



Exploring Competence and Workplace Learning in Supply Chain Management

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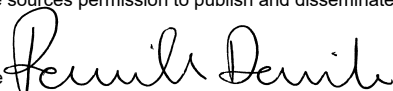
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In memory of my late Grandma Signe.

*And to all other people with a passion for learning who would have loved,
but were (and still are!) denied further professional development opportunities.*

Table of Contents

Abstract	xiii
Popular science summary in Swedish	xv
Acknowledgement.....	xvii
List of figures	xix
List of tables.....	xxi
List of publications.....	xxiii
Preface	xxv
1 Introduction	1
1.1 Background.....	1
1.2 Research problems and questions.....	2
1.3 Research purpose and objectives	5
1.4 Focus and demarcations.....	5
2 Frame of reference	7
2.1 Literature domains.....	7
2.2 Supply chain management.....	7
2.2.1 Supply chain orientation.....	9
2.2.2 Human resources in SCM.....	9
2.3 Competence	11
2.3.1 Definitions of competence.....	11
2.3.2 Managerial competence	13
2.3.3 Organizational competence	14
2.4 Learning.....	15
2.4.1 Constructivist learning.....	15
2.4.2 Workplace learning.....	16
2.4.3 Organizational learning	17
3 Methodology	19
3.1 Point of departure and methodological approach	19
3.1.1 Methodological point of departure	19

3.1.2	Methodological approach	20
3.2	Scientific reasoning and the research process	21
3.3	Research design and research methods.....	23
3.3.1	Study I – systematic literature review	24
3.3.2	Study II – multiple case study	24
3.3.3	Study III – in-depth interview study.....	26
3.3.4	Reflection on research methodology and multiple methods...	27
3.4	Research quality	28
3.4.1	Credibility.....	28
3.4.2	Transferability	30
3.4.3	Dependability	30
3.4.4	Confirmability	31
4	Summary of results	33
4.1	Paper I – Competence in Supply Chain Management: A Systematic Review.....	33
4.1.1	The literature landscape.....	33
4.1.2	Aspects and facets of competence in SCM.....	34
4.2	Paper II – Manager Competences in Logistics and Supply Chain Practice.....	36
4.3	Paper III – How Supply Chain Professionals Learn at Work: An Investigation of Learning Mechanisms	39
4.4	Paper IV – Nurturing Workplace Learning for Supply Chain Professionals: An Organizational Perspective	42
5	Discussion and implications.....	43
5.1	Framing research on competence in SCM.....	43
5.2	Competence in SCM as a system	44
5.2.1	The “level of analysis” loop: interrelationships between individual and organizational levels.....	45
5.2.2	The snowball effect: interrelationships between competence and competence development.....	46
5.3	Managing competence in SCM	47
5.3.1	Implications for staffing of competence in SCM	48
5.3.2	Implications for assessment of competence in SCM.....	49
5.3.3	Implications for development of competence in SCM.....	49
5.3.4	Implications for compensation of competence in SCM.....	50
5.4	Implications for SCM education.....	51
6	Contributions and future research	53
6.1	Theoretical contributions.....	53

6.2	Managerial contributions.....	54
6.3	Methodological contributions.....	55
6.4	Suggestions for future research	56
6.4.1	Future avenues for the fields of competence and workplace learning in SCM	56
6.4.2	Future methodological avenues for the fields of competence and workplace learning in SCM	58
References		61

Abstract

Competence in supply chain management (SCM) is a key factor for achieving superior business performance. The top 25 companies identified as having excellent competence in SCM in the annual research reports by AMR Research/Gartner have displayed substantially higher financial results than their competitors. In line with this cognizance, human resources are increasingly viewed as enablers of SCM and a source of sustainable competitive advantage. There is, however, little consensus on what competence in SCM consists of, and due to constantly ongoing transformations in the supply chain, such competence also needs to develop continuously. The purpose of this research is to contribute to the overall understanding of competence in SCM, and to explore the development of such competence at work.

In line with the explorative nature of this research, a qualitative approach is used to investigate competence and workplace learning in SCM. The research is based on an interpretative epistemological stance and consists of three studies: a structured literature review, a case study, and an in-depth interview study. The case study is based on practice theory along with shadowing for data collection, while the in-depth interview study is based on middle-range theorizing and constructivist learning theory.

This research provides a unique overview of competence in SCM, as well as novel and in-depth insights into the learning process at work for SC professionals. The research also offers initial insights into how organizations can support such competence development. The results on competence in SCM (based on the structured literature review and the case study) extend previous knowledge by simultaneously taking an overall grip to structure the field on a top level, as well as excavating the details to provide understanding on a deeper level. The results on workplace learning in SCM (based on the in-depth interview study) extend previous research that has identified necessary competences for SC professionals, but has not explained how they should be achieved, or only focused on formal SCM education. While prior research stops short of identifying the full complexity of how workplace learning takes place for SC professionals, the in-depth interview study delves into constructive learning process including the full range of contextual elements that affect learning outcomes. The results also extend previous research on workplace learning that has been carried out from an organizational perspective. It does so through its attempt to identify interventions that can support competence development for SC professionals. In total, four frameworks and 22 propositions have been developed and presented.

Popular science summary in Swedish

Supply chain management (SCM) handlar om styrning av processer från inköp och produktion till distribution, med syftet att skapa en sammanhängande och högpresterande försörjningskedja. Kort uttryckt handlar det om att balansera utbud och efterfrågan inom och utanför organisationen. Det är därför inte förvånande att kompetens i SCM är en nyckelfaktor för ökad konkurrenskraft och framgång i organisationer. Till exempel har AMR research visat att de 25 företag med högst kompetens i SCM presterar betydligt bättre både operativt och finansiellt än jämförbara konkurrenter. Trots detta är begreppet kompetens i SCM relativt outforskat, vilket gör det saknas en gemensam grund för diskussion i både akademi och industri. Än större är behovet av kunskap kring kompetensutveckling inom SCM, där vi vet att majoriteten av all kompetensutveckling sker informellt på jobbet, men väldigt lite kring hur detta går till i praktiken. Med tanke på den stora omfattningen av förändringar i försörjningskedjor, samt bristen på kandidater med rätt kompetens, är aktiv kontinuerlig kompetensutveckling inom SCM en nödvändighet, och därmed behovet av mer kunskap.

Målet med denna forskning är att skapa förståelse och insikter om kompetens och kompetens-utveckling i SCM som kan användas av SC managers, HR-managers och utbildningsansvariga i akademien. Resultaten baseras på tre studier; en litteraturstudie, en skuggningsstudie och en intervjustudie. Litteraturstudien har kartlagt och analyserat vetenskaplig litteratur kring ämnet, skuggningsstudien har identifierat vilka kompetenser som SC managers använder i praktiken, emedan intervjustudien har kartlagt hur SC managers utvecklar sådan och andra kompetenser för att bli framgångsrika, samt hur sådan kompetensutveckling kan supportas av organisationer.

Resultaten består av ett antal ramverk och övriga resultat från studierna. Litteraturstudien visar att befintlig forskning inom kompetens i SCM relaterar till sju tema-områden; strategi, finansiella resultat, organisation, processförbättringar, logistik, relationer och utbildning. Vidare identifieras tre nivåer; individ, organisation och supply chain, och fyra typer av kompetens kopplat till funktioner, relationer, management respektive beteende. Ett sammanfattande ramverk summerar och kategoriserar därefter alla de aspekter av kompetens i SCM som hittades i litteraturen baserat på nivå och typ av kompetens. Skuggningsstudien resulterade i ett allomfattande ramverk över kompetenser i SCM och klagörande exempel på vad alla dessa innebär i praktiken. Resultatet visade även att SC managers använder många av dessa kompetenser samtidigt och att det därför kan uppstå positiva synergi-effekter. Studien visade också att ren ämneskompetens i SCM används ganska lite i praktiken, i motsats till de betydligt mer använda kompetenserna som relaterar till de generiska, manageriella och beteende-kopplade

kategorierna av kompetens. Inte minst visade sig erfarenhet vara fundamental i praktiken, och använd i kombination med i princip alla andra kompetenser i ramverket. Intervjustudien, som tar avstamp i ett ramverk med tolv lärande-mekanismer, resulterar slutligen i ett antal spännande resultat. Först och främst bidrog studien med detaljerade skildringar av hur SC managers lär sig i praktiken. En analys indikerar att de fem lärandemekanismerna Skifta perspektiv, Utmanande aktiviteter, Samarbete, Reflektion och Feedback är starkt bidragande i lärandet hos en framgångsrik SC manager. Mentor och Mentala mekanismer befanns bidra till viss grad, emedan Observation & härmning, Transfer av annan yrkesmässig erfarenhet samt Praktik & repetition primärt befanns bidra för juniora SC managers. Övriga mekanismer befanns ha en ringa inverkan, även om samtliga lärandemekanismer såklart bidrar till lärande på något sätt. För det andra påvisade studien en stark koppling mellan SCM-aktiviteter och vissa lärandemekanismer. Exempelvis är SCM-aktiviteten ”integration av nyckelprocesser” överlappande med Utmanande aktiviteter, liksom aktiviteten ”risk- och vinstdelning” överlappar med Skifta perspektiv. Professionen är alltså i sig själv en lärande profession. Detta sammanfaller vidare med den lärandeattityd som lyftes fram i studien. Framgångsrika SC managers är nyfikna, positiva, prestigelösa och öppna för nya perspektiv, och denna attityd avgör både hur man utvecklar och behåller sin kompetens inom SCM. Slutligen lyfter studien fram ett ramverk med interventioner för hur organisationer kan supporta SC managers lärande. Interventionerna återfinns på fyra olika nivåer, nämligen i form av lärandeaktiviteter, lärandeprocesser, en lärande organisationsstruktur, samt en lärande organisationskultur.

Resultaten bidrar till att ge forskare en gemensam plattform för att diskutera och utveckla kunskapen kring kompetens och kompetensutveckling i SCM. Vidare bidrar de olika metoderna som används i studierna (framförallt skuggning, practice theory och middle-range theory) till ökad förståelse kring dess användningsområden och förhoppningsvis inspiration till nya studier. För SC managers bidrar resultaten dels med kunskap kring vad kompetens i SCM består av, och dels insikter i hur denna kompetens kan utvecklas på en individnivå. För HR managers bidrar resultaten till nya perspektiv på allt från rekrytering och kompetensutveckling till kompetensutvärdering och belöningssystem. För utbildningsansvariga inom akademien bidrar resultaten slutligen med att belysa de kompetenser som krävs av framtida SC managers, framförallt då meta-lärande (lära sig att lära), mjuka kompetenser som ledarskap och kommunikation, samt erfarenhet/praktik.

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Last but not least, my teammate in life, Per. Your loving support and cheerful encouragement have been invaluable, not to mention that you still keep one of my feet in industry, shielding me from getting lost in the world of academia. Love you!

List of figures

Figure 2-1. Framework of supply chain management: integrating and managing business processes across the supply chain (Lambert and Cooper, 2000).

Figure 2-2. Management components of SCM (Lambert and Enz, 2017).

Figure 2-3. Relationships between strategy, HRM practices, and performance outcomes (based on Buller and McEvoy (2012))

Figure 2-4. Perspectives on organizational learning (Drejer, 2000).

Figure 3-1 The research process.

Figure 4-1. Illustration of the relative contributions of learning mechanisms for junior and senior SC professionals.

Figure 5-1. Interrelationships of competence segments in SCM.

Figure 5-2. Strategic HRM practices and their relation to competence in SCM, modified from Schuler et al. (2011) and Buller and McEvoy (2012).

List of tables

Table 1-1. Overview of research questions and related objectives.

Table 2-1. Selected definitions of competence.

Table 3-1. Research design: Research studies, RQs, research output, research topics, and research contributions.

Table 3-2. Summary of research methods and level of analysis by paper.

Table 4-1. Levels of analysis in the literature reviewed.

Table 4-2. Elements of competence in the literature reviewed.

Table 4-3. Framework presenting aspects and facets of competence in SCM literature.

Table 4-4. Framework of manager competences in logistics and SCM and related practices.

Table 4-5. Theoretical framework of workplace learning mechanisms and related activities and loci (extended from Cheetham and Chivers, 2001).

Table 4-6. Framework of organizational interventions for SC professionals' workplace learning.

List of publications

This is a cumulative doctoral dissertation based on four papers. Below is a brief description of the authors' contributions to each paper. A summary of the results can be found in chapter 4, and the full versions of the papers are appended at the end of the dissertation.

Paper I

Derwik, P. and Hellström, D. (2017), Competence in Supply Chain Management: A Systematic Review, *Supply Chain Management: An International Journal*, Vol. 22, No. 2, pp. 200-218.

According to the *ABS Academic Journal Guide 2015*, *Supply Chain Management: An International Journal* is a 3* ranked journal published by Emerald. 2015 impact factor: 2.731.

Paper I presents a systematic literature review that includes the framing of the study, and the selection, review, analysis, and synthesis of the existing literature on competence in SCM. As the lead author, Pernilla Derwik collected, analyzed, and synthesized the data. She also wrote the majority of the text. Daniel Hellström contributed guidance on the methodology, valuable and insightful support during the analysis and synthesis process, and critical and constructive reviews of the text. Both authors contributed to the framing of the study. An initial draft of the paper was presented at the 26th NOFOMA Conference in Copenhagen, 2014.

Paper II

Derwik, P., Hellström, D. and Karlsson, S. (2016), Manager Competences in Logistics and Supply Chain Practice, *Journal of Business Research*, Vol. 69, No. 11, pp. 4820-4825.

According to the *ABS Academic Journal Guide 2015*, the *Journal of Business Research* is a 3* ranked journal published by Elsevier. 2015 Impact factor: 2.129

Paper II presents a multiple case study based on shadowing and practice theory. Pernilla Derwik is the lead author and developed the major part of the analytical framework. She had the principal responsibility for the coding of the empirical material. She also carried out the analysis and synthesis and wrote most of the text. Daniel Hellström contributed to the data collection process by setting up the case study protocol and supervising three investigators in the collection of the empirical material. He provided guidance on the research design, gave valuable input into the coding and analysis, and critically reviewed the text at all stages during the research process. The propositions presented were developed by Pernilla Derwik and Daniel Hellström in collaboration. Stefan Karlsson contributed to the coding of the

empirical material and the development of the analytical framework, and provided valuable input based on his extensive managerial experience in human resources. The full paper was presented at the 6th GIKA Conference in Valencia, 2016.

Paper III

Derwik, P. and Hellström, D. (2020), How Supply Chain Professionals Learn at Work: An Investigation of Learning Mechanisms, is in the second review round in the *International Journal of Physical Distribution and Logistics Management* as of August 2020.

According to the *ABS Academic Journal Guide* 2018, the *International Journal of Physical Distribution and Logistics Management* is a 2* ranked journal published by Emerald. 2018 impact factor: 5.212

Paper III presents the results of an in-depth interview study with SC professionals. As the leading author, Derwik developed the theoretical framework, planned and conducted the interviews, coded and analyzed the empirical data, and wrote the manuscript. Hellström assisted with the initial idea and guidance on the structure and contributed input to the analysis as well as critical revision of the manuscript.

Paper IV

Derwik, P. (2019), Nurturing Workplace Learning for Supply Chain Professionals: An Organizational Perspective, NOFOMA, Oslo.

Paper IV is a double-blind peer-reviewed conference paper, presented at the 30th *NOFOMA Conference*, Oslo, Norway, June 2019. Derwik independently wrote the full paper from idea to submission. The paper was an initial attempt to identify interventions that could assist organizations in nurturing workplace learning. Future versions should advance the theoretical and methodological considerations.

Preface

My personal journey in the field of SCM started a long time ago. For many years, I worked as a SCM consultant and witnessed many instances in which the individuals who held key positions either caused or prevented the success of a project because of their competence level. I remain fascinated about the potential that people possess. Those who possess the relevant competences are key employees, but it is a challenge to attract and retain such people today. Even more fascinating is the development of competence and people. I never tire of partaking in people's lives (especially my children's), walking along with them as they step by step transform their assumptions and beliefs, suddenly take the jump, and just look comfortable in taking on new and challenging assignments. What happened? Such development is often tacit and unconscious, and yet so strong and fantastic. Working with supply chains, the need for competence development is ever so crucial due to the constantly changing business conditions and current shortage of competence and talent.

Based on previous work experience as well as recurring input from former peers, I experienced a need to know more about both competence and its development in a SCM context. This need does not involve just a sketchy overview of requirements, but rather detailed insights and understanding of the actual practice. With an increased in-depth knowledge, both the selection and training of such employees can be improved, and consequently, the competitiveness of organizations. In combination with an aspiration for teaching, I decided to reenter the world of academia in 2013. The reason was twofold: first, to make a scholarly contribution to the understanding of competences in SCM and how they develop, and second, to support the industry by increasing the availability of such competence. After a number of years, I now find myself transformed into the role of a researcher, finally identifying myself more as a researcher than a consultant. While focused on competence and workplace learning in SCM, I simultaneously gained understanding for the competence requirements of a researcher. The exciting learning process still teases my curiosity, though. How was this done? I would love to explore it.

It should be noted that this dissertation builds in part on my Licentiate Thesis from 2017 (Derwik, 2017) . This mainly refers to some foundational ideas and excerpts of texts that were kept as they represent completed parts of the Ph.D. dissertation. Specifically, Studies I and II are reproduced here in a similar way as in the Licentiate with regard to the research questions, methodology, and frame of reference.

1 Introduction

This chapter presents the research background, describes the research problem and subsequent research questions. It also outlines the purpose and objectives of the research. The chapter concludes with a discussion on focus and demarcations.

1.1 Background

Competence in supply chain management (SCM) is a key factor for achieving superior business performance and competitiveness (Bowersox et al., 2000). Effective SCM not only offers shorter order cycle times and enhanced delivery performance, but also offers benefits such as increased cash-to-cash velocity, better asset management, superior channel relationships, a flexible customer response, and faster product development (Fawcett et al., 2008). The top 25 companies identified as having excellent competence in SCM in the annual research reports by AMR Research/Gartner have displayed substantially higher financial results than their competitors (Aquino and Draper, 2008; Ellinger et al., 2011). They have also obtained higher customer satisfaction and shareholder value (Ellinger et al., 2012).

Following the acknowledgement of competence in SCM, human resources are increasingly viewed as enablers of SCM (Barnes and Liao, 2012) and a source of sustainable competitive advantage (Marchington, 2015; Hohenstein et al., 2014). As 60-70% of all firm costs are controlled by the extended supply chain (Stank et al., 2011), SC professionals' decisions significantly influence organizational performance. It is therefore vital for them to possess the necessary competences. "Soft" competences, such as communication and the creation and management of relationships, have been identified as fundamental aspects of the modern supply chain (Thomas, 2014; Wieland and Wallenburg, 2013; Stank et al., 2011), and people that manage today's supply chains also need more broad-ranging and high-level skills than ever before (Shou and Wang, 2015). For example, moving retail to multi-channel and omni-channel greatly requires competences other than managing bricks-and-mortar (Hübner et al., 2016). Also, many supply chains are facing exhaustive changes ahead, moving from a linear disposal supply chain to totally new ways for customers to acquire, use, and pass on products. This emerging circularity

infers substantial challenges for SC professionals on how to handle recycling, re-manufacturing, and the optional modes of product offers (Bressanelli et al., 2019). Thus, SC professionals certainly need to develop their competence continuously to sustain and advance SC performance and competitive advantage (Song et al., 2020; Essex et al., 2016). In addition, there is a severe shortage of SC professionals in the industry (Gámez-Pérez Karla et al., 2020; John, 2015; Cottrill, 2010), making competence development even more critical today.

At the same time, more and more firms are appointing supply chain officers to their top management teams (Hendricks et al., 2014). For example, there was more than a doubling of the number of chief supply chain officers in top management teams from 2004 to 2009, as reported in a longitudinal study by Wagner and Kemmerling (2014). This fact highlights an awareness of the importance of both SCM and human resources in the industry. Major organizational changes have also taken place in areas such as supply organizational structure and supply chain responsibilities in large companies (Roh et al., 2017; Johnson and Leenders, 2006). Thus, along with investments in supply chain enablers – such as technology, information, and measurement systems – the competence and development of human resources have emerged as crucial factors for effective SCM (Hohenstein et al., 2014; Fawcett et al., 2008).

1.2 Research problems and questions

While the literature on the strategic, technical, and physical integration components of SCM is extensive, the human and behavioral components have received far less attention (Wieland et al., 2016; Ellinger and Ellinger, 2014). This is unfortunate considering the impact of competence in SCM on performance and has implications for a number of stakeholders. From a scholarly perspective, there is a lack of consensus on the scope and meaning of competence in SCM. This is a deficit for most researchers in the field, and the lack of a coherent view is reflected in the inconsistencies among studies. 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 profession’s 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). Practitioners who seek guidance on the topic therefore have difficulty finding coherent answers in the literature. From a managerial perspective, it thus may be difficult to know which competences are relevant when evaluating candidates for positions in SCM. In the

light of a widely recognized shortage of people with competence in this field (Leon and Uddin, 2016; Prajogo and Sohal, 2013; Hohenstein et al., 2014), such knowledge is of great importance in the selection of shortlist candidates, and to avoid the rejection of potential candidates for the wrong reasons. Finally, there is an academic curriculum perspective. To meet the demand from industry, academic programs in SCM need to correspond to the changing prerequisites of competence in the field. However, a wide range of views on competence in SCM have been identified among the involved stakeholders, (Sauber et al., 2008). A consensus on what future supply chain managers need to learn, should facilitate the process of developing and updating traditional academic programs. To gain a more coherent view of competence in SCM, the first research question thus reads:

RQ1: What does the current body of literature on competence in SCM consist of?

A keyword and component in SCM is “management”. Managerial work is commonly described as complex and situation-dependent, and has been compared to conducting an orchestra (Mintzberg, 1973), as well as being a puppet in a marionette theater (Carlson, 1991). But rather than focusing on analogies or what management is, one can ask what managers do, and what competences they need to do what they do. According to Luthans et al. (1988), successful and effective managers spend far less time on traditional management activities, such as planning, decision-making, and controlling, compared to the average, less effective, manager. Instead, successful managers spend more time on networking, especially socializing and politicking activities. This multifaceted role is also acknowledged by Mintzberg (2009), who put forward personal, interpersonal, informational, and actional competences as appropriate attributes for a manager.

Although managerial competence has been widely studied by scholars (Boyatzis, 2011; Chong, 2013; Collin, 1989), studies in the context of logistics and SCM is still scarce. Considering the effects of competence in SCM, the second research question thus addresses what is happening in practice when SC managers manage, and what competences they actually use. It reads:

RQ2: What competences do SC professionals use in practice?

Much of the competence that underlies successful managerial performance is tacit knowledge, and is never “explicitly taught and in many instances never even verbalized” (Sternberg, 1985). According to Eraut (2000), tacit competence is more likely acquired in an informal setting, and informal learning is also found to be the most prevailing training method based on evidence of how employees learn at work (Gibson et al., 2013; Marsick and Watkins, 1990). This also applies to SC

professionals, who are found to develop the majority of their competence while working (Mangan and Christopher, 2005; Gammelgaard and Larson, 2001). On the contrary, studies have found that formal competence development often fails to develop the desired professional skill sets and competences in SCM (Flöthmann et al., 2018; Hohenstein et al., 2014). Although there is plenty of literature on workplace learning, much of it applies to generic learning in generic workplaces (Fenwick, 2006); limited concrete value is therefore offered to practitioners in specific professions, because universal theories run the risk of concealing important contextual distinctions. In particular, SC professionals, and their competence development, require special attention compared to professionals in other management fields, due to the significance of personal experience in their volatile work (Flöthmann et al., 2018). Although the literature consistently identifies competence in SCM as a key factor for superior performance (Ellinger et al., 2012; Bowersox et al., 2000), the manner of how such competence is acquired has received limited attention. The third research question thus reads:

RQ3: How do SC professionals develop their competence at work?

Competence development at work is highly dependent on task complexity and task variety according to Ellström (2001); these two components are also highly characteristic for the SC profession. However, even though such job characteristics have been shown to facilitate workplace learning, Ellström (2001) contends that such conditions are necessary rather than sufficient for learning. There are thus additional aspects of learning that need to be taken into account. A number of researchers put forward organizational conditions as being important for how workplace learning materializes (Billett, 2004; Ellström and Kock, 2008; Ellinger, 2005; Nikolova et al., 2014).

In the light of a shortage of SC professionals (Cottrill, 2010; John, 2015) and the identification of competence development as a key ingredient for successful SCM (Van Hoek et al., 2002), organizations may therefore secure competence in SCM by supporting competence development. Unfortunately, limited research on the workplace learning of SC professionals has been carried out from an organizational perspective (Ellinger, 2005), and little is therefore known about how organizations can support such learning through various interventions. The fourth and last research questions thus reads:

RQ4. What organizational interventions support SC professionals' learning in practice?

1.3 Research purpose and objectives

The purpose of this research is to contribute to the overall understanding of competence in SCM, and to explore the development of such competence at work. To get a holistic view, the first research question addresses the literature, while the other three focus on the empiricism.

The overall aim is to provide understanding and guidance to involved actors in both academia and industry on the topic, and to enable them to enhance their considerations on competence and competence development in SCM. Since this is a rather broad aim, a number of specific objectives have been specified, see Table 1-1.

Table 1-1.
Overview of research questions and related objectives.

Research question	Objective
RQ1: What does the current body of literature on competence in SCM consist of?	To identify and classify competence in SCM, based on the existing literature. To develop a structured framework for the classification and analysis of competence in SCM.
RQ2: What competences do SC professionals use in practice?	To identify, describe, and analyze those competences that managers in SCM use in practice.
RQ3: How do SC professionals develop their competence at work?	To describe and analyze how SC professionals' workplace learning takes place in practice.
RQ4: What organizational interventions support SC professionals' learning in practice?	To identify, describe, and classify organizational interventions to support competence development in SCM.

1.4 Focus and demarcations

Supply chains are by definition an inter-organizational phenomenon (Mentzer et al., 2001), and thereby naturally embrace a broad scope of analysis. Similarly, when discussing competence in SCM, the topic encompasses a wide spectrum of entities and contexts. The initial scope of this research comprises the full range of competence in SCM; however, since all competence originates from human beings (Lester, 2014), the remaining part of the research focuses on the individual level, regarding both the competences used in practice and the development thereof.

It should be noted that although this research encompasses both competence and workplace learning in detail, it does not include the link between them. As described, the focus of the second part of the research is on the learning process itself and how SC professionals develop. Thus, learning outcomes are not in focus,

and this research does not provide guidelines on how specific competences are or were acquired.

Another demarcation is the limited consideration of human behavior. Though Wieland et al. (2016) conclude that “the ‘people dimension’ of SCM” is one of “the most under-researched areas”, this dissertation research only scratches the surface. Tokar (2010) reports the effects of human behavior on SCM, but although human behavior has an impact on most competences, the dissertation research does not delve into the details of how such behavior affects each one. Nor does it explore the psychological factors that according to Schorsch et al. (2017) precede behavioral outcomes, such as competence development. The dissertation research instead focuses on the learning process as such.

A necessary distinction to highlight in this dissertation is between the terms “workplace learning” and “competence development”. Though the terms have some overlap, “workplace learning” primarily relates to vocational training (Hager, 2011), while “competence development” normally is used as an overall designation for all efforts to increase the competence level of employees with the purpose of supporting learning in daily work, including vocational training (Ellström and Kock, 2008). The term “competence development” is thus often used with the organization in mind, while “workplace learning” is mostly used with the individual in mind. This should, however, not be seen as a strict distinction.

While this research takes a generic perspective on SCM, the results are based on respondents from the public sector and large international companies. Managerial competence requirements have been shown to differentiate between work environments (private/public) (Chong, 2013), and various industries also have different supply chain characteristics when it comes to inventory turnover rate and how SC professionals allocate their time (Boute et al., 2011). This does not mean that the dissertation research results are not applicable to other contexts, but need to be considered for each case. Interestingly, Chong (2013) found little difference in managerial competence requirements between cultural environments, for example between British and Singaporean managers.

In line with the generic perspective, this research encompasses an extensive range of literature beyond competence and workplace learning in supply chain management, for example in the fields of engineering, logistics, business, marketing, education and training, psychology, sociology, management, and information systems. However, the literature focused on competence is consistently connected to SCM, in spite of the wide-ranging origin of the research. Regarding workplace learning, generic literature on learning is used as a base and is applied because of the extremely limited amount of existing literature on SCM learning on an individual level. Although all the results are derived from the SCM context, the frame of reference thus has its origin in generic literature on learning.

2 Frame of reference

This chapter outlines the two primary research fields under study – competence and learning – and the contextual field of supply chain management in which the research has been conducted. The purpose is to provide the reader with complementary background and knowledge.

2.1 Literature domains

The dissertation frame of reference includes the two intriguing research fields of competence and learning, along with the contextual field of SCM. The following subsections focus on each of them and provide an overview of the existing literature and ongoing debates. Due to the huge amount of literature in each domain, the aspects most relevant for this research are presented in reasonable detail, while other information is only discussed briefly or not at all. The literature in the four appended papers and in this chapter overlaps: in some cases, a fuller description is found in the papers, in others, in this chapter.

2.2 Supply chain management

SCM was first introduced in the early 1980s by Oliver and Webber (1982), who used the term to describe a new perspective on marketing which highlighted the benefits of integrating a company's internal functions, such as purchasing, production, sales, and distribution. Over the years, the concept has widened to include a more inter-organizational perspective that integrates multiple organizations, as well as activities and functions into business processes. Principally, SCM consists of three parts: network actors, business processes, and management components (Lambert and Cooper, 2000). Figure 2-1 shows their well-known SCM framework that illustrates how actors and business processes relate to each other. The business processes cross both external and internal borders, and integration between each actor and business process is key for successful SCM, measured as customer satisfaction and financial performance, for example (Yu et al., 2013).

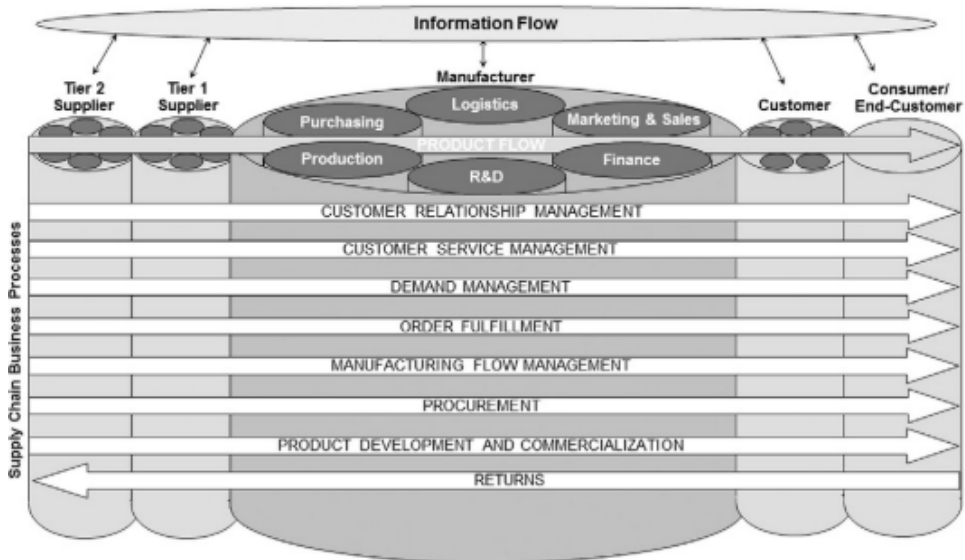


Figure 2-1
Framework of supply chain management: integrating and managing business processes across the supply chain (Lambert and Cooper, 2000)

Naturally, management plays a key role in this integration. While the original task of SCM was to design, implement, and control the functions and processes listed above, it has become an even more complex and challenging task to manage supply chains effectively due to increased demands on service and response times, business transformations, as well as a more dynamic and global environment. A recent (updated) summary of the management components of SCM is presented in Figure 2-2 (Lambert and Enz, 2017). The first group (structural management components) includes the most visible, tangible, and easy-to-change components. The second group (behavioral management components) consists of less tangible components which are often difficult to assess and alter. It is vital to understand each component and its respective interdependence with other components to fully take advantage of the supply chain and its possible competitiveness (Lambert and Enz, 2017).

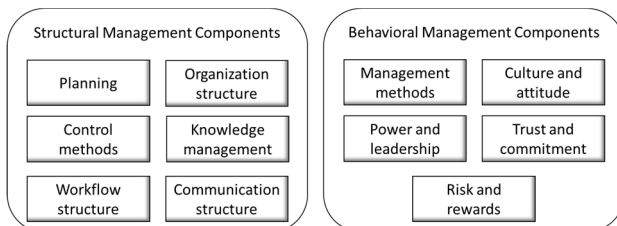


Figure 2-2
Management components of SCM (Lambert and Enz, 2017).

According to the Council of Supply Chain Management Professionals, CSCMP (2020), SCM “encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.”

2.2.1 Supply chain orientation

Prior to implementing SCM in a company, Mentzer et al. (2001) claim that companies need to have a supply chain orientation (SCO), that is, an awareness of the systemic and strategic implications of the activities involved in SCM. In essence, SCO represents “a shared value and belief system that aids in understanding how the organization should strategically manage its supply chain, and the behavioral norms needed inside the organization” (Esper et al., 2010). Although SCO may be considered a strategic management philosophy, it can also involve a structural element. Esper et al. (2010) propose that such an SCO structural element should include the areas of organizational design, human resources, information technology (IT), and organizational measurement. Although all of these areas are, of course, central for SC integration and successful SCM, human resources are the foundation on which this research is built, and therefore deserves a more in depth presentation.

2.2.2 Human resources in SCM

Human resources play a key role in SCM, more specifically their knowledge, skills and abilities (KSAs) (Esper et al., 2010), as well as their attitudes and behaviors (Flöthmann, 2017). SCM is largely influenced by human interaction (Ellinger and Ellinger, 2014), and multiple studies have reported that effective integration of supply chains heavily relies on human behavior (Song et al., 2020; Shub and Stonebraker, 2009; Bendoly et al., 2006). According to Flöthmann (2017), people are the “executing organs” of all activities needed for the successful management of supply chains.

As the human dimension of SCM increases in significance, so does the role of human resource managers and human resource management (HRM). From being a purely administrative function some decades ago, these managers are now highly involved in strategic decisions taken in the organization. One reason for this is the positive effects that HRM practices (i.e., staffing, training and development, assessment, and compensation) have shown on SC integration (Huo et al., 2015). A key in such work is the alignment of individual, group, and organizational

competences, as well as the alignment of these competences in relation to the strategy (Buller 2012). HRM practices also need to be internally aligned with each other. Figure 2-3 illustrates the relationships between strategy, HRM practices and performance outcomes. In addition, Boswell (2006) claims that there is a need for individual congruence with the organization for organizations to get the most out of an individual's competence. This is also in line with the person-organization fit, which Paauwe and Boselie (2008) claim to be one of the most important alignments in HRM.

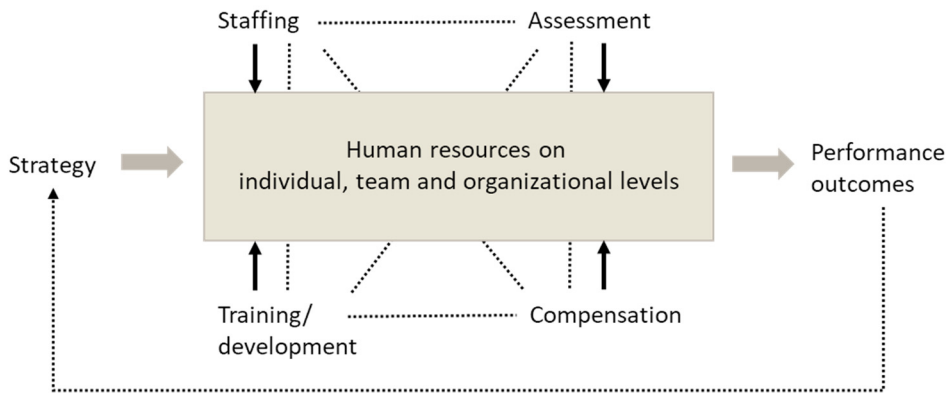


Figure 2-3
Relationships between strategy, HRM practices, and performance outcomes (based on Buller and McEvoy (2012)).

A widely used framework for examining HRM and performance relationships is the Ability – Motivation – Opportunity (AMO) framework (Guest, 2011; Paauwe, 2009). **Ability** relates to the staffing and training/development practices, where the role of HR managers is to align human resources with the needed competence through selection, recruitment, removal, and training/development. This work involves long-term investments in employees to achieve broad-ranging and high-level skills, along with customized and extensive training (Shub and Stonebraker, 2009). **Motivation** relates to the assessment and compensation practices, where HR managers play a delicate role in managing the attitudes and behaviors of SC professionals (Flöthmann, 2017). The significance of this task is illustrated by the 2013 AMR/Gartner ranking and evaluation of the Supply Chain Top 25 companies (Gartner, 2013). The report discloses a common theme among the identified top companies of “building engaged supply chain talent” and “inspiring the hearts and minds of supply chain talent in new ways” (Hofman et al., 2013). Finally, **opportunity** relates to the platforms provided by the organization for motivated employees to apply and contribute with their abilities. Thus, HR managers play a central role in facilitating all three aspects for SC professionals in the AMO framework.

2.3 Competence

Today, 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). This subsection starts by presenting the debate and various definitions of competence along with an introduction to talent, and then presents competence from managerial and organizational perspectives.

2.3.1 Definitions of competence

The concept of competence was introduced by McClelland in 1973 in response to the traditional qualification process of using IQ as a means to detect and select talent (McClelland, 1973). McClelland questioned the validity of using IQ and grades as predictors for occupational, marital, and social success later in life, and highlighted competence as a better criterion for aligning the expected level of performance with the tasks to be performed. For example, a good police officer is not necessarily identified by his ability to explain the meaning of a number of words. McClelland also pointed out the need to include the dynamic aspect when evaluating people, meaning that people actually can change and improve their level of competence by training or experience.

Ever since then, there has been debate on the concept of competence. Two points of view are commonly put forward: namely, whether competence is an attribute possessed by an individual or the performance of the actual activity at hand. To play the piano, for example, may be attributed to both the individual (being a brilliant pianist) and to the activity itself (playing the piano brilliantly). In the English language, this would refer to either competency (attribute-based) or competence (activity-based) in a strict linguistic interpretation. Today most researchers agree that competence is not simply an attribute of an individual, nor an activity, but the interaction between the individual and the activity at hand (Ellström and Kock, 2008; Winterton et al., 2006; Collin, 1989). However, consensus is still far from reached and will probably never be fully established (Winterton et al., 2006; Eneroth, 1997). Table 2-1 presents a selection of definitions of competence presented in the literature.

Table 2-1.

Selected definitions of competence.

Source	What	Locus	Defintions	Comment
Bloom (1976)	Competence	Individual	Knowledge, Skills, and Abilities (KSA).	
International Standards Organisation (2012)	Competence	Individual	Ability to apply knowledge and skills to achieve intended results.	
Lindberg and Rantatalo (2015)	Professional competence	Individual	The inferred potential for desirable activity within a professional practice.	Not necessarily successful, but possessing intention to be
Ropes (2015)	Competence	Individual Managerial	A mixture of attitudes, knowledge, and behaviors that can be shown to contribute to effective work performance.	
Prahalad and Hamel (1990)	Core competence	Organizational	A bundle of skills and technologies that enable a company to provide a particular benefit to customers. It represents the sum of learning across these resources.	
Sanchez (2004)	Competence	Organizational	Ability to sustain the coordinated deployment of assets in ways that help a firm achieve its goals.	
Athey and Orth (1999)	Competency	Individual and organizational	A set of observable performance dimensions, including individual knowledge, skills, attitudes, and behaviors, as well as collective team, process, and organizational capabilities, that are linked to high performance, and provide the organization with sustainable competitive advantage	

As competence and talent sometimes are used intertwined, “talent” is a term that requires an introduction. The first dictionary definition of talent refers to “a denomination of weight”, and it became a monetary unit when value was attributed to a weight of silver (Tansley, 2011). Today numerous definitions exist and the meanings of the term depend on the lens and literature stream; however, the HRM literature still operationalizes talent as capital (Pascal, 2004). Yet, a number of questions exist according to Dries (2013) and Gallardo-Gallardo et al. (2013).

The **first** question is whether talent is a subject or an object. Talent as a subject infers a need for companies to find the right person, while talent as an object refers to the characteristics of a(ny) person. This connects to the **second** question: whether talent is innate or can be acquired. The view of talent as innate strengthens the need to find the right person through assessment and selection, while the view of talent as acquirable infers possibilities for training and development. The **third** question when looking for talent is whether it is about extrinsic ability or intrinsic motivation, that is, do we assess talent according to performance and achievements or based on effort, ambition and career orientation? **Fourth**, there is the question whether talent is general or exclusive, which has consequences for the compensation strategy. Viewing talent as exclusive infers a disproportionate compensation strategy, expecting disproportionate returns from the individual. Alternatively, viewing talent as general infers a more equal reward compensation strategy and likely creates a more open and trustful working environment.

2.3.2 Managerial competence

Managerial competence has a direct impact on a firm's performance (Verle et al., 2014; Winterton and Winterton, 2002), but there are difficulties in framing the exact content of such competence. According to Boyatzis (2011), successful managers possess "cognitive competencies, such as systems thinking and pattern recognition; emotional intelligence competencies, including self-awareness and self-management competencies; and social intelligence competencies, including social awareness and relationship management competencies." In addition, Verle et al. (2014) propose action competence, including a desire for achievements, as a key competence for successful managing.

Most of the literature suggests a hybrid nature of managerial competence. For example, Hansen and von Oetinger (2001) put forward the T-shaped profile of managers, defined as having both overarching knowledge-sharing competence (the crossbar of the "T") and in-depth knowledge of the field (the down bar). Christopher (2012) even claims the former to be a requirement for future SC professionals who will need to think and manage horizontally. Other research suggests that managerial competence is about switching roles, in that a particular competence or role may not be the one preferred in another context. Roles are a combination of relation-based and performance-based competences, where the manager demonstrates various competences for various roles (Ropes, 2015). A competent manager thus has a behavioral repertoire and knows when and how to apply which competences and roles (Wu et al., 2010). There is also a trade-off between relational and performance-based competences, meaning that an individual hardly can be highly sympathetic and highly decisive at the same time. This suggests that there is no optimal level of competence to aim for when assessing competence (Lindberg and Rantatalo, 2015).

The tipping point for outstanding performance also depends on the context (Boyatzis, 2011) (defined as “the point at which a person’s use of a competency tips them into outstanding performance”). A manager at a consulting firm would probably have to show adaptability frequently and consistently, while a manager at a basic chemical processing plant may only need to show it occasionally. Differences in the predictability of customers, product range, and the work process thus affect the reference point for outstanding performance, and thereby the assessment of managers’ competence.

2.3.3 Organizational competence

The organizational competence movement started in 1990 with “The Core Competence of the Corporation” by Prahalad and Hamel (1990), which identified the portfolio of competences that an organization holds as the root to competitive advantage. This was followed by the competence-based view (CBV) that asserts that “competences created by adding capabilities, coordination, and strategic targeting to resources are the sources of competitive advantages and enable firms to attain their goals” (Freiling et al., 2008). The CBV states that every firm has its own distinct resources and competences that result from heterogeneous experience, learning, and knowledge (ibid). A subset of CBV is the knowledge-based view (KBV) of Demsetz (1988), which focuses predominantly on the role of knowledge in creating a firm’s capabilities. However, some researchers suggest a need for a mediator between knowledge and performance, such as a learning culture (Bhatti et al., 2016; Cooper et al., 2016).

According to a well-known view of organizational competence, it consists of the following four components: managerial, input-based, transformational, and output-based competences (Lado and Wilson, 1994). **Managerial** competence is not only about the improvement of employees’ skill profiles or increasing the capabilities of work groups and teams, but also about development, communication, and the realization of strategies for products and processes (Sanchez, 2004). **Input-based** competence encompasses all the physical and human resources that can be transformed to products and services. **Transformational** competence is the actual capability to achieve the transformation of such resources into outputs. Transformational competences include innovation and entrepreneurship, organizational culture, and organizational learning. Finally, **output-based** competence depends on the results of the previous competences, and includes corporate reputation, image, product or service quality, and customer loyalty.

The balance and alignment of the above competences are highlighted as key factors to improve organizational competence (Cooper et al., 2016). Another key factor is

that the members of an organization understand the links between their individual actions and the overall performance of the firm (Zollo and Winter, 2002).

2.4 Learning

Many theories in the learning domain focus on internal aspects of why (or how it is that) an individual learns, such as the behaviorism, cognitivism, and constructivism views. Other theories focus on external aspects of how you learn, such as social learning theory (Bandura and Walters, 1977), action learning theory (Revans, 1982), and experiential learning theory (Kolb, 1984). The present research is based on a constructivist view of learning, which is presented in the next subsection. In addition, two related areas are presented, namely workplace learning and organizational learning.

2.4.1 Constructivist learning

Constructivist learning theory originates in the well-known “learning-by-doing” concept first introduced by Dewey (1889), and was a response to traditional conceptions of learning through observation. Dewey emphasized the relationship between knowledge and action, and the need to include applied tasks and ability training in the learning process. It is worth noting that the original concept, which was recited as “Learn to do by knowing and to know by doing” (Dewey, 1889), implies a cycle of learning.

Constructivist learning theory has developed over the years, and now comprises two major theories: cognitive constructivism and social constructivism. **Cognitive constructivists** claim that the gradual acquisition, construction, and usage of knowledge is relative to the cognitive development of the individual learner (Piaget, 1971). In other words, a person step-by-step assimilates things into existing schemes, and actively constructs knowledge and meaning through action, logical thinking, and reasoning based on his or her cognitive developmental level. **Social constructivists** view learning as a collaborative process, in which interactions with society and more capable peers help to construct knowledge. The most famous social constructivist theory is Vygotsky’s (1978) zone of proximal development, which refers to how new (proximal) knowledge is constructed from existing knowledge through the help of others. Proximity is key because the successful completion of challenging tasks generates the motivation to continue and embark on new ones.

Although the two theories that have developed are somewhat different, they both acknowledge learning as an active process with cognitive as well as social elements. They also emphasize that incremental development is built upon past experiences.

2.4.2 Workplace learning

Workplace learning is an integral part of lifelong learning (Olsen and Tikkanen, 2018) and one of the most prevalent and imperative forms of adult learning in today's society (Ellinger, 2005; Edmondson and Saxberg, 2017). Although research on workplace learning is extensive, there is still not a distinct definition or consensus on the terminology (Fenwick, 2006). However, the research so far has led to a view of workplace learning as a combination of formal and informal learning that occurs while working. Formal learning is often intentional, structured with prescribed outcomes, and produces explicit knowledge and generalized skills, whereas informal learning is often unintentional, unstructured with a lack of prescribed outcomes, and produces implicit and tacit knowledge and situation-specific competences (Tynjälä, 2008). According to Marsick and Watkins (2016), it is problematic to separate formal and informal learning at work since they are often intertwined. Billett (2004) even discards the segmentation and suggests scholars should not make any distinction between formal and informal learning, but should focus instead on workplace learning as a whole.

2.4.2.1 Learning as a process vs. learning as an outcome

A major dividing line of research in the field of training and development is the distinction of learning as a process (how individuals learn) vs. learning as an outcome (what is learned) (Noe et al., 2017). Most researchers tend to focus on the latter (Fenwick, 2006), with learning seen as a change in knowledge, skills, values, and behavior (Ellström and Kock, 2008). More specifically, workplace learning outcomes have been categorized as task performance, awareness and understanding, personal development, teamwork, role performance, academic knowledge and skills, decision-making and problem solving, and judgement (Eraut, 2004). Learning outcome can also be viewed in terms of long-term effects, such as job satisfaction and increased motivation for learning (Ellström and Kock, 2008).

The separation of learning as a process from learning as an outcome is of great importance from both a theoretical and a practical point of view (Wielenga-Meijer, 2010), since the outcomes of workplace learning depend on the qualities of the activities and interactions in the process (Billett, 2004). The literature landscape of learning activities is rather fragmented and diverse, ranging from reflection and experimentation (Nikolova et al., 2014) to feedback and communication tools (Kyndt et al., 2009), and from mentoring and modeling (Marsick and Watkins,

2016) to talking and emails (Berg and Chyung, 2008). Although there is an inevitable connection between the learning process and the learning outcomes, it is difficult to link workplace learning directly to learning outcomes (Marsick, 2009) (c.f. formal education). In other words, there is no “best activity” for getting results, since this depends on a number of contextual factors (Marsick, 2009).

2.4.2.2 Contextual factors influencing workplace learning

The potential of workplace learning is influenced by a range of contextual factors on various levels: individual, task-based, organizational, and inter-organizational. On the **individual level**, personal learning orientation and zest are found to be related to workplace learning (Noe et al., 2013; Choi and Jacobs, 2011), as are intentionality, proactivity and critical reflectivity (Marsick and Watkins, 2016). Also, the individual’s level of education is found to be related to workplace learning (Kyndt et al., 2009). On the **task-based level**, Ellström (2001) outlines characteristics such as task complexity, while Skule (2004) puts forward exposure to changes, a high degree of exposure to demands, managerial responsibilities and extensive professional contacts as characteristics of learning intensive jobs. On the **organizational level**, factors such as leadership, learning orientation, culture, and rewards are reported as being beneficial in stimulating workplace learning (Marsick, 2009; Skule, 2004; Garvin et al., 2008; Ellinger, 2005; Matsuo, 2020). On the **inter-organizational level**, Ellström and Kock (2008) demonstrate external conditions such as competitive pressure and demands from customers as important factors for learning to take place.

2.4.3 Organizational learning

Organizational learning stems from individuals and is mainly based on their experience (Senge, 2006). This is also illustrated in several organizational learning frameworks that are based on multiple levels of analysis (Kim, 1998; Chadwick and Raver, 2015; Crossan et al., 1999). Crossan et al. (1999) put forward organizational learning as a multi-level phenomenon including the individual, group and organizational levels. Individuals correspond to the intuiting and interpreting phases in the learning cycle based on their individual experiences and cognitive maps. Groups correspond to the integrating phase in the form of shared understanding and mutual adjustments. Organizations correspond to the institutionalizing phase in the form of new routines, rules and regulations.

Additionally, Drejer (2000) presents a framework including both the individual/collective dimension and the formal/informal dimension. Figure 2-4 shows the perspectives on organizational learning that are derived from Drejer’s two dimensions.

	Individual dimension	Collective dimension
Formal dimension	The decision-support perspective	The management systems and organizational structure perspective
Informal dimension	The individual behavior perspective	The corporate culture perspective

Figure 2-4
Perspectives on organizational learning (Drejer, 2000).

The **individual behavior perspective** deals with informal learning and how individuals react to situations as well as the interpersonal interactions among members in the organization (Argyris and Schön, 1978). The **decision-support perspective** deals with formal learning and how individual learning is influenced by available information technology and its institutionalized knowledge (Duncan and Weiss, 1979). The **management systems and organizational structure perspective** focuses on the collective learning processes that originates from the formal organizational structure and human resource compensation systems. The **corporate culture perspective** represents the informal and uncoded knowledge that exists in the organization, including collective behavior and attitudes. Corporate culture is seen as “emerging from the collective learning processes and guides and shapes collective and individual behavior” (Drejer, 2000). From a SCM perspective, organizational learning is increasingly used to explore and explain competitiveness and performance of a firm (e.g., Yu et al. (2013).

3 Methodology

This chapter presents the research methodology's point of departure and approach. This is followed by a description of the research process, design and methods. The chapter concludes with a discussion of research quality.

3.1 Point of departure and methodological approach

3.1.1 Methodological point of departure

As stated, the focus of my research is on the human aspects of SCM: namely competence and learning. The methodological point of departure is from these two phenomena in combination with the research questions defined in subsection 1.2. But first, each phenomenon requires a methodological reflection.

As described in the frame of reference (chapter 2), competence is a debated concept and can be viewed either from an objective or a constructivist ontological point of view, that is, either from an “it is what it is” perspective or an “it is what we see it as” perspective (Bryman and Bell, 2015). The former perspective views competence as generic, transferable, and independent of the social and task-specific context, and thereby also as possible to be measured quantitatively (Winterton et al., 2006). Competence can thus well be studied from a positivistic epistemological stance. In contrast, Kosmala (2013) views competence as an unstable and open-ended construct highly integrated with its context (Delamare Le Deist and Winterton, 2005). This includes both attribute and task aspects (Ellström and Kock, 2008) and means that competence is not easily identified or measured. In this case, an interpretative epistemological stance is best suited to capture the concept of competence.

Regarding learning, a range of views are put forward in the frame of reference (chapter 2) that all call for their specific methodological approaches. Constructivist learning is, just as it sounds, based on the construction of new knowledge, which in turn is based on prior knowledge and personal experiences (Ertmer and Newby, 2018). This individual constructing infers the need for one to be open to the

possibility of multiple versions of reality, and the subsequent need for an interpretative epistemological stance. It should be noted, however, that there is a difference between structured and unstructured learning. Structured learning is highly organized and can be related, in part, to a positivistic stance with structured objectives, contents, time and support, while unstructured learning may well be viewed as phenomenological with the perceived value from the learning originating from the individuals (Jacobs and Park, 2009).

Constructivism is the ontological point of departure in this research, recognizing competence and learning as human-made social constructs (i.e., they only exist and mean something if they are constructed and acknowledged to do so). Competence is viewed from an open-ended, context-integrated perspective, while learning – by nature contextual through the workplace – is viewed as intangible and unstructured. These views on competence and learning are, furthermore, mirrored by the research questions, which are highly explorative in nature and seek to understand in depth how things work out in practice. The research questions aim to capture the full complexity of what is being studied.

3.1.2 Methodological approach

The nature of competence and learning and the research questions calls for an interpretative epistemological stance, and a qualitative methodological approach “designed to explore the deep structure of the phenomenon using thick descriptions that explore the multiple dimensions and properties of the phenomenon” (Golobic et al., 2005). Such thick descriptions should not be confused with surface observations, but rather seen as the foundation for critical analysis and synthesis that “makes explicit the patterns of cultural and social relationships and puts them in context” (Geertz, 1973). This research thus finds inspiration in the broad literature stream on methodology that is based on interpretative and phenomenological principles (Denzin and Lincoln, 2011). This means taking a bottom-up, inside-out approach (Mangan et al., 2004), focusing on understanding rather than explanation, subjectivity rather than objectivity, and narratives rather than analytical numbers (Jennings, 2005; Mangan et al., 2004).

This dissertation research is further inspired by both the systems and the actors approach (Arbnor and Bjerke, 1997), as each of them contributes to various aspects of understanding the phenomena. The systems approach considers a system where there is interaction between the included parts, and also synergy effects which means that the total is not the same as the sum of the parts. The actors approach originates from people and their intentionality, rather than their behavior being conditioned by external systemic factors. Supply chains have commonly, though not surprisingly, been studied from a systems approach (Nilsson and Gammelgaard,

2012), because they are made up of relationships among infinite actors and business processes; one supply chain is not isolated from others, but rather is integrated with many others in the system. This can of course also be applied for people who can be considered components in the system, and whose competence and workplace learning then are affected by the system. But while competence is viewed as an open-ended construct that exists and transfers freely in the supply chain system, workplace learning is focused on the learning process, and thereby the learner. The actors approach can therefore assist to understand this process by acknowledging people as active creators of knowledge and understanding. Thus, this dissertation research is inspired by both the systems and the actors approach. Regardless, the overall qualitative approach helps to “capture the figural aspects of a phenomenon that dominate perception as well as the contextual background that is less visible but integral to understanding it” (Sohn et al., 2017).

3.2 Scientific reasoning and the research process

In general, a research process can start either from theory (deductive research) or through empiricism (inductive research). Deductive research starts with a theoretically-based hypothesis, which is then tested and scrutinized empirically (Bryman and Bell, 2015). The test results add to existing theory (or generate new theory), based on support or falsification of the hypothesis. Inductive research originates with the study of empirical evidence. Without any hypothesis or other preconceptions, observations are made, and possible patterns and generalizations are registered. Certainly, no research is purely inductive or deductive. It is simply impossible for a researcher to be totally without preconceptions, just as it is impossible not to register and reflect upon issues outside a pre-stated hypothesis. A more recent conceptualized scientific reasoning is “abductive reasoning” which is a combination of inductive and deductive reasoning (Dubois and Gadde, 2002), moving back and forth between theory and empiricism. The qualitative and interpretative approach of the dissertation research includes both theory and empiricism as input into the research process. Along with the intention to integrate various theoretical fields, as well as theory and empiricism, this research thus uses both inductive and abductive reasoning.

Given my initial empirical experience and understanding, a theoretical departure seemed to be a good starting point for the dissertation research. The reason for carrying out a literature review (Study I) was to support the identification of the research topic, to synthesize the literature, and to understand the structure of the topic (Rowley and Slack, 2004; Hart, 2009).

The Study I systematic literature review provided inspiration for two additional studies of a more empirical character. Since few publications in the literature review on competence in SCM had adopted a qualitative approach, and no one had focused on the competences used in practice, this became the topic of Study II. An important milestone in the process was the Licentiate Thesis (Derwik, 2017), where the research up to that point was summarized and which provided an excellent opportunity to reflect on what had been done and where to go next. I then realized that “competence” per se was rather well worked through, but most of all, quite static and even a bit boring. In contrast, the “development of competence” seemed like a dynamic and really intriguing area for further research and a topic in the SCM field that was also lacking empirical evidence. Hence, the topic for the Study III became workplace learning. Although this dissertation is the final destination for my Ph.D. studies, my research in the field of workplace learning is nowhere near completion.

The present research thus encompasses three studies from different angles, that resulted in four papers, and ending with a synthesis (the dissertation). The role of the theoretical portion of the Licentiate Thesis should be mentioned. It constitutes a good baseline for the theoretical portion of this dissertation, along with the three studies. Figure 3-1 presents an overview of the research process, and illustrates the chronological timeline, the scientific origin/reasoning, and the inter-dependence between the different research elements.

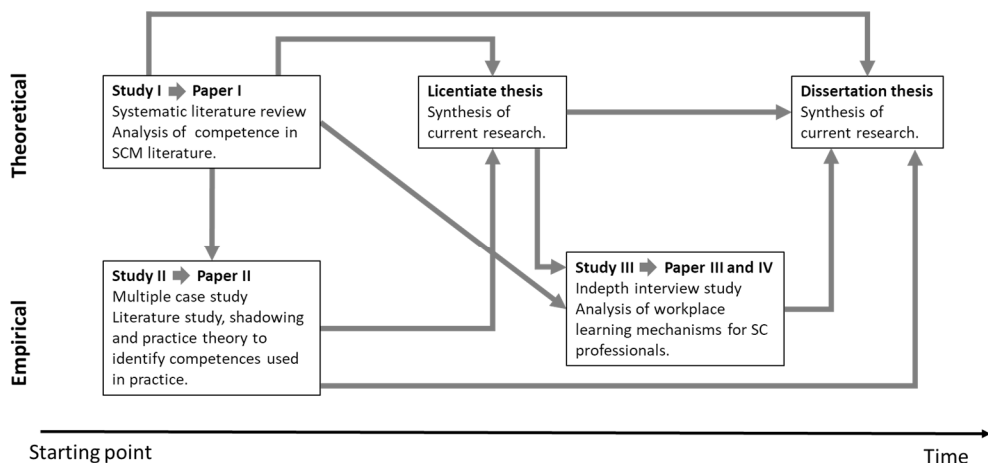


Figure 3-1
The research process.

3.3 Research design and research methods

The research design can be defined as the logical plan of how to reach conclusions from the initial research questions (Yin, 2014). Table 3-1 presents the research design with its three studies, four research questions, their relation to the output (i.e., the four papers), the topics covered and the fields to which the research contributes.

Table 3-1. Research design

Research studies, RQs, research output, research topics, and research contributions.

Research studies	Research questions	Research output	Research topics	Research contributions	
				Literature	Practice
Study I: Systematic literature review	RQ1. What does the current body of literature on competence in SCM consist of?	Paper I – Competence in Supply Chain Management: A Systematic Review	Competence	SCM	SCM, HRM
Study II: Multiple case study	RQ2. What competences do SC professionals use in practice?	Paper II – Manager Competences in Logistics and Supply Chain Practice	Competence	SCM	SCM, HRM
Study III: Indepth interview study	RQ3. How do SC professionals develop their competence at work?	Paper III – How Supply Chain Professionals Learn at Work: An Investigation of Learning Mechanisms	Workplace learning	SCM, WPL	SCM, HRM, WPL
	RQ4. What organizational interventions support SC professionals' learning in practice and why?	Paper VI – Nurturing Workplace Learning for Supply Chain Professionals: An Organizational Perspective	Workplace learning	SCM	SCM, HRM

The following subsections present and discuss the design of each study and the methods selected.

3.3.1 Study I – systematic literature review

Study I was explorative, taking a conceptual approach. The topic was competence in SCM. A systematic literature review was conducted to answer RQ1. Multiple keywords were tested in various combinations to frame the topic, and after many iterations, the keywords *competenc**, *supply chain*, and *manage** were deemed sufficient to cover the topic. The search was undertaken in four wide-ranging databases, considering that the topic was of a multidisciplinary nature. All peer-reviewed scientific journal publications identified were considered for inclusion, and after an initial subject screening and a final screening for relevance, 98 publications remained.

The thematic analysis of the publications mainly consisted of deriving categories from the content (regarding the elements of competence, for example). In some cases, the categorization was also informed by other literature (regarding research streams, for example). The process was iterative and moved back and forth between the material and the categorizations in progress. The categories were tentatively formed, merged, decomposed, remerged, and the content of the selected publications was re-coded accordingly a multiple number of times. Multiple versions of the Study I manuscript were also exposed to peer review, leading to additional analyses of the categories. For example, the first conference version of the manuscript reporting on the study contained nine elements of competence; by the final version it was compressed down to four. All throughout the process, two researchers worked with the material. Disagreements were resolved by discussions leading to consensus, which further refined the analysis.

Study I helped to answer RQ1 through the framework developed. It further served as the foundation and inspiration for Studies II and III.

3.3.2 Study II – multiple case study

Study II was also exploratory, but unlike Study I, it aimed to identify what competences managers in SCM use in practice. This called for a significantly different research design. Because of the extensive and in-depth descriptions that were required to study the phenomenon in question, a multiple case study was decided upon (Yin, 2014). To capture the full range of details, the case study was based on practice theory, in combination with shadowing for data collection. Shadowing is a micro-ethnographical technique in which the researcher follows the subject from place to place throughout the working day and is able to ask questions to clarify issues (Bryman and Bell, 2015; Czarniawska, 2014). Practice theory has a theoretical perspective that seeks to understand and explain social and cultural phenomena through the level of human practice (Bourdieu, 1972). Such practice

involves “both a general understanding and a practical understanding (knowing how to), the latter of which involves rules, teleo-affective structure (connection between normativized tasks and normativized emotions)” (Schatzki, 2001). In line with this, practice does not only include what people do, but perspectives on body, mind, things, knowledge, discourse, structure/process, and the agent (Reckwitz, 2002). Collecting practice data thus generates a rich body of empirical data which helps to explore social phenomena like what competences SC managers use in practice. However, and most importantly, competence was not directly the subject for data collection, but was later derived from the practice data. Practice theory is also a methodological tool that consists of the iteration of three movements: 1) to zoom in on the practice, 2) to zoom out and shift focus to the surroundings, and 3) to enrich understanding through solid interpretations. In this way, practice theory provides a methodology on which to build theory grounded in practice (Nicolini, 2012).

A total of six cases were selected based on theory-based purposeful sampling to secure knowledgeable managers that covered the expected variation of the phenomenon in focus (Palinkas et al., 2015). The cases consisted of managers with various experience and types of positions, from different industries and from companies of different sizes. Three investigators shadowed two managers each for a total of ten working days per manager, spread out over six weeks. The days were carefully selected to ensure observation of the dynamic and situation-dependent characteristics of managerial work. The investigators were instructed to include all the perspectives on practice in their data collection, and to continuously zoom in and zoom out on what they observed. Data collection included shadowing, short unstructured interviews during shadowing, a longer semi-structured interview after shadowing, and access to internal documents, such as managers’ job descriptions and working materials.

Three researchers were involved in the data analysis, which consisted of two parallel processes. The first process was to code the empirical data and translate the practice into competences used. Often one practice translated into more than one competence, and the competences were also constantly reevaluated (redefined, merged, decomposed, and remerged). The second process was to develop an analytical framework based on the literature by which the final analysis could be carried out. Both the coding guidelines and the analytical framework were refined several times during the process. The analytical framework was an iterative integration process, combining existing literature on competence in SCM and results from the empirical data collection. The final analysis required that all competences used in practice matched a competence in the analytical framework. Thus, the final analysis included both inductive and deductive reasoning, equivalent to the abductive reasoning described by Dubois and Gadde (2002). In addition, the frequency of all competences used were registered and analyzed.

It should be noted that the analytical framework from Study II partly overlaps with the corresponding framework developed in Study I. This is, of course, natural, but the reader might wonder why they do not overlap fully, since they both relate to competence in SCM. The answer is that the Study II analytical framework was finished and published before the final framework from Study I was completed. The analytical framework in Paper II has its benefits, but the categories in Paper I are sharper. If I were to modify the analytical framework presented in Paper II today, I would base it fully on the categories from Paper I. Study II helped to answer RQ2.

3.3.3 Study III – in-depth interview study

Study III was an explorative in-depth interview study using middle-range theorizing to uncover the phenomenon of how SC professionals develop their competence to become successful at work. Middle-range theorizing is well-equipped to illuminate the phenomenon because it focuses on the middle range between X and Y instead of generalizable correlations between them (Stank et al., 2017). The aim of middle-range theory is to explain why, how, and when X causes Y to happen (Astbury and Leeuw, 2010). Thus the body of evidence incorporates a high level of specificity, and is also highly integrated in its context (Pawson and Tilley, 1997). Study III started off from two pilot interviews with an unstructured protocol, which revealed the difficulty to perceive and talk about actual learning experiences without further guidance. The two researchers restarted by reviewing the literature and identified twelve learning mechanisms and their loci and related learning activities. This framework of learning mechanisms then formed the baseline for the interview protocol and later empirical data collection. A cornerstone in the research was storytelling (New and Payne, 1995; Fawcett and Waller, 2014), that along with perceptions and interpretations were vital components of the research (Stentoft and Halldorsson, 2002; Gephart, 2004). The research was both descriptive and heuristic, meaning that the researchers strived for both a comprehensive description of how SC professionals learn and the contextual specifics, as well as engagement in higher order interpretative work and proposition development.

Data collection consisted of semi-structured one-to-one interviews with a sample of twelve experienced and successful SC professionals selected through theory-based purposeful sampling (Palinkas et al., 2015). As described in paper III, “the data were analyzed continuously in NVivo 12 software throughout the study, and included both à priori coding (Stemler, 2001) and open coding (Strauss and Corbin, 1998). À priori coding was conducted based on the learning mechanisms previously identified, that is, all empirical data were coded and placed proximally in nodes based on what learning mechanism they related to. Open coding of the material in each node led to the emergence of sub- concepts for each learning mechanism. This

helped to describe and understand in more detail the workplace learning of SC professionals.

Open coding was also applied to the entire empirical material, and from this coding a range of initial concepts emerged. As data collection and analysis continued, concepts were reviewed and empirical data recoded accordingly. The concepts served to develop tentative higher order categories, and as the data analysis was a strongly iterative process, the researchers continually moved back and forth between the emerging categories and the data” (Derwik and Hellström, 2020). Study III helped to answer RQ3 and RQ4.

3.3.4 Reflection on research methodology and multiple methods

As previously stated, understanding is the core of this research, and dialogue is fundamental in its execution (Arbnor and Bjerke, 1997). This particularly applies to Study III which focuses on the development of competence in SCM. Study III delves into the perceptions and minds of the selected respondents, and dialogue is thus vital for mutual understanding. In other words, words are important and there is a need for a common language. In Study II, the focus was on the practice, which is a rather tangible subject matter. It was therefore quite easy to describe, talk about, reflect upon and interpret. Thus, the inductive reasoning worked fine. In Study III, the focus was on workplace learning, and the pilot interviews revealed a deficit of language that could manage to describe, talk about and reflect upon the phenomenon. Thus, purely inductive reasoning did not work as well, and in this case, theory elaboration, starting out from the theory (a form of abductive reasoning), helped to develop a common language (that is, our framework) to assist in the dialogue (Fisher and Aguinis, 2017).

A characteristic of this research is the use of multiple methods for data collection, along with the foundation in both theory and empiricism. In this way, the phenomena are illuminated from various perspectives and this strengthens the qualitative approach of the research by providing a variety of details and complementary aspects (McKendrick, 1999). The combination of theory and empiricism also helped to illuminate multiple levels of analysis. Table 3-2 summarizes the methods used in each paper.

Table 3-2.

Summary of research methods and level of analysis by paper.

Paper	Data collection	Data analysis	Level of analysis	Contribution
I	Systematic literature review	Categorization of aspects and facets of competence in SCM, based on level of analysis and type of element in the literature.	From individual to inter-organizational	RQ1
II	Shadowing Unstructured and semi-structured interviews Secondary data	Categorization of empirical data, based on practice theory and iteratively developed framework.	Individual managers in logistics and SCM	RQ2
III	Indepth semi-structured interviews	À priori coding of learning mechanisms, followed by open coding, interpretations and storytelling of each learning mechanism. Middle-range theorizing. Concept development based on open coding of entire empirical material.	Individual SC professionals	RQ3
IV			From organizational to individual level	RQ4

3.4 Research quality

Last, but definitely not least, is the question of how to judge research quality. Due to the qualitative methodological approach, and in order to account for the multiple dimensions of research quality, the concept of trustworthiness by Lincoln and Guba (1985) was used. This includes credibility, transferability, dependability, and confirmability.

3.4.1 Credibility

Credibility deals with the question of whether the results appear to be acceptable representations of the data (Lincoln and Guba, 1985).

The primary goal of a systematic literature review (Study I) is to achieve auditability (i.e., How do we know that the reviewer's conclusions are grounded in the data retrieved and not an argument fabricated to support prior conclusions?) (Booth et al., 2012). Since the results from Study I were carefully established by using a structured and documented methodology, credibility must thus be considered to be reasonably achieved. In addition, the concept and content have been scrutinized by multiple industry experts, other academics and by means of blind journal reviews.

Study II involved three investigators and three researchers. In order to ensure credibility, the investigators and one researcher (not the author) held multiple meetings and conducted reconciliations before and during the shadowing to ensure understanding of the practice theory concept. The meetings were held “ensemble”, which made it possible for the investigators to share their experiences and observations between the shadowing occasions. They also became aware of some things that they had actually observed, but not registered as a practice. It should be noted that the collected material was purely focused on the practice; thus, the investigators did not know that competence was the focus of Study II. This was the intention of the researcher in charge of reconciliation. By keeping the investigators unaware of the real purpose, they collected neutral data based on all the practices they observed, including body, mind, things, knowledge, discourse, structure/process, and the agent. In addition, the days for shadowing were selected with heterogeneity in mind. For example, the weekdays covered approximately as many Mondays as Fridays. This selection strategy was deliberate in order to cover as many contexts as possible and to capture as many competences used in practice as possible. It is thus reasonable to assume that this strategy contributed positively to the credibility of the studies. The shadowing was also triangulated with interviews and existing documents to ensure quality of data. All interviews during the shadowing were recorded and transcribed the same day by the investigators, and ambiguities were resolved before the next occasion to ensure that issues were correctly understood. The total empirical material amounted to more than 550 pages and 130,000 words. Two researchers (of whom the author of this dissertation was one) worked together with the empirical material in the subsequent data coding and analysis. The mission was to translate the practice into competences used. The two researchers met at least twice a week for a period of 6 weeks to secure consistent coding and also congruence with the developing analytical framework. This framework helped to establish a robust frame of reference in two ways: first, by the iterative process of how it was developed, and second, by providing clear guidance on how to translate practice into the competences used. All three researchers discussed the discrepancies that emerged during the process and rectified them primarily by modifying or adding to the analytical framework to ensure agreement on the findings, thus improving credibility.

Study III was carefully designed and documented to meet the requirements of credibility. The respondents all had extensive experience and were recognized for their competence in SCM. This suggests they had relevant and deep knowledge of how SC professionals learn how to become successful. The empirical data were promptly transcribed and the interpretations and analyses were carried out iteratively in NVivo by the author with input from other researchers. Multiple tentative versions were discussed and cross-checked. Although the results were based on individual perceptions and interpretations, there was high theoretical

saturation (Seidman, 2013), indicating that the empirical data were appropriate and the results thus an acceptable representation of the phenomenon studied. The results were also scrutinized by peer respondents.

3.4.2 Transferability

Transferability refers to the degree to which research findings can be generalized beyond the specific context of the study (Bryman and Bell, 2015). Based on the value-laden interpretation of qualitative elements in the research, the generalization of results is somewhat limited to the context.

Study I focuses on competence in SCM, and there is no intention for its findings to be generalized beyond the scope of this research. The exclusion of non-English articles in the selection process probably strengthens the significance of the findings in a Western context more than elsewhere.

Study II is a multiple case study, and as such, always subject to contextual factors. To enhance transferability, the case selection focused on a heterogeneous sample. The managers selected represent a wide range of characteristics, rather than a homogeneous category.

Study III is based on middle-range theorizing, which by definition does not aim for generalizable findings. However, Study III is based on a diverse sample of respondents, and the results are thus transferable to a range of SC professionals. Study III also provides thick contextual descriptions, which can open the way for naturalistic generalization (Lincoln and Guba, 1985).

3.4.3 Dependability

Dependability deals with how consistently the results and conclusions are replicable, should a later researcher repeat the study (Lincoln and Guba, 1985). The value of a systematic literature review lies in its transparency and replicability (Tranfield et al., 2003). Since the systematic approach helps to avoid personal preferences and selectivity (Bennett et al., 2005), another review with the same setup should yield approximately the same results. The results from Study I are therefore considered to be reasonably consistent. However, it should be noted that the findings are based on literature from the past 15 years and consequently, the competences studied were those that were in place during that period to handle contemporary issues. Thus the results may not be generalizable for forthcoming literature and contexts, especially considering how the ongoing transformations in business are likely to affect SCM.

In Study II, the stringent use of practice theory assisted to increase dependability. The use of zooming in and zooming out, and the clear definition of practice, helped to make the findings consistent with possible later studies.

The interviews in Study III are based on a developed interview protocol, which in turn is based on a theoretical framework of learning mechanisms. This pre-work helped to identify and specify the learning process. Future researchers replicating Study III should therefore expect to find dependability between the results. In addition, the use of NVivo in the analysis can help to structure future studies and provide transparency in the analysis.

3.4.4 Confirmability

Confirmability refers to objectivity and the extent to which interpretations are the result of the phenomenon as opposed to researcher biases (Bryman and Bell, 2015).

The systematic approach in Study I helped to provide clarity (i.e., to judge what was done and not done), as well as a defense against potential bias in selection and publication (Booth et al., 2012). The involvement of two researchers in the analysis also helped to improve confirmability.

In Study II, the use of multiple investigators as well as the simultaneous analysis work by two researchers (of whom the author of this dissertation was one) decreased the risk of bias, and thereby improved the confirmability of the study.

In Study III, both the input from other researchers in the analysis and the peer-responder check helped to provide confirmability. Most of the papers have undergone a double-blind peer review process, further strengthening the objectivity and quality of the research.

4 Summary of results

This chapter provides brief summaries of the results. The reader, however, is encouraged to read the full versions of the appended papers as they offer richer descriptions. Study I and Study II (Papers I and II, respectively) focus on competence in SCM. Study III (Papers III and IV) is concerned with the development of such competence.

4.1 Paper I – Competence in Supply Chain Management: A Systematic Review

A researcher who enters the field of competence in SCM observes that the literature is varied and points in many directions. He or she will find everything from trust to education and inventory-level algorithms, and from HR departments to students and Chinese logistics service providers. The purpose of Paper I was therefore 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 the literature so as to facilitate further study, practice, and research. A systematic literature review was conducted.

4.1.1 The literature landscape

The systematic review shows that competence in SCM is a growing research area, expanding seemingly exponentially. It is, however, not yet a mature area, and this is also indicated by the diverse and fragmented literature. To obtain an overview of the thematic landscape, the selected literature was classified according to research streams. The following categories were identified: (1) business results and outcomes, (2) strategic management, (3) process improvement orientation, (4) logistics, (5) education and training, (6) organizational behavior and, (7) relationships. This range of categories shows that competence in SCM is of interest in multiple research fields.

In the methodological landscape, quantitative methods dominate, with a majority of the papers based on statistical sampling for hypothesis testing. Only a couple of multi-method papers were found and no systematic literature reviews.

4.1.2 Aspects and facets of competence in SCM

The major challenge was to present what competence in SCM actually consists of. The review identified and classified the key content of competence in SCM in two dimensions: level of analysis (whose competence), and elements of competence (types of competence). This resulted in a framework that brought together aspects at the individual, intra- and inter-organizational levels with the functional, relational, managerial, and behavioral elements of competence from the SCM literature.

4.1.2.1 Dimension 1 – Level of analysis

The level of analysis consists of a broad spectrum of stakeholders, see Table 4-1. The average number of levels per publications is, however, close to 1, indicating that most publications only discuss a single level of analysis.

Table 4-1.
Levels of analysis in the literature reviewed.

Level of analysis	No. of publications
Individual	29
-Supply chain professionals	18
-Logistics employees	2
-Purchasing professionals	1
-Agribusiness managers	1
-Humanitarian logisticians	1
-Students	3
-Employees in general	3
Intra-organizational level	56
-HR department	1
-Purchasing department	5
-Seller/market department	1
-Retail companies	1
-Manufacturing companies	22
-Contracted manufacturer	2
-LSP	4
-SME	5
-Companies in general	15
Inter-organizational level	23
-Manufacturing industry	6
-Manufacturing vs. retail industry	1
-LSP	2

-SME	2
-Retail industry	2
-Pharma industry	1
-General industry	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.

4.1.2.2 *Dimension 2 – Elements of competence*

The elements of competence in the existing literature support the conceptualization of competence in SCM as a multidimensional construct (see Table 4-2). In contrast to the level of analysis, the average number of elements per publication is close to 2.5. This means that when discussing competence in SCM, the literature reviewed encompasses several elements. However, while merely one in five of the publications includes all four elements, half of them only cover one or two.

Table 4-2.
Elements of competence in the literature reviewed.

Elements of competence	No. of publications
Functional	76
Relational	62
Managerial	66
Behavioral	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.

4.1.2.3 *Framework of competence in SCM*

Table 4-3 presents all the aspects and facets of competence in SCM that were found in the literature, categorized by element and level of analysis, and thereby provide a more coherent body of knowledge in the field. Paper I contains a longer discussion of the results, but the most essential conclusion is the need to consider the full range of elements and levels of analysis when studying competence in SCM.

Table 4-3.

Framework presenting aspects and facets of competence in SCM literature.

Elements of competence	Individual level of analysis	Intra-organizational level of analysis	Inter-organizational level of analysis
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

4.2 Paper II – Manager Competences in Logistics and Supply Chain Practice

The purpose of Paper II was to address the literature gap in supply chain manager competences by “focusing on managing rather than management – not just looking at management and manager competence *per se*, but rather at what is happening in practice when managers manage, and what competences they actually use” (Derwik et al., 2016). As a result of the application of practice theory, the study also provides an enhanced understanding of the nature of manager competences and explains the reason for the current use of competences.

The first result from this study is a framework that presents manager competences in supply chain management and their related practices. It is a detailed presentation which translates manager competences into more hands-on descriptions of practices. The framework is divided into 5 competence categories and 11 subcategories, and is based on both literature and empiricism (see Table 4-4).

Table 4-4.

Framework of manager competences in logistics and SCM and related practices.

Competence	Examples of related manager practices
1. Behavioral competence	
<i>Intra-personal</i>	
Self-awareness	Know your shortcomings and act accordingly; accept criticism; be comfortable talking about your weaknesses.
Self-management	Control your emotions; avoid hasty judgment; show integrity and trustworthiness. Consider personal grooming.
Self-motivation	Show inner drive and ambition; take pride in a job well done and strive for results. Learn by curiosity.
<i>Inter-personel</i>	
Empathy toward others	Coach others effectively by considering their personality. Have perspective of others' points of view.
Social skills	Show interpersonal skills; handle conflicts fairly; find common ground; negotiate; resolve problems; collaborate cross-functionally and in cross-culture teams in multiple locations and countries.
Political skills	Be aware of the situation and adjust your communication accordingly.
Leadership	Motivate others; create openness for others to develop; gain commitment; ensure support for proposed ideas.
2. Business managerial competence	
<i>Dynamic awareness</i>	
Commercial awareness	Demonstrate business acumen and a general awareness of cost-to-serve analyses.
Industrial experience	Apply experience gained from specific industries.
Company experience	Demonstrate knowledge of operations; understand organizational infrastructure; show structural intelligence.
Ethics and sustainability awareness	Show respect for diversity, social justice principles, and the environment. Apply sustainable solutions.
Strategic awareness	Develop strategies based on the company's core values while considering risks.
Law and regulations awareness	Show a general understanding of contractual law and ensure compliance with all regulations and legal requirements.
Technology awareness	Be aware of recent technology. Be able to deploy hardware and software to solve process improvements.
<i>Business management</i>	
Planning and organizing	Plan and organize to achieve targets involving relevant parties and consider constraints and hurdles.
Performance evaluation	Use key performance indicators, benchmarks, and best practices to monitor and evaluate performance.
Decision-making skills	Set goals; prioritize and make holistic decisions based on goal achievement.
Execution skills	Ability to develop, recommend, and execute activities resulting in fulfillment of plans and strategies.
<i>Stakeholder management</i>	
Managing staff	Hire, schedule, train, motivate, and supervise subordinates to ensure they carry out activities.

Managing external relationships	Develop and maintain long-term business relationships cross-functionally and inter-organizationally.
3. Generic competence	
Communication	
Information gathering	Actively take in written, verbal, and non-verbal information; extract and interpret the essence.
Information sharing	Use clear language; consider the receiver. Track responses from audiences and demonstrate in presentations.
Cognitive	
Analysis	Demonstrate analytical ability and numerical techniques, as well as qualitative data handling.
Problem solving	Recall and apply information to propose alternatives based on goal-oriented thinking.
4. Functional competence	
Technology	
Basic technical skills	Handle databases, spreadsheets, and word processing and have web search ability.
Information systems	Handle information systems and L&SCM-specific software.
Modeling and optimization	Develop and use interactive decision support models based on simulation and optimization.
Administrative routines	
Administration	General administration practices.
Cost control	Demonstrate basic accounting skills, manage budget, and control costs.
5. SCM expertise	
SCM knowledge areas	
Supply chain management	Demonstrate understanding of the supply chain concept, synchronization challenges, and performance trade-offs.
Customer management	Measure customer satisfaction and ensure customer focus in all areas. Practice value-added customer relationships.
Sales and marketing management	Understand and profile customers and analyze patterns to identify market opportunities.
E-commerce	Demonstrate an understanding of the function and effect of e-commerce on supply chain processes.
Order management	Order, monitor, review, and execute order flow and allocation. Demonstrate an understanding of the function and effect of e-commerce on supply chains.
Purchasing	Demonstrate knowledge of the criteria for assessing and evaluating suppliers. Undertake basic negotiations.
Production	Show an understanding of the manufacturing process, material replenishment systems, and the consequences of order scheduling.
Inventory management	Know and use inventory systems for demand planning and inventory management.
Warehousing	Control movements of materials, information, and services through factories and warehouses.
Transportation management	Prove operational knowledge of carriers, fuel, load planning, end-to-end-solutions, taxation, and customs.
Reverse logistics	Manage returned goods, parts, and scrap disposals.
Product development	Be able to design to manufacture. Be knowledgeable about new product introduction and packaging.
Quality and process improvement	Be knowledgeable about quality systems, TQM, ISO 9000. Visualize a process and propose improvements.
Applied SCM analysis	
Forecasting	Demonstrate an understanding of how to forecast using quantitative and qualitative methods.

Production scheduling	Schedule production and distribute products among manufacturing facilities, terminals, and customers.
Facilities location analysis	Be familiar with and able to plan the location for each facility.
Route planning	Reach optimal efficiency through vehicle routing, using both qualitative and quantitative data and techniques.

The empirical results indicate that managers use SCM expertise competence only to a small extent in practice, and make much more use of business managerial, generic, and behavioral competences. This is in line with other studies, claiming that a manager in SCM is a manager first and a logistician second. A manager in SCM is thus a generalist rather than a specialist. Furthermore, multitasking is used continuously in practice, when managers perform more than one activity concurrently. Moreover, competences are used in combination, which suggests the possibility of synergy generation. One example is problem-solving competence, which combined with competences such as information gathering and company experience, may not only generate a better solution to a problem, but also do it faster. This finding is in contrast to the existing literature, which depicts competences as discrete and factor-based.

Finally, the results suggest that company experience is fundamental in practice and that it is used in combination with almost all the competences identified in the study. Even though this finding may seem rather obvious, few publications highlight experience as a key competence. Paper II presents four propositions.

4.3 Paper III – How Supply Chain Professionals Learn at Work: An Investigation of Learning Mechanisms

Drawing on constructivist learning theory, Paper III investigates how SC professionals develop their competence at work. The study is based on a theoretical framework of learning mechanisms (see Table 4-5), and a series of in-depth interviews with an expertise panel of overwhelmingly competent and experienced SC professionals. Applying middle-range theorizing, the results provide detailed insights into the complex learning process of SC professionals, and provide profound descriptions of how SC professionals take advantage of the mechanisms to become successful at work. In addition, Paper III presents 15 propositions.

Table 4-5.

Theoretical framework of workplace learning mechanisms and related activities and loci (extended from Cheetham and Chivers (2001)).

Locus	Learning mechanism	Related learning activities	References
Interactional (outside oneself in cooperation with others)	Feedback	Formal performance appraisal, debriefings, continuous verbal/non-verbal peer and supervisor feedback, 360 degree evaluation exercises.	Ellström (2001); Kyndt et al. (2009); Nikolova et al. (2014); Bednall et al. (2014); Eraut (2004)
	Collaboration	Communication and interaction with colleagues, other departments, clients, suppliers, participation in multiple communities of practice, work in (multidisciplinary) teams.	Illeris (2007); Kyndt et al. (2009); Tynjälä (2008); Eraut (2004); Nikolova et al. (2014)
	Mentoring	Formal mentoring/coaching, counselling, peer-mentoring group meetings, buddy system, internship.	Nikolova et al. (2014); Billett (2004); Kyndt et al. (2009); Jacobs and Park (2009); Bednall et al. (2014)
	Vocalizing	Teaching, instructing, sharing information with external people in a comprehensive way, develop manuals, coach others.	Eraut (2004); Kim (1998); Kyndt et al. (2009)
Actional (outside oneself single-handedly)	Practice and repetition	Doing the job itself, trial and error, practicing and refining skills, preparation and planning, rehearsing for future events.	Noe et al. (2013); Nikolova et al. (2014); Tynjälä (2008); Jacobs and Park (2009); Coetzer (2007); Eraut (2004)
	Stretching activities	New or challenging tasks/problems, complex assignments, cathartic incidents, working above grade.	Billett (2004); Eraut (2004); Tynjälä (2008); Kyndt et al. (2009); Christian et al. (2015); Coetzer (2007)
	Perspective switching	Job rotation/exchange, perspective-taking exercises, intervision, mental perspective switching, cross-cultural working.	Edmondson and Saxberg (2017); Kyndt et al. (2009)
	Extra-occupational transfer	Formal education, professional attachments, pre-entry experiences, out of work learning.	Noe et al. (2013); Tynjälä (2008); Eraut (2004); Jacobs and Park (2009)
Cognitive (inside one-self)	Observation and copying	Job shadowing, imitation and use of a positive/negative role model, formal/informal observation of others.	Bandura and Walters (1977) ; Eraut (2004); Coetzer (2007); Hoover et al. (2012); Jacobs and Park (2009)
	Reflection	Conscious or subconscious individual assessment/judgement, group discussion and review of past actions and events, reflection in action, self-analysis.	Kim (1998); Tynjälä (2008); Nikolova et al. (2014); Noe et al. (2013); Griggs et al. (2015); Eraut (2004); Jacobs and Park (2009)
	Mental devices	Self-regulated learning, lateral thinking, use of mental models, simplification, use of graphical representation, positive thinking.	Felder and Silverman (1988); Bandura and Walters (1977) ; Rau et al. (2015)
	Unconscious absorption	Working alongside more experienced colleagues, observing, listening, networking with experts and other professionals.	Eraut (2004); Garvin (1993)

The key findings show that SC professionals use a wide range of learning mechanisms throughout their careers, and that the contribution and complexity of these mechanisms change dynamically with seniority (see Figure 4-1). The most

essential learning mechanisms appear to be perspective switching, collaboration, stretching activities, reflection, and feedback. The findings also show that learning mechanisms should not be viewed as isolated phenomena, but instead as being integrated into the learning process, more precisely with key SCM activities and learning attitude. Key SCM activities coincide with a number of the learning mechanisms, inferring a difficulty to differentiate between them. On one hand, learning mechanisms are an essential part of the learning process, and on the other, they are central parts of everyday SCM work. Learning attitude is also found to be profoundly integrated and to play a key role in the process of building knowledge through active participation and interaction with the environment. Such an attitude is described in terms of curiosity, open mindedness, enthusiasm, and a positive disposition, all of which were put forward as being overrepresented in people working with SCM. The integration of key SCM activities and learning attitude in the learning process leads to the conclusion that the SC profession is indeed a learning profession with a range of implications accounted for in Paper III. In total, 15 propositions are presented in Paper III.

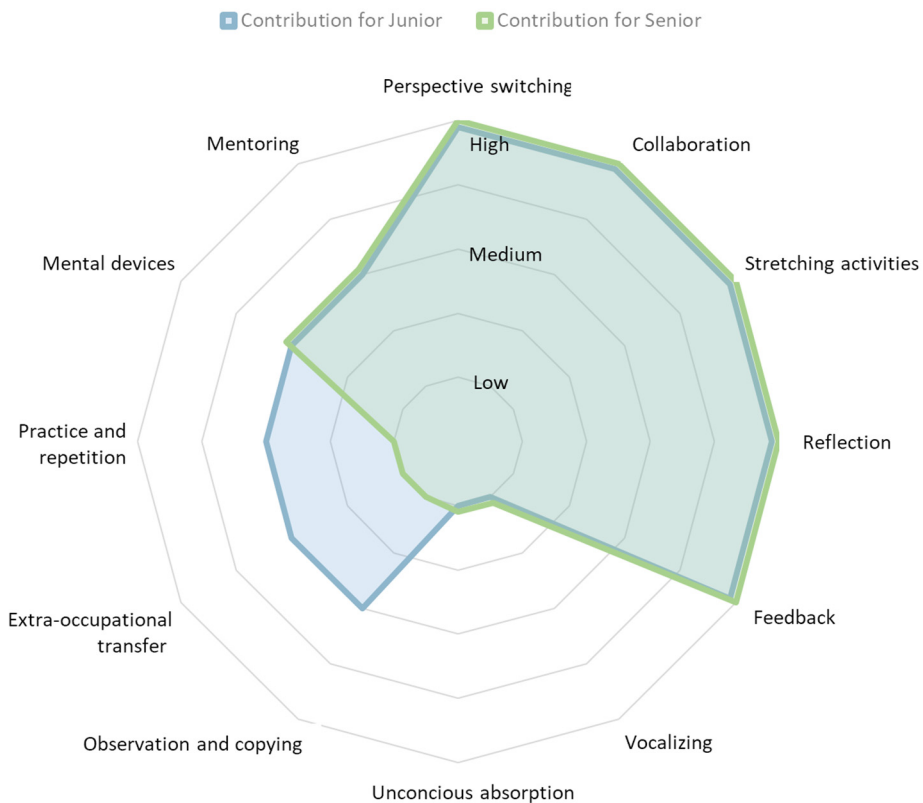


Figure 4-1.
Illustration of the relative contributions of learning mechanisms for junior and senior SC professionals.

4.4 Paper IV – Nurturing Workplace Learning for Supply Chain Professionals: An Organizational Perspective

Based on Study III and the Paper III outcomes, the purpose of Paper IV was to explore how organizations can facilitate workplace learning for SC professionals. The paper is an initial attempt to identify interventions that can assist in such competence development. In brief, the paper presents an inductively developed framework of organizational interventions occurring over four levels of institutionalization, along with in-depth descriptions of each intervention. Table 4-6 shows the framework, and the results suggest that leadership is a common facilitator through all levels of institutionalization. The results furthermore imply synergy effects over levels of institutionalization and also between interventions. Although all respondents were genuinely interested in learning and worked consciously with it, few organizations worked actively with more than a few of the interventions. Regardless of possible synergy effects, there is thus a great potential to further improve support for SC professionals' workplace learning. This paper is only a starting point for future work and studies.

Table 4-6.
Framework of organizational interventions for SC professionals' workplace learning.

Level of institutionalization	Organizational intervention
Learning activities	Mentoring promotion Benchmarking promotion Teaching promotion
Learning processes	Individual performance evaluation Pre- and post-project evaluation
Learning structure	Organizational structure Job rotation Cross-functional meetings
Learning culture	Feedback feasibility Positive philosophy and psychological safety Room for reflection

5 Discussion and implications

This chapter discusses the results from an overview perspective and then delves into the systemic interrelationships found. It goes on to discuss the implications of the results from the perspectives of HR managers and academic program leaders.

5.1 Framing research on competence in SCM

The purpose of this research is to contribute to the overall understanding of competence in SCM, and to explore the development of such competence at work. As the results show, competence in SCM is a broad-ranging field covering multiple levels of analysis as well as many disciplines. This is not surprising considering the definition of SCM which involves many functions and stakeholders (CSCMP, 2020), but also involves the many management components presented by Lambert and Enz (2017). The wide-ranged nature of the field is apparent in the number of research streams from which competence in SCM has been studied, ranging from business outcomes and strategic management, to education and organizational behavior. This indicates that competence in SCM has a recognized impact on business in more than one way, but also that it is a challenge to fully cover the field.

The wide-ranged topic shows a tradeoff in coverage between the general top view and the specific finite perspectives in research on competence in SCM. This is illustrated by most publications covering only one level of analysis and only a few elements. This infers that each study and/or publication may only capture a limited view of competence in SCM. In addition, each publication only belongs to one research stream. One might ask if it is possible to study competence in SCM without considering the full range of elements, research streams, and levels of analysis in view of the above discussion. This is a rhetorical question, however, since it would be impossible to include all the aspects mentioned above. An attempt at such a study would lack a solid foundation and the necessary focus and demarcations. In fact, there is no set limit for the number of dimensions that can be identified, even though this research has tried to capture many of them. For example, competence in SCM has been studied on a national level of analysis, and can probably be extended to regional levels of analysis, like the EU. At the other end, the individual level of

analysis can probably be broken down into practice or personality levels. Also the elements, and all the aspects and facets identified in Table 4-3 can be extended or changed in the future, since the ones presented here are derived from current research, and the competences studied are based on current prerequisites. In the future, additional elements, aspects and facets can be identified. Considering the broad and dynamic spectrum of the topic, it is thus a delicate task to frame research on competence in SCM.

5.2 Competence in SCM as a system

Although all research requires a focus on the studied phenomenon, it is difficult to do so in research on competence in SCM. Competence and competence development are by nature connected, but these two phenomena also stretch and interact over multiple levels (such as the individual and organizational levels). A key to understanding competence in SCM is to understand each of these segments and their interrelationships. To take full advantage of competence in SCM, it thus needs to be viewed as a system, and studies should try to incorporate more than one segment of it. Figure 5-1 illustrates the interrelationships of competence segments, which will be discussed closer in the following subsections.

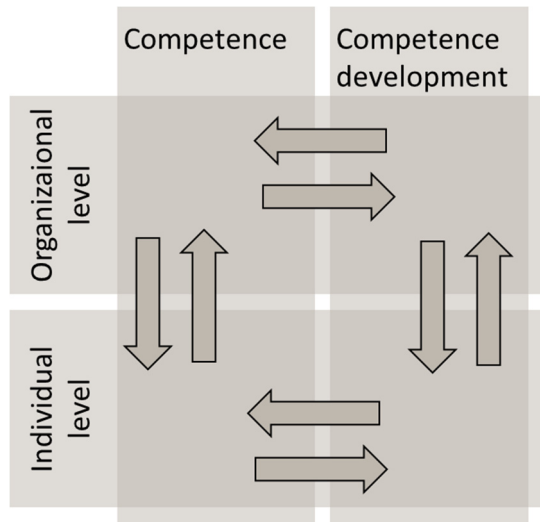


Figure 5-1.
Interrelationships of competence segments in SCM.

5.2.1 The “level of analysis” loop: interrelationships between individual and organizational levels

5.2.1.1 Competence

Though often discussed in separate terms, Hagan (1996) points out that organizational competences essentially are the sum of the individuals' competences. This means that competence at the individual level contributes to competence at the organizational level, but it is also reasonable to suggest that competence at the organizational level may contribute to competence at the individual level. Paper I presents a framework of competences from various elements and on various levels of analysis. For example, communication competence at the individual level can support relationship management competence at the intra-organizational level, just as business intelligence at the intra-organizational level can support business analysis competence at the individual level. This is particularly so when viewing competence as an ability rather than pure knowledge. It is thus reasonable to assume that there are interrelationships in competences between various levels of analysis. It is to be noted, however, that competences on various levels of analysis are not conditional on each other (i.e., individual competence does not guarantee organizational competence and vice versa). This may be partly explained by Boswell (2006) who claims that there is a need for individual congruence with the organization in order for them to get the most out of an individual's competence. This alignment is also referred to as the person-organization fit (Paauwe and Boselie, 2008). In particular, individuals need to be aware of the organization's strategy to effectively apply their competences in the organization.

5.2.1.2 Competence development

As stated in the frame of reference, organizational learning stems from individuals, who become agents and influence the way others in the organization think, act, and learn (Drejer, 2000). However, there is also a feedback loop to individuals. New routines, structures and culture in the organization guide and shape future individual behavior and experiences. This forms a constant interrelationship in learning between the different levels of analysis. Competence development is thus a system of actors and changes on various levels of analysis that need to be considered simultaneously. For example, Paper IV puts forward a number of interventions that can support individual workplace learning in organizations. These interventions were found to be more or less prevailing in organizations, indicating that organizations need to learn more about them. But organizations cannot learn without individuals who take in and understand the interventions and then initiate them. During implementation or thereafter, routines and structures change (i.e., organizational learning takes place), which in turn can result in new individual

experiences of the interventions. This can help to improve or implement other organizational interventions for learning.

5.2.2 The snowball effect: interrelationships between competence and competence development

5.2.2.1 Individual snowball effect

Naturally, competence development leads to a change in competence volume. On the individual level, the most common view of competence development relates to changes in knowledge, skills, and ability (Bloom, 1976), but also attitude (Ropes, 2015). Furthermore, experience is highlighted as a competence in Paper II. Interestingly enough, this research shows that the relationship also goes in the opposite direction, namely that the specific competences people already have facilitate their competence development. Both attitude and experience are profoundly integrated in the process of developing existing competences. Moreover, Kyndt et al. (2009) show that having experience in the form of education strongly corresponds to the presence of learning mechanisms, and thereby most likely a higher degree of learning. This can further be explained by the constructivist view on learning in the dissertation research, in which new knowledge is incrementally added to existing knowledge based on cognitive developmental level (Piaget, 1971). Thus, the level of competence an individual has is a prerequisite for additional competence development. Paper III shows that learning attitude strongly affects the process of competence development. This also correlates with motivation and the zone of proximal development in constructivist learning theory (Vygotsky, 1978). Incremental steps and successful completion of tasks generate motivation and a positive learning attitude for further competence development. Thus, there is a cycle of competence and competence development that can either promote or hinder further development of individual competence.

5.2.2.2 Organizational snowball effect

Organizational learning is a tool for improving organizational competences (Hult et al., 2003). Lado and Wilson (1994) suggest that these consist of managerial, input-based, transformational, and output-based competences. Transformational competence by definition includes organizational learning, which also indicates a reverse direction of organizational competence and competence development. Such a reverse direction is also suggested by the interventions presented in Paper IV, which link directly to managerial competence. By applying the interventions, organizations can increase their ability to improve skills and develop processes. Thus, there is also a cycle of competence and competence development on the organizational level. The organizational interrelationship between competence and competence development is also strongly integrated with the individual level of

analysis as described in the section 5.2.1. This further strengthens the need to maintain a systems perspective when studying competence in SCM.

5.3 Managing competence in SCM

Competence in SCM is a highly strategic tool for transforming strategy into successful performance. A recurring discussion in the industry is about finding, developing, retaining and managing such competence. Simultaneously, the role of HRM has increased in strategic significance, and currently includes alignment between individual, group, and organizational competences, as well as the alignment of these competences with strategy (Buller and McEvoy, 2012). Figure 5-2 is a modified illustration outlining HRM practices merged with competence in SCM on various levels, and the alignment with strategy and desired outcome (performance in Figure 5-2). Strategy is rooted in the SC level and its surroundings, but primarily relates to and places demands on the organizational level. These competence demands are then decomposed into the group and individual levels, which in turn place demands on HR to adjust possible competence gaps, primarily through staffing, and training & development. After requested competence is hired or developed, mainly at the individual level, individuals will take action and contribute to the group level, which in turn will contribute to the organizational level and thereby achieve results to fulfill the strategy. A major challenge in HRM work is thus to align strategy and various levels in providing competence and competence development. In addition, two other HRM practices can support this alignment work, namely assessment and compensation. Based on the results from this research, the following subsections discuss the various implications of these four HRM practices for future work on managing competence in SCM.

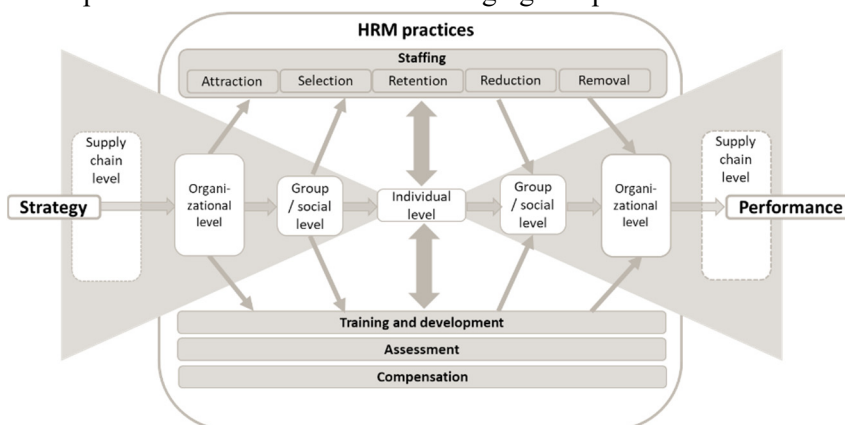


Figure 5-2. Strategic HRM practices and their relation to competence in SCM, modified from Schuler et al. (2011) and Buller and McEvoy (2012).

5.3.1 Implications for staffing of competence in SCM

SC professionals hold many key positions in organizations today, and staffing becomes a matter of talent management including attraction, selection, retention, reduction, and removal (Schuler et al., 2011) (see Figure 5-2). Due to the current shortage of SC professionals, attracting the right people to positions is a significant task for HR managers. However, their everyday working life is often filled with unplanned happenings that call for immediate attention, making the **attraction** task easy to postpone. Just as important are the **reduction and removal** tasks, since getting the wrong people off is as crucial to great companies as getting the right people on (Collins, 2001). However, due to the shortage of SC professionals, these tasks also risks getting inhibited.

For the **selection** task of SC professionals, this research offers a number of insights. Paper I reports on the wide range of competences required for SC professionals according to the literature, while Paper II points out which of these are mainly used in practice. The conclusion is that SC professionals mainly use generic, managerial, and behavioral competences in practice, why HR managers might favor these competences at the expense of more functional SC-related ones. This is in line with the T-shaped profile and Tatham et al. (2017), who promotes the “horizontal” competences (general management skills) for SC professionals, as these help to sense and seize opportunities in the supply chain. Selection of such competences is even more vital if talent is viewed as a subject and as being innate (Dries, 2013). Another specific competence identified in Paper II is experience, which was found to be fundamental in practice. The sample of candidates can therefore be extended to internal candidates with long experience from the organization’s business, but not necessarily from SCM. More importantly, though, this finding about experience has implications for **retention**, where HR should put effort into retaining existing SC professionals over attracting new ones. This can also better secure the person-organization fit (Paauwe and Boselie, 2008), as the current fit of these candidates is already known by the organization.

Finally, and perhaps most importantly, Paper III highlights the SC profession as a learning profession. This is not surprising considering the constant transformations in the SC environment, but also considering the wide range of competences required. It is simply difficult for a single employee to possess the full range of competences required, which is why they need to learn continuously. The amount of learning necessary in the SC profession can partly explain why functional SC-related competence is not at the top of the list for a successful SC professional. Such competence is simply developed when needed. However, this has implications for the selection task, where a learning profile should be elevated. By basing the selection on learning profile, experience, and generic competences, the potential

pool of candidates increases to include other types of managers and elevates internal candidates. This can counteract the shortage of SC professionals.

5.3.2 Implications for assessment of competence in SCM

Because of the nature of competence in SCM, assessment is difficult, though imperative for all other HRM practices (i.e., staffing (primarily selection), training and development, and compensation). As the results show, it is a delicate task to assess competences in isolation, since there can be synergy effects with other competences (Paper II). There can also be integration effects with other levels, such as the group and organizational levels. Furthermore, there is no optimal level of competence since this depends on the context. For example, relational-based versus performance-based competences can be more or less appreciated depending on the task at hand (Lindberg and Rantatalo, 2015).

There is a debate in the literature about various perspectives on competence, for example, the tension between competence as ability or motivation (Dries, 2013). Ability infers an output-based view on competence, making the assessment focus on achievements and performance. Motivation is input-based, making the assessment focus on effort and ambition. Based on this dissertation research, the primary focus for the assessment of competence in SCM would be the latter, especially for employee selection. Motivation involves the learning attitude which is connected to the individual's effort and ambition. This is also in line with Dries et al. (2012) who found learning attitude to be a better predictor of a high-performance employee than job performance, which is the traditional way of identifying people with high-performance capability. A possible explanation is that whereas all individuals with high potential are indicated to be high performers, not all high performers are high potential individuals (Corporate Leadership Council, 2005). However, assessment of achievements and performance can nourish motivation and increase the learning attitude, which is why a combination is probably to be recommended.

5.3.3 Implications for development of competence in SCM

Development of competence in SCM is highly affected both positively and negatively by contextual factors. SCM work itself is characterized by task complexity and extensive professional contacts. SC professionals are also highly exposed to external changes and competitive pressure. While all these factors are known to positively influence workplace learning (Ellström and Kock, 2008; Skule, 2004), they simultaneously generate a huge need for continuous competence development.

However, Paper I shows that the literature on competence in SCM focuses on outcome (i.e., what) and much less on the process to get there (i.e., how). This infers that there is little support in the literature for developing competence in SCM. Paper III therefore delves into how this process takes place from junior to senior individuals, while Paper IV concentrates on learning interventions on the organizational level. As competence development encompasses both levels (individual and organizational), as well as the transfer between them, this is extremely challenging and should not be left to HR managers alone. Unfortunately, this aspect of management capabilities is rarely found in management development programs (Eraut, 2004). Paper IV thus proposes that top managers should also be trained in how workplace learning materializes. The learner is not to be forgotten. He or she plays an active and vital role in the process of constructing knowledge, which is also reported in Paper III. Thus to succeed in their quest, HR managers and others also need to secure motivation in the process of competence development in line with both the AMO framework (Guest, 2011) and constructivist learning theory (Vygotsky, 1978).

Based on the results from this research, the focus should be directed to support the learning process as such, and not specific learning outcomes. Such support can consist of implementing a learning-to-learn-strategy for competence development, as well as working on the organizational interventions found to support individual learning in Paper IV. According to Marsick (2009), such an organizational strategy can be easier to work with than an individually dependent one. Regardless, and based on the interrelationships described above (5.2), there is a snowball effect in competence development. The more you learn, the more competence you gain, and the more you go on to learn. This applies to both the individual and organizational levels. HR should make that snowball roll.

5.3.4 Implications for compensation of competence in SCM

Compensation of competence in SCM is naturally connected to the individual level in the form of salary and possible bonuses. However, considering that SCM includes cross-functional and cross-organizational work (where relationships and teamwork are key for ultimate performance), compensation should encourage overall earnings and savings rather than individually identified ones. This is a true challenge for any management to handle because it is often difficult to identify the individual contribution to overall performance. Moreover, there is a pitfall: high-performers do not always continue to perform highly (one reason can be that performance is mistakenly connected to the individual instead of the organization). Regarding the previous discussion on assessment (5.3.2), a personal profile of effort and motivation can be a better benchmark for compensation than performance. At least such characteristics are more likely to support future performance, which to be

honest, would be more in line with the intentions of a compensation strategy. Also, Study III suggests that monetary compensation is not the driver of workplace learning, but rather a genuine learning attitude. Thus, HR managers must consider intrinsic as well as extrinsic motivation. Although this research does not offer any silver bullet for how to approach these issues, it hopes to have improved the understanding of competences at various levels, as well as the inter-relationships between them.

5.4 Implications for SCM education

Just as the role of SC professionals has developed over the years, SCM education needs to develop (van Hoek and Wagner, 2013). Looking into most SCM educational programs, the majority of courses are highly oriented towards functional knowledge such as logistics, procurement, and production. Such courses are, of course, expected to be included and are relevant. But to meet the requirements for competences used in practice today, soft competences need to be added. Paper II highlights communication and leadership as highly relevant skills for SC professionals to possess. Multidisciplinary elements should therefore be considered. However, the trend is the opposite in practice. SCM elements are increasing while soft elements are decreasing in European SCM graduate programs (Onar et al., 2013).

Another significant competence for future SC professionals is learning skills, which is stated in Paper III. Having a Master's Degree in mechanical engineering myself, my classmates and I were often told that the reason for taking this or that course was that we should learn how to learn new things quickly. So, in order to learn-to-learn, we took courses in transmissions, automatic control, tribology, and heat transfer. This was always confusing to us, and it was not until writing this dissertation that I finally understood the full meaning of that advice. However, I now also believe there are alternative ways of how to achieve such a learn-to-learn-capability.

Another reflection is the emphasis on knowledge in academia. Although course syllabuses include skills and abilities as well as knowledge (perfectly in line with the definition of competence in this research), skills and abilities are often downgraded in educational practice. This deficit offers opportunities for executive training organizations that focus particularly on such outcomes. Though there are examples of programs that integrate student projects with real-world problems (Zsidisin et al., 2013), graduate programs in SCM are generally designed based on research interests and therefore lack a connection to the skills and abilities required in the industry (Onar et al., 2013). A personal note is that the program I embarked upon 25 years ago still offers exactly the same courses as then, indicating that

change is slow. It would be a true pleasure if this dissertation could make a change in that respect.

6 Contributions and future research

This chapter outlines the theoretical, managerial, and methodological contributions of this research. It concludes by presenting suggestions for future research.

6.1 Theoretical contributions

This research provides a unique overview of competence in SCM, as well as novel and in-depth insights into the learning process at work for SC professionals. The research also provides initial insights into how organizations can support such competence development. The following two paragraphs present an overview of the theoretical contribution.

The research on competence in SCM extends previous knowledge by simultaneously taking an overall grip to structure the field on a top level, as well as excavating the details to provide understanding on a deeper level. The research ranges from diverse research streams and multiple levels of analysis to detailed aspects and facets; from theoretical requirements to practical usage; from isolated phenomena to highlighted interrelationships; and from present management to future education. By looking at the full spectra of the competence in SCM (in line with the Japanese KonMari cleaning method (Kondo, 2014)), the ambition of this research is to tidy up the territory and provide clarity by categorizing components, identifying relationships, and creating frameworks into which both present and future components easily fit. These frameworks can assist researchers in the fields to position their own research, but also to find opportunities to extend their research into related areas.

The research on workplace learning in SCM extends previous research that has identified the necessary competences for SC professionals (Schulze et al., 2019; Shou and Wang, 2015; Christopher, 2012; Murphy and Poist, 2006), but has not explained how they should be achieved, or only has focused on formal SCM education (Mangan and Christopher, 2005). While prior research stops short of identifying the full complexity of how workplace learning for SC professionals takes place, this research delves into a constructive learning process including the full range of contextual elements that affect learning outcomes. The research also

extends previous research on workplace learning carried out from an organizational perspective (Ellinger, 2005) through its attempt to identify interventions that can support competence development for SC professionals.

More precisely, this research provides the following theoretical contributions:

- Classification of research streams in SCM literature.
- Framework presenting aspects and facets of competence in SCM based on identified elements and levels of analysis in the SCM literature.
- Framework of manager competences and related practices in logistics and SCM, providing a detailed map of what constitutes competence in SCM in practice.
- Identification and analysis of competences used in practice including multi-tasking and experience which are highly prevalent. This adds to the previous literature on the required competence for SC professionals.
- Identification of synergy effects when competences are used in combination. This complements the prevailing factor-based picture of SC professional competences.
- Framework of workplace learning mechanisms and related learning activities and loci, providing a theoretical reference point for future research in workplace learning.
- Detailed descriptions and analyses of how SC professionals take advantage of learning mechanisms in their learning process, as well as the identification of essential learning mechanisms for junior and senior SC professionals.
- Identification of learning attitude as imperative in the constructive learning process of SC professionals, thereby pointing out behavioural aspects in the learning process.
- Identification of key SCM activities as learning mechanisms, and the subsequent classification of the profession as a true learning profession.
- Framework of organizational interventions to support SC professionals' workplace learning.
- Multiple theoretical propositions on competence and workplace learning to further explore.

6.2 Managerial contributions

The results from this dissertation research include four frameworks, three tables, three figures, and many narratives and empirical examples. Altogether they provide understanding for competence and workplace learning in SCM and are useful for managers in a number of ways.

First, and in line with the competence-based view/movement (Freiling et al., 2008), SC managers and other executives can use the framework in Paper I and the discussion on inter-relationships for strategy development. This can support managerial discussions regarding current competence status, and illustrate the need to involve and synchronize all levels of analysis. It can also help to secure the necessary competences for improved outcomes at all levels. Moreover, the ratio of learning in the SC profession can inspire managers to promote learning in general, instead of focusing on single competences in the quest for improved performance. This research can also provide guidance for the managers' own choice of in-service training.

Second, this research also contributes to HR managers in their new strategic role, applying to all of their major practices; namely staffing, assessment, training and development, and compensation. As described in the discussion and implication chapter, there is a broad range of actions that can be taken. By providing insights into competence and workplace learning in SCM on a detailed level along with guidelines, HR managers can gain a profound understanding of the competences that are required in SCM as well as how to develop them. This research also provides insights on an overall level, which can help HR managers gain a clearer understanding of their role and possibilities on a strategic level.

Third, this research supports academic leaders in the process of developing relevant educational programs and training by highlighting the full range of competences needed. This can include learn-to-learn-ability, experience, and soft competences. The range of fields embraced under the umbrella of competence in SCM should also influence planning for future SCM education and training programs by motivating efforts for collaborative programs between faculties.

Fourth, for those who aim for a managerial career in SCM, this research provides an awareness of the range of competences that managers use in practice. This is not always the same as job descriptions and seldom matches academic curricula. The research results also point out the benefits of specific learning mechanisms, both for juniors and seniors in the profession.

6.3 Methodological contributions

The major methodological contributions of this dissertation are the use of shadowing as a data collection method along with practice theory and the application of middle-range theorizing in SCM research. **Shadowing** is used to collect micro-ethnographical data. Researchers follow the people they are studying around during their day and questions are asked to clarify issues (Bryman and Bell,

2015; Czarniawska, 2014). **Practice theory** aims to understand and explain phenomena through the level of human practice (Bourdieu, 1972) and uses zooming in on and zooming out from the practice to understand and explain the phenomenon. To the best of the author's knowledge, neither of these two methods (shadowing and practice theory) has previously been used in the field of SCM. The present research demonstrates their applicability in SCM research, and can inspire other researchers to apply non-traditional methods to highlight various phenomena in SCM.

Middle-range theorizing offers a level of detail that allows researchers to delve into the full range of contextual elements that explain how, why and when a phenomenon is linked to its outcome (Pellathy et al., 2018), in this case, the workplace learning process of creating successful SC professionals. Since the results are deeply embedded in the context from which they are derived, they offer unique insights into the link/middle range between learning activities and outcomes. Despite this, middle-range theorizing is limited in SCM research (Stank et al., 2017). The dissertation research thus makes a methodological contribution by showing how middle-range theorizing can be applied in the field of SCM.

6.4 Suggestions for future research

6.4.1 Future avenues for the fields of competence and workplace learning in SCM

Although this research genuinely has explored competence and workplace learning in SCM, it by no means offers a complete guide to the fields. Nor does it claim to offer true or valid knowledge in line with a positivistic epistemological view, but rather an invitation to reinterpretation in line with the constructivist epistemological view. Regardless, the research's point of gravity lies on SC professionals' individual competence and their workplace learning, and multiple integral areas remain to be further explored.

First, it would be beneficial to conduct additional research on the organizational level from a number of aspects. Since strategy is tightly connected to organizational competence in SCM, more knowledge on the connection between various strategies and desired competences would be valuable. Does the required set of organizational competences in SCM depend on the strategy, and if so, how? Are there contextual differences? There is also a need to explore how competence on the organizational level develops. As discussed, there are interrelationships between individual and organizational competence development, and it is thus vital to understand all the components and their respective interdependence in order to take full advantage of

the supply chain and its possible competitiveness. Future research can delve into these interrelationships and how to take advantage of them. Organizational interventions that support competence development on the individual level also need to be looked at more closely. The current research was implicit and the results were derived inductively. Future research should carry out studies explicitly focused on interventions that include SC professionals and HR managers in order to obtain a more insightful picture of these interventions.

Second, research is needed on the inter-organizational level, and particularly on the interaction between this and the organizational level. Supply chains are foremost an inter-organizational phenomenon, and competence on this level is critical for their effective performance. How does the overall organizational competence of an organization affect inter-organizational competence, and vice versa?

Third, and highly important, research on competence in SCM needs to include HRM to a much larger extent. As stated, competence and competence development are interrelated as well as the various levels of analysis; strategic HR managers have a unique mission to work on them all simultaneously. However, since the individual level is part of the other levels and interacts with them in interrelationships, HR managers have a specific obligation to work on this level. Yet little is known about how to do this, and more research is needed to assist future HRM work. A residual question deals with competence assessment, and how to measure competence and outcomes at a higher level while properly rewarding such outcomes on an individual competence level. Since people with competence in SCM are a valuable but scarce resource, and one issue deals with how to attract and reward such competence, the reward system is a major factor in attracting and retaining competent people for most organizations. There can be concern, though, about rewarding individual competence and its impact on overall performance. From a SCM perspective, the outcome is highly dependent on collaboration among many individuals, and the reward system should thus support collaborative efforts. This is not an easy task and future research needs to examine the question of how to compensate SC professionals properly. In this respect, it must also be remembered that the “M” in the AMO framework is not only about extrinsic compensation, but most importantly also about intrinsic motivation. Paper III clearly shows a strong learning attitude among successful SC professionals, but lacks an explanation as to how this attitude is gained and sustained. Future research can well include behavioural aspects such as those suggested by Schorsch et al. (2017), who investigates environmental, structural, and procedural moderators on behavioural outcome.

Fourth, more research is needed on the learning process and on the specific outcomes deriving from various learning processes. Today there is an imbalance in research on competence development in SCM, with a clear focus on learning outcome as opposed to the learning process. The existing research is divided and

either focused on what you learn (Kotzab et al., 2018) or how you learn (Derwik and Hellström, 2020). Future research can explore how specific learning processes or mechanisms relate to specific learning outcomes. A few researchers have investigated both the what (outcome) and the how (process), for example Ellström and Kock (2008) and Eraut (2004); however, both describe the “how” in general terms and do not connect specific learning outcomes to the learning process, nor to SCM. Although workplace learning is difficult to link directly to learning outcomes (Marsick and Watkins, 2016), this is not a reason for neglecting to do it.

Fifth, future research is needed to capture the development of the fields of competence and workplace learning in SCM, and to capture still unidentified aspects of this research. As previously discussed, the terrain of SCM is constantly changing, and so are the required competences. It would not be surprising if future research identified additional levels of analysis and additional elements of competence. I would primarily expect additional aspects and facets of competence to appear in future studies. Emerging areas in SCM are big data (Andersson and Jonsson, 2018) and green SCM (Martinsen and Høge-Brodin, 2019); accordingly, competence in such areas needs to be identified and developed.

6.4.2 Future methodological avenues for the fields of competence and workplace learning in SCM

This dissertation research has provided evidence of (along with many other publications) the multidisciplinary character of the two fields and a continued need for multidisciplinary research. This equally applies to the content-related portion of the research as well as to the methodological portion. The choice of methodology has implications for the methods selected, such as those related to data collection and data analysis. Future research should attempt to incorporate non-traditional methods from other disciplines in order to extend the scope and possibilities for research in the fields of competence and workplace learning in SCM. A specific example is on how to assess competence in SCM in various combinations and contexts. This dissertation has shown the difficulties in competence assessment due to context dependency and that a competence in one context may not be universal. The level of competence can also be subject to varied assessments. For example, there can be non-linearity in the level of experience, where either no experience at all or very long experience is considered disadvantageous (Boswell, 2006). Combinations of competence were found to be used in practice (Paper II), and some combinations can be considered more advantageous than others. To determine what levels and which combinations of competence are beneficial, and in what contexts, a “fuzzy set” Qualitative Comparative Analysis (fsQCA) method is suggested. With this method, multiple factors can be loaded simultaneously and multiple

configurations of factors can be identified and compared based on specific outcomes. For example, A + B + D may achieve a specific outcome, but A + C without D may also achieve the same outcome, where D represents the context. Through additional research, HR managers can find guidance on how to assess competence in SCM in various combinations and contexts.

Finally, the systems approach has been dominant for many years in SCM research (Gammelgaard, 2004). This is not very surprising, due to the holistic perspective of SCM and its focus on total cost and avoidance of suboptimization (Grant et al., 2005); human aspects, however, have been neglected to a large extent. Boudreau et al. (2003) point out a number of simplifications about human beings that have been commonly used in operations research: that people are deterministic and predictable, have the same responses to incentives, and are unaffected physically or psychologically by one another. In practice, decisions are affected by people's intentions, actions, and reactions (Bendoly et al., 2006). That is why in exploring the field of SCM, which increasingly involves people, additional methodological approaches are required. SCM by nature involves a systems approach, but an actors approach can assist researchers in gaining new perspectives and insights in the field of competence in SCM by acknowledging human intentionality and social constructs. Furthermore, the core of knowledge in the actors approach consists of understanding (c.f. explanatics) (Arbner and Bjerke, 1997), and by conducting rigorous research based on the actors approach, researchers can advance understanding as scientific fulfilment.

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