 2009), and a systematic returns-flow process (Morgan et al., 2016). Demand-management literature includes demand sensing, demand shaping, and order fulfilment (Ellinger et al., 2012; Chikán and Gelei, 2010), whereas product-development-management literature deals with competence aspects of the development and introduction of new products, based on understanding the market, the use of feedback from previous projects, and knowledge from other supply chain partners (Schoenherr et al., 2014).

Ability in information and communications technology (ICT) is a fundamental organizational attribute and is discussed from three perspectives: ICT functionality, ICT integration, and ICT deployment. The literature reviewed on ICT functionality highlights the IT infrastructure and having all the needed systems in place (Davis and Golicic, 2010). ICT integration is not only about providing efficient, timely, and transparent business information to appropriate parties but also about including flexibility based on connectivity, compatibility, and modularity (Ngai et al., 2011). ICT deployment refers to ICT availability (Sangari and Razmi, 2015), but most of all training and the effective use of ICT (Barclay, 2005). Finally, an aspect of supply chain alignment management competence is present in the literature, dealing with alignment of demand creation and demand fulfilment (Jüttner et al., 2006) and how to achieve process compliance in line with the overall company strategy (Blome et al., 2013).

On the *inter-organizational* level, the literature reviewed highlights logistics service capability, business capability, and system connectivity and compatibility. Logistics service capability is discussed both in terms of quality (accuracy) (Richey et al., 2007) and content (infrastructure and range of offers) (Fulconis et al., 2006). Business capability is discussed in terms of collaborative and complementary capabilities in NPD, manufacturing, and forecasting, which leads to flexibility and responsiveness and improved customer satisfaction (Samuel and Spalanzani, 2009). Finally, the literature mentions aspects of system connectivity and compatibility as competence characteristics, which in turn affect supply chain flexibility (Ngai et al., 2011; Ha et al., 2011).

4.3.2. Relational competence in supply chain management

The relational competence element is the glue in SCM that keeps the various stakeholders together. On the *individual* level, the literature reviewed provides three distinct aspects of competence; namely, communication, teamwork, and cultural and cross-functional awareness. Communication is the top aspect found in all publications dealing with relational competence on this level [see, e.g., Shou and Wang (2015) and Gammelgaard and Larson (2001)]. Teamwork and teambuilding is another frequently mentioned aspect (Mangan and Christopher, 2005; Dotson et al., 2015), whereas cultural and cross-functional awareness is emerging and is an extension of the previous two aspects (Prajogo and Sohal, 2013; Sohal, 2013).

On the *intra-organizational* level, selected literature on relationship management deals with the management of existing relationships, involving aspects such as value-adding factors (Tokman et al., 2011), conflict management (Rosenzweig and Roth, 2007), and knowledge transfer (Halley et al., 2006). Not surprisingly, several types of relationships are included in the literature, from customer service management (Barclay, 2005) and development of upstream suppliers (Feldmann and Olhager, 2013) to pure buyer and supplier relationships (Kern et al., 2011; Chiadamrong and Suppakitjarak, 2008). The literature on relationship integration focuses on integration of new or existing relationships based on cooperation for mutual gain and involves aspects of both technical collaboration (Ling-Yee and Ogunmokun, 2001) and relational capital (Schoenherr et al., 2014). Bowersox et al. (2000) point out the competences needed to succeed with supplier, customer, and internal integration, respectively, and they conclude that internal integration is often more difficult than the first two. Nevertheless, integration is proven to be an antecedent to supply chain performance (Bowersox et al., 2000).

The competence characteristics discussed on the *inter-organizational* level can be divided into aspects of relational, structural, and cognitive capital. Relational capital is based on trust and a concern or mentality that all parties will consider the welfare of others as well as their own (Stuart et al., 2012; Spekman et al., 2002). Competence literature on structural capital aspects discusses how parties interact and communicate on a real-time basis (Whipple et al., 2015) and to which degree parties share information that will facilitate the other party's activities (Kim and Wemmerloev, 2015). Finally, literature on cognitive capital refers to a collaborative awareness, where the parties have a common purpose and share the same vision (Barnes and Liao, 2012; Whipple et al., 2015).

4.3.3. Managerial competence in supply chain management

The managerial competence element is at the heart of SCM, and the future of supply chains is based on these competences. The *individual* level in the literature reviewed on managerial competence includes aspects of business analysis, business management, people management, and company and industry experience. Business analysis literature discusses the benefits of structural IQ (Richey et al., 2010), the ability to use advanced ICT (Prajogo and Sohal, 2013), basic cost accounting (Okongwu, 2007), and an understanding of complex systems and the cost-to-serve concept (Mangan and Christopher, 2005). Business-management literature deals with execution ability, such as decision-making, seeing the big picture, setting goals, prioritizing, and developing and implementing long-term strategies (Sohal, 2013; Dotson et al., 2015; Gammelgaard and Larson, 2001), in addition to more routine management issues such as planning, organizing, and controlling (Thai and Yeo, 2015; Shou and Wang, 2015). The people-management literature mentions skills in HRM and the development and supervision of staff as competences in SCM (Bernon and Mena, 2013; Shou and Wang, 2015;

Thai and Yeo, 2015). Company and industry experience includes the aspect of previous work experience (Margherita et al., 2009; Gammelgaard and Larson, 2001).

On the *intra-organizational* level, the literature discusses areas of business intelligence, business strategy, resource management, and business execution. The wide range of literature on business intelligence discusses generation, dissemination, and the use of intelligence (Tokman et al., 2011; Davis and Golicic, 2010; Sangari and Razmi, 2015), both in terms of knowledge landscape (Kayakutlu and Büyüközkan, 2010) and information sharing with customers and suppliers (Das and Narasimhan, 2000). The literature furthermore discusses the ability to monitor and track performance (Bowersox et al., 2000), with value-stream analysis and market analysis as two applications (Parry et al., 2010). The literature on business strategy discusses knowing what to do, pointing at competence in supply chain risk management (Ellinger et al., 2015), sourcing without leaking competence (Parry et al., 2006; Drejer and Sørensen, 2002), and the alignment of processes and synergy creation; in brief, how to rethink and restructure the supply chain strategy according to current and future business (Chikán and Gelei, 2010). Resource management deals with how to manage business strategies (in terms of cost) (Halley and Beaulieu, 2009; Perunović et al., 2012) and talent management (Kern et al., 2011). Finally, the literature on business execution discusses how to actually execute the business, such as how to manage change (Halley et al., 2006) and how to implement the organizational response to market changes (Ngai et al., 2011).

Literature on the *inter-organizational* level discusses two aspects of competence in SCM in the managerial element; namely, information management and business management. The information-management literature discusses characteristics such as knowledge channels and how to transfer, recombine, and/or create knowledge among supply chain partners (Rosenzweig and Roth, 2007), whereas the business-management literature discusses how to manage and share costs and risks between each party (Ferrer et al., 2011), and the degree of joint decision-making (Ha et al., 2011).

4.3.4. Behavioral competence in supply chain management

The behavioral competence element can be considered the soul of SCM, and although the literature reviewed presents a broad spectrum of characteristic aspects of competence, their achievement might entail challenges. On the *individual* level, the literature highlights self-management, self-motivation, empathy, leadership, creativity, and cognitive skills. The self-management literature includes aspects of time management, integrity, confidence, multitasking, and stress-resistance (Gammelgaard and Larson, 2001; Okongwu, 2007; Thai, 2012b), whereas the self-motivation literature discusses personal enthusiasm (Thai, 2012a), result orientation (Kayakutlu and Büyüközkan, 2010), and a trait for continuous learning (Dubey and Gunasekaran, 2015). Empathy aspects consider both self-awareness, meaning comfort in talking about both your weaknesses and strengths, as well as the ability to put yourself in another person's shoes and considering their feelings (Van Hoek et al., 2002). Leadership aspects include role commitment, charisma, and the ability to manage change (Bölsche et al., 2013; Kayakutlu and Büyüközkan, 2010), while the creativity aspects highlighted are creativity skills (Dubey and Gunasekaran, 2015) and creative and innovative IQ (Harvey and Richey, 2001). Finally, cognitive skills include problem-solving ability (Kovács et al., 2011) and analytical skills (Harvey and Richey, 2001).

On the *intra-organizational* level, the literature mainly deals with the competence characteristics of change and learning orientation and collaborative orientation. The change and learning orientation aspects are based on the absorptive capacity of the given organization, facilitating both the learning willingness and outcomes and the capacity for change (Ellinger et al., 2015; George and Rangaraj, 2006). The collaborative-orientation

literature includes a commitment to SCM and, thereby, a willingness to trust and engage in operations with customers and suppliers and develop alliances (Roth et al., 2008). On the *inter-organizational* level, the literature deals with aspects of cultural orientation, including technological readiness (Richey et al., 2007), commitment to the application of new knowledge among supply chain members (Wang et al., 2008), as well as a win-win orientation and the aim to work hard for the common good (Spekman et al., 2002).

5. DISCUSSION AND SUGGESTIONS FOR FUTURE RESEARCH

The many aspects and facets of competence found in the two-dimensional framework above might imply that the subject in question has been sufficiently treated by previous research. However, numerous opportunities remain to make a meaningful contribution to the body of knowledge within the broad domain of competence in SCM. The following sections discuss the results and present a rich map and foundation for future research.

5.1. Competence elements in supply chain management

First of all, the review reveals that functional competences have been thoroughly studied, whereas the behavioral competences have received less attention. The dominance of the functional element is even more apparent when looking at the publications that only cover one or two elements of competence. For publications covering one single element, two out of three publications deal with the functional element, whereas publications covering two elements deal with the functional element in more than four out of five publications (along with one more element). This might not be a surprise considering the context of this review, which entails a natural strong emphasis on the SCM discipline among the publications, but the disequilibrium has conceptualization implications for the progression of the subject. Competence in SCM touches so many areas that researchers should try to incorporate as many other disciplines as possible; for example, psychology, sociology, education, marketing, and organization science. The call for multidisciplinary research is in line with the conclusions of many researchers in the area, such as Thomas (2014), Myers et al. (2004), and van Hoek and Wagner (2013). The numerous journals and authors in the review also indicate that competence in SCM is of interest for researchers from a vast array of backgrounds, and future research may well discover additional elements of competence, as well as associated aspects and facets.

In contrast to the above discussion, the present review also reveals that one out of five publications actually include all four elements, which indicates that the competence elements are interconnected. To further enlarge and deepen the body of knowledge on competence in SCM, the relationship between competences must therefore be considered, such as combinations and ambidexterity. Considering the multidisciplinary nature of SCM, the competences requested subsequently need to be multidisciplinary in nature; that is, individuals and organizations must excel in a number of competence elements. Researchers should therefore continue to include multiple elements of competence in their studies. Combining competences has also been proposed to create synergies (Derwik et al., 2016), and companies that manage to use an ambidextrous approach and to align operational and entrepreneurial competences have been shown to reach a higher degree of both efficiency and innovation relative to their competitors (Sarkees and Hulland, 2009; Rojo et al., 2016). So far, research on these topics remains scarce, and they present themselves as excellent areas for future research.

5.2. Aspects and facets of competence in supply chain management

Apart from the relationship between competences, there is also a need to delve deeper into each single aspect and facet of each competence, where the framework provides an initial description simply by presenting the context. Business management, for example, is found in the managerial element on both the individual and inter-organizational level, but obviously the content description differs in each context. The aspect of supply chain alignment management is quite surprisingly found on the intra-organizational level. The publications reviewed discuss the integration of demand and supply from the focal organization's point of view, although one would expect this to be discussed from an inter-organizational point of view. From the point of view of the level of analysis, the inter-organizational level in particular has received far less attention than it deserves. This is somewhat surprising in light of supply chains being defined as an inter-organizational phenomenon, crossing cultural and organizational boundaries. Evidently, more research is needed that extends the scope and looks at supply chain alignment management and other aspects based on more than one tier.

5.3. Levels of analysis

The present literature review also reveals remarkably limited research on the potential relations and transfers between the levels of analysis, with few articles involving more than one level of analysis. According to Barnes and Liao (2012), a firm's competitiveness is "tied to enhancing its human capital through the development of the competencies of its employees and by creating unique, distinctive and difficult to imitate core competences." Thus, it is important to transfer people's competences on the individual level to the intra-organizational (and inter-organizational) level. According to Spekman et al. (2002), the challenge is to make learning occur throughout the supply chain and in the three levels (i.e., individual, firm, and supply chain enterprise levels). Lambrechts et al. (2012) pinpoint the role and competences of a leading facilitating actor to promote in-depth joint learning, and thereby creating outcome on a system level. The publication of Kayakutlu and Büyüközkan (2010) is one of few in the review that displays more than one level of analysis, elaborating on individual, team, and organizational levels. This deficiency leads to questions: What should the supply chain organization structure look like to support competence transfer? How can HR support individuals and the organization itself? These and other questions need further attention, partly through research that embraces more than one level of analysis. In addition, a possibility exists to refine and add levels of analysis and to develop an even more detailed framework, considering a number of levels not explicitly put forward in this review. First of all, multiple dimensions of levels remain to be found in the intra-organizational level, ranging from the team level to the level of the entire corporate group. Second, the inter-organizational level could be divided into upstream or downstream categories. Finally, although this literature review unearthed publications on the national level, they were excluded due to subject framing in the screening process.

Not to be forgotten is that the aspects and facets presented in the framework are contemporary and mirror the competences in focus over the last 15 years. These aspects and facets have altered in accordance with the evolution of SCM (Bernon and Mena, 2013) and will continue to do so. Historically, technical developments have profoundly influenced the prerequisites for SCM. In the future, the most critical factor for supply chains is proposed to be people (Sweeney, 2013; Thomas, 2014). This implies that future research should focus on softer competences to update the framework, and this calls (again) for a multi-disciplinary approach, primarily involving the psycho-social discipline.

5.4. Development of competence in supply chain management

Just as the field itself develops and requires updated sets of competences, the actual development of competence is another area that merits research. According to Bernon and Mena (2013), the educational needs of supply chain practitioners have evolved from acquiring technical competency-based training to obtaining support for “wider strategy deployment and change management programmes within organisations” (Bernon and Mena, 2013). The underlying reasons for this transformation have led to a current mismatch between existing and required competences for supply chain practitioners (Sohal, 2013), creating a need for advancing and expanding the curriculum (van Hoek and Wagner, 2013) and for exploring the relationships between academic institutions and customers of executive education (Bernon and Mena, 2013). Gibson et al. (2016) have searched for enablers to accelerate SCM learning in integrated contexts (university and industry), but more remains to be done.

Publications in this literature review that explore the required competence profile of supply chain professionals comprise various sets of individual SCM competences. However, none of these sets are the same, nor do frequent references exist between them. This supports our notion that the concept of competence in SCM is vague and poorly defined. We claim that our framework helps to give a more unified picture of competence in SCM, and that this benefits competence development in SCM. Possessing a clear picture of the desired profile will simplify the work of developing and achieving that profile. Currently, many of the desired competences identified in the literature are absent from academic course syllabuses and from a number of academic SCM programs. The same applies for other types of competence development, such as in-service training.

Despite the existence of research on competence development in SCM at the individual level, very little research describes the development of competence in SCM at the organizational level. The majority of the publications reviewed have an *ex-post* perspective, i.e., they evaluate *what* competences are or have been of interest and neglect to discuss or analyze *how* these competences were developed (*ex-ante* perspective). Based on the fact that competence in SCM leads to business improvements both operationally and financially, this lack of understanding calls for rigorous research and encompassing endeavors to explore ways to achieve it. In the light of a forecasted shortage of supply chain talent (Van Hoek et al., 2002), along with the paradox that companies requiring SCM competence are not preferred employers (Blanchard, 2011), no reason is apparent for not accepting this challenge. Last but not least, in order to prioritize among all the competences identified in the review, it would be of interest to explore and determine the financial implications of specific competences in SCM and their relations. Bowersox et al. (2000) were pioneers in the field, but subsequent research on the financial implications is limited. It either focuses on a single specific competence like trust (Stuart et al., 2012), or takes a general perspective on competence in SCM as a whole (Ellinger et al., 2011; Ellinger et al., 2012).

6. CONCLUSIONS

This paper provides an integrated view of competence in the SCM field by providing a framework for identification and classification of the key content of the subject. A systematic literature review was conducted to develop a more coherent body of knowledge and provide a cohesive view of the fragmented and diverse landscape of the literature on competence in SCM.

6.1. *Implications for research*

Of significance, the results help to resolve the present ambiguity and complexity of the concept of competence in the SCM literature. This work furthermore provides an important

foundation for future examination of the subject and for building theories in the area, and propose a significant number of suggestions for future research that awaits attention from scholars from various disciplines. Moreover, the results alert researchers to complementary studies outside their own “customary” domains of expertise. Thus, this work makes important contributions to the understanding and development of the research field of competence in SCM. The key contributions of this work to the literature are:

- identification of methodologies, research streams, and the evolutionary timeline of literature on competence in SCM;
- classification of literature according to level of analysis (i.e., whose competence) and elements of competence (i.e., the type of competence);
- development of a framework to present aspects and facets of competence in the SCM literature;
- implications for future research.

6.2. *Implications for managers*

From a managerial point of view, this literature review offers no silver bullet to improve competence in SCM. Instead, it reveals the complexity of the subject and highlights challenges that need to be addressed. The proposed framework displays a wide range of competences on various levels. Companies need to consider the full range of competences (and not only single elements or aspects) as well as attempt to enhance competence on all levels of analysis from individual to inter-organizational level. By doing so, they can secure necessary competences for improved outcomes on all levels. The framework can also support academic program leaders and HR managers in the process of developing relevant programs and training sessions by highlighting the full range of competences needed. The framework can also be of guidance to HRM staff in the recruiting process. HR personnel are usually quite knowledgeable about law and psychology, but less so about competence success attributes in SCM. The literature review provides knowledge of and insight into all dimensions of competence in SCM. It can furthermore support managerial discussions on the current competence status, and assist in developing competence plans for the future.

6.3. *Limitations and concluding remarks*

As with any research, the present work has limitations. The findings of this review are based on a limited number of publications and disciplines and should therefore be confirmed and further developed by other researchers who can independently classify sets of publications, choose larger samples, use other databases, and include publications in languages other than English. This review is also limited to competence in SCM and thus excludes nearby subjects such as talent and capability. In addition, knowledge development must also pursue endeavors that in turn will assist practitioners and stakeholders to better understand the emerging area of competence in SCM.

To conclude, this review does not propose a definition of competence in SCM, because such an attempt would be a life-long mission and would not simplify the complexity associated with competence as such. However, this review does present an integrated view of what constitutes competence in SCM literature and attempts to develop a common language and understanding of the subject and how this translates into practice. This review of the literature shows clearly that more research is needed on the subject. Competence in SCM is constantly evolving, which calls for a continuous re-evaluation of the content in the framework, particularly through multidisciplinary research. Also needed is more research with an ex-ante perspective, that is, how to develop such competences and transfer them between levels of analysis.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the anonymous reviewers for their constructive and detailed feedback on the previous draft of this paper. Their comments have contributed to improving this paper. The authors also thank Associate Professor Carl-Henric Nilsson, Department of Business Administration, School of Economics and Management at Lund University, and Associate Professor Henrik Sternberg, Department of Design Sciences, Faculty of Engineering at Lund University, for their careful reading and suggestions. This research was financially supported by The Swedish Retail and Wholesale Development Council through the Centre for Retail Research at Lund University, and by Helsingborg City and VINNOVA through the ReLog research platform.

REFERENCES

- Aquino, D. and Draper, L. (2008), "Supply chain talent: State of the Discipline", AMR Research, available at: www.amrresearch.com (accessed: October 2014).
- Athey, T. R. and Orth, M. S. (1999), "Emerging competency methods for the future", *Human Resource Management*, Vol. 38 No. 3, pp. 215-225.
- Bagchi, P. K. (2001), "Measuring the Supply Chain Competency of Nations: The Case of India", *Supply Chain Forum: An International Journal*, Vol. 2 No. 1, pp. 52-59.
- Barclay, I. (2005), "Supply chain management in SMEs - benchmarking best practice core competencies", *Journal of General Management*, Vol. 30 No. 3, pp. 35-50.
- Barnes, J. and Liao, Y. (2012), "The Effect of Individual, Network, and Collaborative Competencies on the Supply Chain Management System", *International Journal of Production Economics*, Vol. 140 No. 2, pp. 888-899.
- Bennett, J. et al. (2005), "Systematic Reviews of Research in Science Education: Rigour or Rigidity?", *International Journal of Science Education*, Vol. 27 No. 4, pp. 387-406.
- Bernon, M. and Mena, C. (2013), "The evolution of customised executive education in supply chain management", *Supply Chain Management: An International Journal*, Vol. 18 No. 4, pp. 440-453.
- Blanchard, D. (2011), "Supply chain talent needs to be spread around more", *Industry Week*, Vol. 260 No. 10, pp. 58-59.
- Blome, C. et al. (2013), "Antecedents and enablers of supply chain agility and its effect on performance: a dynamic capabilities perspective", *International Journal of Production Research*, Vol. 51 No. 4, pp. 1295-1318.
- Booth, A. et al. (2012), *Systematic approaches to a successful literature review*, Sage Publications, Ltd., London.
- Bowersox, D. J. et al. (2000), "How Supply Chain Competency Leads to Business Success", *Supply Chain Management Review*, Vol. 4 No. 4, pp. 70-78.
- Burgess, K. et al. (2006), "Supply chain management: A structured literature review and implications for future research", *International Journal of Operations & Production Management*, Vol. 26 No. 7, pp. 703-729.
- Bölsche, D. et al. (2013), "Specific competencies in humanitarian logistics education", *Journal of Humanitarian Logistics and Supply Chain Management*, Vol. 3 No. 2, pp. 99-128.

- Chiadamrong, N. and Suppakitjarak, N. (2008), "Relationships of supply chain management capability and manufacturing operations competence on organisational performance: A case study of Thai industries", *International Journal of Logistics Systems and Management*, Vol. 4 No. 5, pp. 551-573.
- Chikán, A. and Gelei, A. (2010), "New Insight into the Competitiveness of Supplier Firms: Aligning Competences and Customer Expectations", *Supply Chain Forum: An International Journal*, Vol. 11 No. 2, pp. 30-44.
- Christopher, M. (2012), "Managing Supply Chain Complexity: Identifying the Requisite Skills", *Supply Chain Forum: International Journal*, Vol. 13 No. 2, pp. 4-9.
- Cottrill, K. (2010), "Are you prepared for the supply chain talent crisis?", MIT Center for Transportation and Logistics, Cambridge, MA, available at: www.Distributiongroup.com/articles/0211mit.pdf (accessed: October 2014).
- Cox, A. (2001), "Understanding Buyer and Supplier Power: A Framework for Procurement and Supply Competence", *Journal of Supply Chain Management*, Vol. 37 No. 1, pp. 8-15.
- Croom, S. et al. (2000), "Supply chain management: An analytical framework for critical literature review", *European Journal of Purchasing and Supply Management*, Vol. 6 No. 1, pp. 67-83.
- Das, A. and Narasimhan, R. (2000), "Purchasing Competence and Its Relationship with Manufacturing Performance", *Journal of Supply Chain Management*, Vol. 36 No. 1, pp. 17-28.
- David, R. J. and Han, S. K. (2004), "A systematic assessment of the empirical support for transaction cost economics", *Strategic Management Journal*, Vol. 25 No. 1, pp. 39-58.
- Davis, D. F. and Golicic, S. L. (2010), "Gaining comparative advantage in supply chain relationships: the mediating role of market-oriented IT competence", *Journal of the Academy of Marketing Science*, Vol. 38 No. 1, pp. 56-70.
- Delbufalo, E. (2012), "Outcomes of inter-organizational trust in supply chain relationships: a systematic literature review and a meta-analysis of the empirical evidence", *Supply Chain Management: An International Journal*, Vol. 17 No. 4, pp. 377-402.
- Derwik, P. et al. (2016), "Manager competences in logistics and supply chain practice", *Journal of Business Research*, Vol. 69 No. 11, pp. 4820-4825.
- Ding, M. J. et al. (2012), "Operational routines and supply chain competencies of Chinese logistics service providers", *The International Journal of Logistics Management*, Vol. 23 No. 3, pp. 383-407.
- Dotson, M. J. et al. (2015), "Desired skills and competencies of prospective supply chain managers: An empirical investigation of US supply chain executives", *International Journal of Logistics Systems and Management*, Vol. 22 No. 1, pp. 55-66.
- Drejer, A. and Sørensen, S. (2002), "Succeeding with sourcing of competencies in technology-intensive industries", *Benchmarking: An International Journal*, Vol. 9 No. 4, pp. 388-408.
- Dubey, R. and Gunasekaran, A. (2015), "Supply chain talent: The missing link in supply chain strategy", *Industrial and Commercial Training*, Vol. 47 No. 5, pp. 257-264.

- Ellinger, A. E. et al. (2015), "Learning orientation, integration, and supply chain risk management in Chinese manufacturing firms", *International Journal of Logistics Research and Applications*, Vol. 18 No. 6, pp. 476-493.
- Ellinger, A. E. and Ellinger, A. D. (2014), "Leveraging human resource development expertise to improve supply chain managers' skills and competencies", *European Journal of Training and Development*, Vol. 38 No. 1-2, pp. 118-135.
- Ellinger, A. E. et al. (2011), "Supply chain management competency and firm financial success", *Journal of Business Logistics*, Vol. 32 No. 3, pp. 214-226.
- Ellinger, A. E. et al. (2012), "The influence of supply chain management competency on customer satisfaction and shareholder value", *Supply Chain Management: An International Journal*, Vol. 17 No. 3, pp. 249-262.
- Feldmann, A. and Olhager, J. (2013), "Plant roles: Site competence bundles and their relationships with site location factors and performance", *International Journal of Operations & Production Management*, Vol. 33 No. 6, pp. 722-744.
- Ferrer, M. et al. (2011), "Competences and capabilities for innovation in supply chain relationships", *International Journal of Technology Management*, Vol. 56 No. 2/3/4, pp. 272-289.
- Fink, A. (2014), *Conducting research literature reviews : from the Internet to paper*, Sage Publications, Inc., USA.
- Fulconis, F. et al. (2006), "Exploring New Competences in the Logistics Industry: The Intermediation Role of 4PL", *Supply Chain Forum: An International Journal*, Vol. 7 No. 2, pp. 68-77.
- Gammelgaard, B. and Larson, P. D. (2001), "Logistics Skills and Competencies for Supply Chain Management", *Journal of Business Logistics*, Vol. 22 No. 2, pp. 27-50.
- Gartner (2007-2010), "The Gartner Supply Chain Top 25 ", Gartner, Inc. (former AMR Research, Inc.), available at: <http://www.gartner.com/technology/supply-chain/top25.jsp>.
- George, S. A. and Rangaraj, N. (2006), "New organisational competences for supply chain management: A study in the Indian context", *International Journal of Value Chain Management*, Vol. 1 No. 3, pp. 205-222.
- Gibson, T. et al. (2016), "Accelerating supply chain management learning: identifying enablers from a university-industry collaboration", *Supply Chain Management: An International Journal*, Vol. 21 No. 4, pp. 470-484.
- Golicic, S. L. and Davis, D. F. (2012), "Implementing mixed methods research in supply chain management", *International Journal of Physical Distribution & Logistics Management*, Vol. 42 No. 8-9, pp. 726-741.
- Ha, B.-C. et al. (2011), "Suppliers' affective trust and trust in competency in buyers", *International Journal of Operations & Production Management*, Vol. 31 No. 1, pp. 56-77.
- Halley, A. and Beaulieu, M. (2009), "Mastery of operational competencies in the context of supply chain management", *Supply Chain Management: An International Journal*, Vol. 14 No. 1, pp. 49-63.

- Halley, A. et al. (2006), "Power Relationships and Their Impact on Competency Development", *Supply Chain Forum: An International Journal*, Vol. 7 No. 2, pp. 4-14.
- Harvey, M. G. and Richey, R. G. (2001), "Global supply chain management: The selection of globally competent managers", *Journal of International Management*, Vol. 7 No. 2, pp. 105-128.
- Hohenstein, N. O. et al. (2014), "Human resource management issues in supply chain management research: A systematic literature review from 1998 to 2014", *International Journal of Physical Distribution & Logistics Management*, Vol. 44 No. 6, pp. 434-463.
- Jasemi, M. et al. (2014), "On competence of vendor managed inventory in supply chains using basic mathematical inventory models", *Scientia Iranica*, Vol. 21 No. 3, pp. 1061-1071.
- Jüttner, U. et al. (2006), "Demand chain alignment competence — delivering value through product life cycle management", *Industrial Marketing Management*, Vol. 35 No. 8, pp. 989-1001.
- Kamal, M. M. and Irani, Z. (2014), "Analysing supply chain integration through a systematic literature review: a normative perspective", *Supply Chain Management: An International Journal*, Vol. 19 No. 5/6, pp. 523-557.
- Kayakutlu, G. and Büyüközkan, G. (2010), "Effective supply value chain based on competence success", *Supply Chain Management: An International Journal*, Vol. 15 No. 2, pp. 129-138.
- Kembro, J. et al. (2014), "Theoretical perspectives on information sharing in supply chains: a systematic literature review and conceptual framework", *Supply Chain Management: An International Journal*, Vol. 19 No. 5-6, pp. 609-625.
- Kern, D. et al. (2011), "Purchasing competence: A stakeholder-based framework for Chief Purchasing Officers", *Journal of Business Logistics*, Vol. 32 No. 2, pp. 122-138.
- Kim, Y. H. and Wemmerloev, U. (2015), "Does a Supplier's Operational Competence Translate into Financial Performance? An Empirical Analysis of Supplier-Customer Relationships", *Decision Sciences*, Vol. 46 No. 1, pp. 101-134.
- Kovács, Z. et al. (2011), "Competence requirement determination and development in supply chains", *Problems of Management in the 21st Century*, available at: http://www.scientiasocialis.lt/pmc/files/pdf/Kovacs_Vol.2.pdf (accessed: October 2014).
- Lambert, D. M. and Cooper, M. C. (2000), "Issues in supply chain management", *Industrial Marketing Management*, Vol. 29 No. 1, pp. 65-83.
- Lambrechts, F. et al. (2012), "In-depth joint supply chain learning: Towards a framework", *Supply Chain Management: An International Journal*, Vol. 17 No. 6, pp. 627-637.
- Ling-Yee, L. and Ogunmokun, G. O. (2001), "Effect of export financing resources and supply-chain skills on export competitive advantages: Implications for superior export performance", *Journal of World Business*, Vol. 36 No. 3, pp. 260-279.
- Mangan, J. and Christopher, M. (2005), "Management development and the supply chain manager of the future", *The International Journal of Logistics Management*, Vol. 16 No. 2, pp. 178-191.

- Mangan, J. et al. (2004), "Combining quantitative and qualitative methodologies in logistics research", *International Journal of Physical Distribution & Logistics Management*, Vol. 34 No. 7, pp. 565-578.
- Margherita, A. et al. (2009), "New challenges for agribusiness management. Designing a curriculum for competencies building", *International Journal of Continuing Engineering Education and Life-Long Learning*, Vol. 19 No. 1, pp. 19-33.
- McCarter, M. W. et al. (2005), "The effect of people on the supply chain world: Some overlooked issues", *Human Systems Management*, Vol. 24 No. 3, pp. 197-208.
- Morgan, T. R. et al. (2016), "Developing a reverse logistics competency: The influence of collaboration and information technology", *International Journal of Physical Distribution & Logistics Management*, Vol. 46 No. 3, pp. 293-315.
- Myers, M. B. et al. (2004), "Maximizing the human capital equation in logistics: education, experience, and skills", *Journal of Business Logistics*, Vol. 25 No. 1, pp. 211-229.
- Ngai, E. W. T. et al. (2011), "Information technology, operational, and management competencies for supply chain agility: findings from case studies", *Journal of Strategic Information Systems*, Vol. 20 No. 3, pp. 232-249.
- Näslund, D. (2002), "Logistics need qualitative research - especially action based", *International Journal of Physical Distribution & Logistics Management*, Vol. 32 No. 5, pp. 321-338.
- Okongwu, U. (2007), "An Innovative Supply Chain Management Programme Structure: Broadening the SCM Skill Set", *International Journal of Learning and Change*, Vol. 2 No. 2, pp. 192-212.
- Parry, G. et al. (2006), "The threat to core competence posed by developing closer supply chain relationships", *International Journal of Logistics Research and Applications*, Vol. 9 No. 3, pp. 295-305.
- Parry, G. et al. (2010), "Lean competence: integration of theories in operations management practice", *Supply Chain Management: An International Journal*, Vol. 15 No. 3, pp. 216-226.
- Perunović, Z. et al. (2012), "Impact of information technology on vendor objectives, capabilities, and competences in contract electronic manufacturing", *International Journal of Production Economics*, Vol. 139 No. 1, pp. 207-219.
- Prahalad, C. K. and Hamel, G. (1990), "The Core Competence of the Corporation", *Harvard Business Review*, Vol. 68 No. 3, pp. 79-91.
- Prajogo, D. and Sohal, A. (2013), "Supply chain professionals: A study of competencies, use of technologies, and future challenges", *International Journal of Operations & Production Management*, Vol. 33 No. 11/12, pp. 1532-1554.
- Richey, G. et al. (2010), "Marketing Managers" in the Context of Global Supply Chains: Functional Versus Multiple IQ Competencies", *Journal of Marketing Channels*, Vol. 17 No. 3, pp. 243-262.
- Richey, R. G. et al. (2007), "Firm technological readiness and complementarity: Capabilities impacting logistics service competency and performance", *Journal of Business Logistics*, Vol. 28 No. 1, pp. 195-228.
- Rojó, A. et al. (2016), "The impact of ambidexterity on supply chain flexibility fit", *Supply Chain Management: An International Journal*, Vol. 21 No. 4, pp. x-x.

- Rosenzweig, E. D. and Roth, A. V. (2007), "B2B seller competence: construct development and measurement using a supply chain strategy lens", *Journal of Operations Management*, Vol. 25 No. 6, pp. 1311-1331.
- Roth, A. V. et al. (2008), "Antecedents and performance outcomes of global competence: An empirical investigation", *Journal of Engineering and Technology Management*, Vol. 25 No. 1-2, pp. 75-92.
- Rousseau, D. M. et al. (2008), "Evidence in Management and Organizational Science: Assembling the Field's Full Weight of Scientific Knowledge Through Syntheses", *Academy of management annals*, Vol. 2 No. 1, pp. 475-515.
- Samuel, K. E. and Spalanzani, A. (2009), "Developing collaborative competencies within supply chains", *International Journal of Information Technology & Management*, Vol. 8 No. 2, pp. 146-160.
- Sanchez, R. (2004), "Understanding competence-based management: Identifying and managing five modes of competence", *Journal of Business Research*, Vol. 57 No. 5, pp. 518-532.
- Sangari, M. S. and Razmi, J. (2015), "Business intelligence competence, agile capabilities, and agile performance in supply chain: An empirical study", *The International Journal of Logistics Management*, Vol. 26 No. 2, pp. 356-380.
- Sarkees, M. and Hulland, J. (2009), "Innovation and efficiency: It is possible to have it all", *Business Horizons*, Vol. 52 No. 1, pp. 45-55.
- Sauber, M. H. et al. (2008), "Developing supply chain management program: A competency model", *Quality Assurance in Education*, Vol. 16 No. 4, pp. 375-391.
- Schoenherr, T. et al. (2014), "Intangible capital, knowledge and new product development competence in supply chains: Process, interaction and contingency effects among SMEs", *International Journal of Production Research*, Vol. 52 No. 16, pp. 4916-4929.
- Schoenherr, T. and Narasimhan, R. (2012), "The fit between capabilities and priorities and its impact on performance improvement: revisiting and extending the theory of production competence", *International Journal of Production Research*, Vol. 50 No. 14, pp. 3755-3775.
- Seuring, S. and Gold, S. (2012), "Conducting content-analysis based literature reviews in supply chain management", *Supply Chain Management: An International Journal*, Vol. 17 No. 5, pp. 544 - 555.
- Shou, Y. and Wang, W. (2015), "Multidimensional competences of supply chain managers: an empirical study", *Enterprise Information Systems*, available at: <http://www.tandfonline.com/doi/abs/10.1080/17517575.2015.1080303> (accessed: August 2015).
- Shub, A. N. and Stonebraker, P. W. (2009), "The human impact of supply chains: evaluating the importance of soft areas on integration and performance", *Supply Chain Management: An International Journal*, Vol. 14 No. 1, pp. 31-40.
- Sohal, A. S. (2013), "Developing competencies of supply chain professionals in Australia: collaboration between businesses, universities and industry associations", *Supply Chain Management: An International Journal*, Vol. 18 No. 4, pp. 429-439.
- Spekman, R. E. et al. (2002), "Supply chain competency: learning as a key component", *Supply Chain Management: An International Journal*, Vol. 7 No. 1, pp. 41-55.

- Stemler, S. (2001), "An overview of content analysis", *Practical Assessment, Research and Evaluation*, available at: <http://pareonline.net/getvn.asp?v=7&n=17> (accessed: October 2014).
- Stuart, F. I. et al. (2012), "Trust in buyer-supplier relationships", *Journal of Enterprise Information Management*, Vol. 25 No. 4, pp. 392-412.
- Sweeney, E. (2013), "The People Dimension in Logistics and Supply Chain Management – its Role and Importance", in Passaro, R. & Thomas, A. (eds.), *Supply Chain Management: Perspectives, Issues and Cases*, McGraw Hill, Milan, Italy, pp. 73-82.
- Tachizawa, E. M. and Wong, C. Y. (2014), "Towards a theory of multi-tier sustainable supply chains: a systematic literature review", *Supply Chain Management: An International Journal*, Vol. 19 No. 5-6, pp. 643-663.
- Teece, D. J. et al. (1997), "Dynamic capabilities and strategic management", *Strategic Management Journal*, Vol. 18 No. 7, pp. 509-533.
- Thai, V. V. (2012a), "Competencies required by port personnel in the new era: Conceptual framework and case study", *International Journal of Shipping and Transport Logistics*, Vol. 4 No. 1, pp. 49-77.
- Thai, V. V. (2012b), "Competency requirements for professionals in logistics and supply chain management", *International Journal of Logistics Research and Applications*, Vol. 15 No. 2, pp. 109-126.
- Thai, V. V. and Yeo, G. T. (2015), "Perceived competencies required for container shipping logisticians in Singapore and South Korea", *The International Journal of Logistics Management*, Vol. 26 No. 2, pp. 334-355.
- Thomas, R. (2014), "In modern supply chains, the soft stuff is the hard stuff", *International Journal of Physical Distribution & Logistics Management*, Vol. 44 No. 6, pp. 1-4.
- Tokman, M. et al. (2011), "Logistics service orientation: An integrated strategy to build logistics service competency", *Journal of Transportation Management*, Vol. 22 No. 1, pp. 27-46.
- Tranfield, D. et al. (2003), "Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review", *British Journal of Management*, Vol. 14 No. 3, pp. 207-222.
- van Hoek, R. and Wagner, B. (2013), "Supply chain management (SCM): current education provision and practitioner future needs", *Supply Chain Management: An International Journal*, Vol. 18 No. 4.
- Van Hoek, R. I. et al. (2002), "Managers in supply chain management, the critical dimension", *Supply Chain Management: An International Journal*, Vol. 7 No. 3, pp. 119-125.
- Wang, C. et al. (2008), "A conceptual case-based model for knowledge sharing among supply chain members", *Business Process Management Journal*, Vol. 14 No. 2, pp. 147-165.
- Whipple, J. M. et al. (2015), "A Dyadic investigation of collaborative competence, social capital, and performance in buyer-supplier relationships", *Journal of Supply Chain Management*, Vol. 51 No. 2, pp. 3-21.
- Zacharia, Z. G. et al. (2011), "Capabilities that enhance outcomes of an episodic supply chain collaboration", *Journal of Operations Management*, Vol. 29 No. 6, pp. 591-603.

APPENDIX I – Publication reference numbers

1. Ambulkar, S. et al. (2016), "Supply chain risk mitigation competency: an individual-level knowledge-based perspective", *International Journal of Production Research*, Vol. 54 No. 5, pp. 1398-1411.
2. Armoutis, N. et al. (2008), "Establishing agile supply networks through competence profiling", *International Journal of Computer Integrated Manufacturing*, Vol. 21 No. 2, pp. 166-173.
3. Barclay, I. (2005), "Supply chain management in SMEs — benchmarking best practice core competencies", *Journal of General Management*, Vol. 30 No. 3, pp. 35-50.
4. Barnes, J. and Liao, Y. (2012), "The Effect of Individual, Network, and Collaborative Competencies on the Supply Chain Management System", *International Journal of Production Economics*, Vol. 140 No. 2, pp. 888-899.
5. Berlak, J. and Weber, V. (2004), "How to configure cyber chains via competence networks", *Business Process Management Journal*, Vol. 10 No. 3, pp. 291-299.
6. Bernon, M. and Mena, C. (2013), "The evolution of customised executive education in supply chain management", *Supply Chain Management: An International Journal*, Vol. 18 No. 4, pp. 440-453.
7. Blome, C. et al. (2013), "Antecedents and enablers of supply chain agility and its effect on performance: a dynamic capabilities perspective", *International Journal of Production Research*, Vol. 51 No. 4, pp. 1295-1318.
8. Bowersox, D. J. et al. (2000), "How Supply Chain Competency Leads to Business Success", *Supply Chain Management Review*, Vol. 4 No. 4, pp. 70-78.
9. Bölsche, D. et al. (2013), "Specific competencies in humanitarian logistics education", *Journal of Humanitarian Logistics and Supply Chain Management*, Vol. 3 No. 2, pp. 99-128.
10. Chiadamrong, N. and Suppakitjarak, N. (2008), "Relationships of supply chain management capability and manufacturing operations competence on organisational performance: A case study of Thai industries", *International Journal of Logistics Systems and Management*, Vol. 4 No. 5, pp. 551-573.
11. Chikán, A. and Gelei, A. (2010), "New Insight into the Competitiveness of Supplier Firms: Aligning Competences and Customer Expectations", *Supply Chain Forum: An International Journal*, Vol. 11 No. 2, pp. 30-44.
12. Cox, A. (2001), "Understanding Buyer and Supplier Power: A Framework for Procurement and Supply Competence", *Journal of Supply Chain Management*, Vol. 37 No. 1, pp. 8-15.
13. Das, A. and Narasimhan, R. (2000), "Purchasing Competence and Its Relationship with Manufacturing Performance", *Journal of Supply Chain Management*, Vol. 36 No. 1, pp. 17-28.
14. Davis, D. F. and Golicic, S. L. (2010), "Gaining comparative advantage in supply chain relationships: the mediating role of market-oriented IT competence", *Journal of the Academy of Marketing Science*, Vol. 38 No. 1, pp. 56-70.
15. Ding, M. J. et al. (2012), "Operational routines and supply chain competencies of Chinese logistics service providers", *The International Journal of Logistics Management*, Vol. 23 No. 3, pp. 383-407.
16. Ding, M. J. et al. (2015), "Effects of human resource management practices on logistics and supply chain competencies — evidence from China logistics service market", *International Journal of Production Research*, Vol. 53 No. 10, pp. 2885-2903.
17. Dotson, M. J. et al. (2015), "Desired skills and competencies of prospective supply chain managers: An empirical investigation of US supply chain executives", *International Journal of Logistics Systems and Management*, Vol. 22 No. 1, pp. 55-66.
18. Drejer, A. and Sørensen, S. (2002), "Succeeding with sourcing of competencies in technology-intensive industries", *Benchmarking: An International Journal*, Vol. 9 No. 4, pp. 388-408.
19. Dubey, R. and Gunasekaran, A. (2015), "Supply chain talent: The missing link in supply chain strategy", *Industrial and Commercial Training*, Vol. 47 No. 5, pp. 257-264.
20. Ellinger, A. E. et al. (2015), "Learning orientation, integration, and supply chain risk management in Chinese manufacturing firms", *International Journal of Logistics Research and Applications*, Vol. 18 No. 6, pp. 476-493.
21. Ellinger, A. E. and Ellinger, A. D. (2014), "Leveraging human resource development expertise to improve supply chain managers' skills and competencies", *European Journal of Training and Development*, Vol. 38 No. 1-2, pp. 118-135.
22. Ellinger, A. E. et al. (2011), "Supply chain management competency and firm financial success", *Journal of Business Logistics*, Vol. 32 No. 3, pp. 214-226.
23. Ellinger, A. E. et al. (2012), "The influence of supply chain management competency on customer satisfaction and shareholder value", *Supply Chain Management: An International Journal*, Vol. 17 No. 3, pp. 249-262.

24. Essex, A. et al. (2016), "The relationship between supply chain manager capabilities and performance: empirical evidence", *Production Planning & Control*, Vol. 27 No. 3, pp. 198-211.
25. Feldmann, A. and Olhager, J. (2013), "Plant roles: Site competence bundles and their relationships with site location factors and performance", *International Journal of Operations & Production Management*, Vol. 33 No. 6, pp. 722-744.
26. Ferrer, M. et al. (2011), "Competences and capabilities for innovation in supply chain relationships", *International Journal of Technology Management*, Vol. 56 No. 2/3/4, pp. 272-289.
27. Fulconis, F. et al. (2006), "Exploring New Competences in the Logistics Industry: The Intermediation Role of 4PL", *Supply Chain Forum: An International Journal*, Vol. 7 No. 2, pp. 68-77.
28. Gammelgaard, B. and Larson, P. D. (2001), "Logistics Skills and Competencies for Supply Chain Management", *Journal of Business Logistics*, Vol. 22 No. 2, pp. 27-50.
29. George, S. A. and Rangaraj, N. (2006), "New organisational competences for supply chain management: A study in the Indian context", *International Journal of Value Chain Management*, Vol. 1 No. 3, pp. 205-222.
30. Golini, R. et al. (2014), "Developing sustainability in global manufacturing networks: The role of site competence on sustainability performance", *International Journal of Production Economics*, Vol. 147 No. B, pp. 448-459.
31. Green Jr., K. W. et al. (2014), "Total JIT (T-JIT) and its impact on supply chain competency and organizational performance", *International Journal of Production Economics*, Vol. 147 No. A, pp. 125-135.
32. Ha, B.-C. et al. (2011), "Suppliers' affective trust and trust in competency in buyers", *International Journal of Operations & Production Management*, Vol. 31 No. 1, pp. 56-77.
33. Halley, A. and Beaulieu, M. (2001), "Supply Chain Management and Development of Competencies: The Learning Logistics Concept and Applications", *Supply Chain Forum: An International Journal*, Vol. 2 No. 2, pp. 12-19.
34. Halley, A. and Beaulieu, M. (2009), "Mastery of operational competencies in the context of supply chain management", *Supply Chain Management: An International Journal*, Vol. 14 No. 1, pp. 49-63.
35. Halley, A. et al. (2010), "The impact of the supply chain on core competencies and knowledge management: directions for future research", *International Journal of Technology Management*, Vol. 49 No. 4, pp. 297-313.
36. Halley, A. et al. (2006), "Power Relationships and Their Impact on Competency Development", *Supply Chain Forum: An International Journal*, Vol. 7 No. 2, pp. 4-14.
37. Hanna, V. (2007), "Exploiting complementary competencies via inter-firm cooperation", *International Journal of Technology Management*, Vol. 37 No. 3/4, pp. 247-258.
38. Harvey, M. G. and Richey, R. G. (2001), "Global supply chain management: The selection of globally competent managers", *Journal of International Management*, Vol. 7 No. 2, pp. 105-128.
39. Heide, M. et al. (2008), "The paradoxical role of competence development in supply chain management: Empirical findings from Norway", *International Journal of Logistics Research and Applications*, Vol. 11 No. 1, pp. 1-15.
40. Hsu, C.-C. et al. (2011), "Entrepreneurial SCM competence and performance of manufacturing SMEs", *International Journal of Production Research*, Vol. 49 No. 22, pp. 6629-6649.
41. Huo, B. et al. (2015), "The effect of high-involvement human resource management practices on supply chain integration", *International Journal of Physical Distribution & Logistics Management*, Vol. 45 No. 8, pp. 716-746.
42. Jasemi, M. et al. (2014), "On competence of vendor managed inventory in supply chains using basic mathematical inventory models", *Scientia Iranica*, Vol. 21 No. 3, pp. 1061-1071.
43. Jüttner, U. et al. (2006), "Demand chain alignment competence — delivering value through product life cycle management", *Industrial Marketing Management*, Vol. 35 No. 8, pp. 989-1001.
44. Kayakutlu, G. and Büyüközkan, G. (2010), "Effective supply value chain based on competence success", *Supply Chain Management: An International Journal*, Vol. 15 No. 2, pp. 129-138.
45. Kern, D. et al. (2011), "Purchasing competence: A stakeholder-based framework for Chief Purchasing Officers", *Journal of Business Logistics*, Vol. 32 No. 2, pp. 122-138.
46. Kim, Y. H. and Wemmerloev, U. (2015), "Does a Supplier's Operational Competence Translate into Financial Performance? An Empirical Analysis of Supplier-Customer Relationships", *Decision Sciences*, Vol. 46 No. 1, pp. 101-134.
47. Kovács, Z. et al. (2011), "Competence requirement determination and development in supply chains", *Problems of Management in the 21st Century*, available at: http://www.scientiasocialis.lt/pmc/files/pdf/Kovacs_Vol.2.pdf (accessed: October 2014).
48. Kusaba, K. et al. (2011), "Low-cost country sourcing competence: A conceptual framework and empirical analysis", *Journal of Supply Chain Management*, Vol. 47 No. 4, pp. 73-93.

49. Lin, M.-L. et al. (2015), "An Intermediary's Learning Business System: A Case Study of Gore-Tex", *Long Range Planning*, Vol. in press.
50. Ling-Yee, L. and Ogunmokun, G. O. (2001), "Effect of export financing resources and supply-chain skills on export competitive advantages: Implications for superior export performance", *Journal of World Business*, Vol. 36 No. 3, pp. 260-279.
51. Lutz, S. and Ritter, T. (2009), "Outsourcing, supply chain upgrading and connectedness of a firm's competencies", *Industrial Marketing Management*, Vol. 38 No. 4, pp. 387-393.
52. Malekifar, S. et al. (2014), "Organizational culture, IT competence, and supply chain agility in small and medium-size enterprises", *Global Business and Organizational Excellence*, Vol. 33 No. 6, pp. 69-75.
53. Mangan, J. and Christopher, M. (2005), "Management development and the supply chain manager of the future", *The International Journal of Logistics Management*, Vol. 16 No. 2, pp. 178-191.
54. Marcus, A. A. and Anderson, M. H. (2006), "A general dynamic capability: Does it propagate business and social competencies in the retail food industry?", *Journal of Management Studies*, Vol. 43 No. 1, pp. 19-46.
55. Margherita, A. et al. (2009), "New challenges for agribusiness management. Designing a curriculum for competencies building", *International Journal of Continuing Engineering Education and Life-Long Learning*, Vol. 19 No. 1, pp. 19-33.
56. Mollenkopf, D. and Dapiran, G. P. (2005), "The importance of developing logistics competencies: a study of Australian and New Zealand firms", *International Journal of Logistics Research and Applications*, Vol. 8 No. 1, pp. 1-14.
57. Morgan, T. R. et al. (2016), "Developing a reverse logistics competency: The influence of collaboration and information technology", *International Journal of Physical Distribution & Logistics Management*, Vol. 46 No. 3, pp. 293-315.
58. Myers, M. B. et al. (2004), "Maximizing the human capital equation in logistics: education, experience, and skills", *Journal of Business Logistics*, Vol. 25 No. 1, pp. 211-229.
59. Møller, M. M. et al. (2003), "Managing buyer-supplier relationships and inter-organisational competence development", *Integrated Manufacturing Systems*, Vol. 14 No. 4, pp. 369-379.
60. Ngai, E. W. T. et al. (2011), "Information technology, operational, and management competencies for supply chain agility: findings from case studies", *Journal of Strategic Information Systems*, Vol. 20 No. 3, pp. 232-249.
61. Okongwu, U. (2007), "An Innovative Supply Chain Management Programme Structure: Broadening the SCM Skill Set", *International Journal of Learning and Change*, Vol. 2 No. 2, pp. 192-212.
62. Parry, G. et al. (2006), "The threat to core competence posed by developing closer supply chain relationships", *International Journal of Logistics Research and Applications*, Vol. 9 No. 3, pp. 295-305.
63. Parry, G. et al. (2010), "Lean competence: integration of theories in operations management practice", *Supply Chain Management: An International Journal*, Vol. 15 No. 3, pp. 216-226.
64. Paulraj, A. et al. (2008), "Inter-organizational communication as a relational competency: Antecedents and performance outcomes in collaborative buyer-supplier relationships", *Journal of Operations Management*, Vol. 26 No. 1, pp. 45-64.
65. Perunović, Z. et al. (2012), "Impact of information technology on vendor objectives, capabilities, and competences in contract electronic manufacturing", *International Journal of Production Economics*, Vol. 139 No. 1, pp. 207-219.
66. Prajogo, D. and Sohal, A. (2013), "Supply chain professionals: A study of competencies, use of technologies, and future challenges", *International Journal of Operations & Production Management*, Vol. 33 No. 11/12, pp. 1532-1554.
67. Pyne, R. et al. (2007), "Enhancing the intercultural competence of postgraduate logisticians", *International Journal of Logistics Research and Applications*, Vol. 10 No. 3, pp. 221-233.
68. Richey, G. et al. (2010), ""Marketing Managers" in the Context of Global Supply Chains: Functional Versus Multiple IQ Competencies", *Journal of Marketing Channels*, Vol. 17 No. 3, pp. 243-262.
69. Richey, R. G. et al. (2007), "Firm technological readiness and complementarity: Capabilities impacting logistics service competency and performance", *Journal of Business Logistics*, Vol. 28 No. 1, pp. 195-228.
70. Richey, R. G. and Wheeler, A. R. (2004), "A New Framework for Supply Chain Manager Selection", *Journal of Marketing Channels*, Vol. 11 No. 4, pp. 89-103.
71. Rogers, D. S. et al. (2013), "Reverse logistics: A New Core Competency", *Supply Chain Management Review*, Vol. 17 No. 3, pp. 40-47.
72. Rosenzweig, E. D. and Roth, A. V. (2007), "B2B seller competence: construct development and measurement using a supply chain strategy lens", *Journal of Operations Management*, Vol. 25 No. 6, pp. 1311-1331.

73. Roth, A. V. et al. (2008), "Antecedents and performance outcomes of global competence: An empirical investigation", *Journal of Engineering and Technology Management*, Vol. 25 No. 1-2, pp. 75-92.
74. Salvador, F. and Villena, V. H. (2013), "Supplier integration and NPD outcomes: conditional moderation effects of modular design competence", *Journal of Supply Chain Management*, Vol. 49 No. 1, pp. 87-113.
75. Samuel, K. E. and Spalanzani, A. (2009), "Developing collaborative competencies within supply chains", *International Journal of Information Technology & Management*, Vol. 8 No. 2, pp. 146-160.
76. Sangari, M. S. and Razmi, J. (2015), "Business intelligence competence, agile capabilities, and agile performance in supply chain: An empirical study", *The International Journal of Logistics Management*, Vol. 26 No. 2, pp. 356-380.
77. Sauber, M. H. et al. (2008), "Developing supply chain management program: A competency model", *Quality Assurance in Education*, Vol. 16 No. 4, pp. 375-391.
78. Schoenherr, T. et al. (2014), "Intangible capital, knowledge and new product development competence in supply chains: Process, interaction and contingency effects among SMEs", *International Journal of Production Research*, Vol. 52 No. 16, pp. 4916-4929.
79. Schoenherr, T. and Narasimhan, R. (2012), "The fit between capabilities and priorities and its impact on performance improvement: revisiting and extending the theory of production competence", *International Journal of Production Research*, Vol. 50 No. 14, pp. 3755-3775.
80. Shou, Y. and Wang, W. (2015), "Multidimensional competences of supply chain managers: an empirical study", *Enterprise Information Systems*, available at: <http://www.tandfonline.com/doi/abs/10.1080/17517575.2015.1080303> (accessed: August 2015).
81. Shukla, R. K. et al. (2013), "Supply chain coordination competency and firm performance: An empirical study", *International Journal of Supply Chain Management*, Vol. 2 No. 4, pp. 64-70.
82. Sohal, A. S. (2013), "Developing competencies of supply chain professionals in Australia: collaboration between businesses, universities and industry associations", *Supply Chain Management: An International Journal*, Vol. 18 No. 4, pp. 429-439.
83. Spekman, R. E. et al. (2002), "Supply chain competency: learning as a key component", *Supply Chain Management: An International Journal*, Vol. 7 No. 1, pp. 41-55.
84. Stentoft Arlbjörn, J. et al. (2006), "Improved change readiness through supply chain competency development", *Industrial and Commercial Training*, Vol. 38 No. 3, pp. 128-136.
85. Stuart, F. I. et al. (2012), "Trust in buyer-supplier relationships", *Journal of Enterprise Information Management*, Vol. 25 No. 4, pp. 392-412.
86. Sun, L. (2013), "Core Competences, Supply Chain Partners' Knowledge-Sharing, and Innovation: An Empirical Study of the Manufacturing Industry in Taiwan", *International Journal of Business and Information*, Vol. 8 No. 2, pp. 299-324.
87. Thai, V. V. (2012), "Competencies required by port personnel in the new era: Conceptual framework and case study", *International Journal of Shipping and Transport Logistics*, Vol. 4 No. 1, pp. 49-77.
88. Thai, V. V. (2012), "Competency requirements for professionals in logistics and supply chain management", *International Journal of Logistics Research and Applications*, Vol. 15 No. 2, pp. 109-126.
89. Thai, V. V. and Yeo, G. T. (2015), "Perceived competencies required for container shipping logisticians in Singapore and South Korea", *The International Journal of Logistics Management*, Vol. 26 No. 2, pp. 334-355.
90. Tokman, M. et al. (2011), "Logistics service orientation: An integrated strategy to build logistics service competency", *Journal of Transportation Management*, Vol. 22 No. 1, pp. 27-46.
91. Torkkeli, L. (2014), "Profitable SME internationalisation: The influence of cross-relational and relationship-specific network competence", *International Journal of Procurement Management*, Vol. 7 No. 6, pp. 677-694.
92. Wadhwa, S. et al. (2008), "Supply chain as a flexible system: A KM focused competence", *Global Journal of Flexible Systems Management*, Vol. 9 No. 2-3, pp. 15-30.
93. Wang, C. et al. (2008), "A conceptual case-based model for knowledge sharing among supply chain members", *Business Process Management Journal*, Vol. 14 No. 2, pp. 147-165.
94. Varella, L. and Gonçalves, M. B. (2013), "Information Technology as the Main Competence in the Design of the Strategic Planning of Logistics Platforms", *Journal of Technology Management & Innovation*, Vol. 8 No. 3, pp. 160-172.
95. Venkatasubramanian, V. and Baskaran, R. (2014), "Developing Competency by Strategising an Agile Supply Chain", *International Journal of Research in Commerce, Economics and Management*, Vol. 4 No. 3, pp. 66-70.

96. Whipple, J. M. et al. (2015), "A Dyadic investigation of collaborative competence, social capital, and performance in buyer-supplier relationships", *Journal of Supply Chain Management*, Vol. 51 No. 2, pp. 3-21.
97. Wieland, A. and Wallenburg, C. M. (2013), "The influence of relational competencies on supply chain resilience: a relational view", *International Journal of Physical Distribution & Logistics Management*, Vol. 43 No. 4, pp. 300-320.
98. Zacharia, Z. G. et al. (2011), "Capabilities that enhance outcomes of an episodic supply chain collaboration", *Journal of Operations Management*, Vol. 29 No. 6, pp. 591-603.

APPENDIX II – Sources in the review and publications

Journal	No.
Supply Chain Management: An International Journal	7
International Journal of Logistics: Research and Applications	6
International Journal of Production Research	6
Journal of Business Logistics	5
Journal of Supply Chain Management	5
International Journal of Production Economics	4
Supply Chain Forum: An International Journal	4
The International Journal of Logistics Management	4
International Journal of Operations & Production Management	3
International Journal of Physical Distribution & Logistics Management	3
International Journal of Technology Management	3
Journal of Operations Management	3
Business Process Management Journal	2
Industrial and Commercial Training	2
Industrial Marketing Management	2
International Journal of Logistics Systems and Management	2
Journal of Marketing Channels	2
Supply Chain Management Review	2
Benchmarking: An International Journal	1
Decision Sciences	1
Enterprise Information Systems	1
European Journal of Training and Development	1
Global Business and Organizational Excellence	1
Global Journal of Flexible Systems Management	1
Integrated Manufacturing Systems	1
International Journal of Business and Information	1
International Journal of Computer Integrated Manufacturing	1
International Journal of Continuing Engineering Education and Life-Long Learning	1
International Journal of Information Technology & Management	1
International Journal of Learning and Change	1
International Journal of Procurement Management	1
International Journal of Research in Commerce, Economics and Management	1
International Journal of Shipping and Transport Logistics	1
International Journal of Supply Chain Management	1
International Journal of Value Chain Management	1
Journal of Engineering and Technology Management	1
Journal of Enterprise Information Management	1
Journal of General Management	1
Journal of Humanitarian Logistics and Supply Chain Management	1
Journal of International Management	1
Journal of Management Studies	1
Journal of Strategic Information Systems	1

Journal of Technology Management & Innovation	1
Journal of the Academy of Marketing Science	1
Journal of Transportation Management	1
Journal of World Business	1
Long Range Planning	1
Problems of Management in the 21st Century	1
Production Planning & Control	1
Quality Assurance in Education	1
Scientia Iranica	1
Total:	51 unique (98)

APPENDIX III – Authors in the review and publications

Author	No.	Author	No.	Author	No.	Author	No.
Richey, R. G.	6	Bowersox, D. J.	1	Hsu, P.-K.	1	Rogers, D. S.	1
Ellinger, A. E.	4	Chiurciu, R.-M.	1	Kovács, Z.	1	Rosenzweig, E. D.	1
Halley, A.	4	Cho, S.	1	Kusaba, K.	1	Roy, J.	1
Beaulieu, M.	3	Christoffersen, M.	1	Lado, A. A.	1	Saglietto, L.	1
Chen, H.	3	Closs, D. J.	1	Lalwani, C. S.	1	Salvador, F.	1
Schoenherr, T.	3	Cox, A.	1	Laosirihongthong, T.	1	Samuel, K. E.	1
Thai, V. V.	3	Dapiran, G. P.	1	Larson, P. D.	1	Sangari, M. S.	1
Adams, F. G.	2	Das, A.	1	Lembke, R.	1	Santa, R.	1
Christopher, M.	2	Davè, D. S.	1	Leong, G. K.	1	Sauber, M. H.	1
Daugherty, P. J.	2	Davis, D. F.	1	Liao, Y.	1	Saxena, A.	1
Ding, M. J.	2	De Haas, H.	1	Lin, M.-L.	1	Secundo, G.	1
Griffith, D. A.	2	Dinwoodie, J.	1	Ling-Yee, L.	1	Shin, H.	1
Gunasekaran, A.	2	Dotson, M. J.	1	Liu, R.-J.	1	Shou, Y.	1
Harvey, M.	2	Drejer, A.	1	Lomas, C.	1	Shukla, R. K.	1
Hofman, D.	2	Dubey, R.	1	Longoni, A.	1	Spalanzani, A.	1
Johansen, J.	2	Ducq, Y.	1	Lutz, S.	1	Spear, J.	1
Kam, B. H.	2	Elbert, N.	1	Malekifar, S.	1	Spekman, R. E.	1
Lusch, R. F.	2	Ellinger, A. D.	1	Mangan, J.	1	Stank, T. P.	1
Moser, R.	2	Essex, A.	1	Marcus, A. A.	1	Stentoft Arlbjorn, J.	1
Narasimhan, R.	2	Feldmann, A.	1	Margherita, A.	1	Storer, M.	1
Nollet, J.	2	Fergusson, C.	1	Maropoulos, P. G.	1	Stuart, F. I.	1
O'Marah, K.	2	Ferrer, M.	1	Matthews, P.	1	Subramanian, N.	1
Parry, G.	2	Froehle, C. M.	1	McSurely, H. B.	1	Sun, L.	1
Roth, A. V.	2	Fulconis, F.	1	Mefford, R.	1	Sundaresan, N.	1
Sohal, A. S.	2	Gammelgaard, B.	1	Mena, C.	1	Suppakitjarak, N.	1
Abidi, H.	1	Garg, D.	1	Miller, S. E.	1	Sørensen, S.	1
Agarwal, A.	1	Gelei, A.	1	Mills, J.	1	Taghizadeh, S. K.	1
Ambulkar, S.	1	George, S. A.	1	Moeller, M.	1	Tan, K. C.	1
Anderson, M. H.	1	Gharibi, M.	1	Mollenkopf, D.	1	Taskin, N.	1
Antony, J.	1	Godsell, J.	1	Morgan, T. R.	1	Taurino, C.	1
Armoutis, N.	1	Golicic, S. L.	1	Myers, M. B.	1	Tian, Y.	1
Armstrong, C.	1	Golini, R.	1	Møller, M. M.	1	Tokman, M.	1
Autry, C. W.	1	Gonçalves, M. B.	1	Natarajarathinam, M.	1	Torkkeli, L.	1
Barclay, I.	1	Graves, A.	1	Ngai, E. W. T.	1	Tummala, V. M. R.	1
Barnes, J.	1	Green Jr., K. W.	1	Nix, N. W.	1	Turner, C.	1
Baskaran, R.	1	Grønhaug, K.	1	Northington, W. M.	1	Vaaland, T. I.	1
Benardino, J.	1	Ha, B.-C.	1	Nørmølle, J.	1	Wadhwa, S.	1
Berlak, J.	1	Haji, A.	1	Ogunmokun, G. O.	1	Wallenburg, C. M.	1
Bernon, M.	1	Han, Z.	1	Oh, E.-T.	1	Wang, C.	1
Bigras, Y.	1	Hanna, V.	1	Okongwu, U.	1	Wang, W.	1
Birou, L. M.	1	Hardy, G.	1	Olhager, J.	1	Varella, L.	1
Blackhurst, J. V.	1	Hartmann, E.	1	Paché, G.	1	Weber, V.	1
Blome, C.	1	Heide, M.	1	Park, Y.-K.	1	Wemmerloev, U.	1
Boer, H.	1	Hsu, C.-C.	1	Pató, B.	1	Venkatasubramanian, V.	1

Boyer, K. K.	1	Huo, B.	1	Paulraj, A.	1	Verville, J.	1
Brian Gray, J.	1	Hyland, P.	1	Perry, D.	1	Wheeler, A. R.	1
Büyüközkan, G.	1	Inman, R. A.	1	Perunović, Z.	1	Whipple, J. M.	1
Bölsche, D.	1	James-Moore, M.	1	Prajogo, D.	1	Whitten, D.	1
Cagliano, R.	1	Jasemi, M.	1	Prakash, A.	1	Wiedmer, R.	1
Cantor, D. E.	1	Jie, F.	1	Pyne, R.	1	Wieland, A.	1
Caspersen, R.	1	Jüttner, U.	1	Rahman, S. A.	1	Villena, V. H.	1
Cattani, K. D.	1	Kamauff, J.	1	Rangaraj, N.	1	Yeo, G. T.	1
Chan, T. L. A.	1	Kayakutlu, G.	1	Razmi, J.	1	Zacharia, Z. G.	1
Chandra, A.	1	Keller, S. B.	1	Rexhausen, D.	1	Zhang, J. Y.	1
Chau, D. C. K.	1	Kern, D.	1	Ritter, T.	1	Zhao, X.	1
Chen, I. J.	1	Khan, S. U. R.	1	Roath, A. S.	1		
Chiadamrong, N.	1	Kim, Y. H.	1	Rodrigues, A. M.	1		
Chikán, A.	1	Klumpp, M.	1	Roe, M.	1		
Total:						229 unique (266)	

