The Integration Within:
What is internal integration in SCM?

– An indicative study of the definition of internal integration

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**Title:**

The Integration Within: What is internal integration in SCM? - An Indicative Study of the Definition of Internal Integration

Integration inifrån: Vad är intern integration inom SCM? - en Indikativ Studie i Definitionen av Intern Integration

**Name:** Emma Toivo

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**Aim:** The aim of this thesis is to identify internal integration through determining the most prominent building blocks of the concept and thus identify a state of integration. This is done to add to the understanding of what internal integration is and what it is made up of.

**Completion and results:** VG

**Search terms:** supply chain integration, internal integration, integration issues, integration type, integration boundary
**ABSTRACT**

The definition of internal integration is not complete. This state of integration holds an essence and elements that encompass a complex network of characteristics stemming from its origin(s), SCM and SCI, as well as stemming from its unique nature. Its modest acknowledged presence in the competitive world today compared to other integration forms testifies to the difficulty there is in defining and understanding the true form of internal integration.

In this thesis the concept of internal integration is defined by sketching out its boundaries in an *internal integration boundary framework*. By looking at the scope, essence, and elements of supply chain management, and supply chain integration, as well as by situating internal integration among the other levels of integration the nature of internal integration can be more comprehensible, and there can be more clarity in how internal integration differs from internal collaboration and coordination. By defining the boundaries of internal integration there is more ease in understanding its complexity, its nature, and maybe even how it can be implemented in a supply chain. As such, the internal integration boundary framework offers a starting point in getting to grips with integration within: the term internal integration.
## Table of Content

Chapter 1: Introduction ........................................................................................................................... 1
1.1 Background: SCM today ................................................................................................................ 1
1.2 Background: SCM and competitive integration ............................................................................ 2
1.3 Aim ................................................................................................................................................. 5
1.4 Research Questions ....................................................................................................................... 5
1.5 The target audience and use of the findings ................................................................................. 5
1.6 Delimitations .................................................................................................................................. 6

Chapter 2: Methodology ........................................................................................................................ 8
PART I .................................................................................................................................................. 8
2.1 Introduction ................................................................................................................................... 8
   2.1.1 Knowledge Claims – Ontology: ............................................................................................... 9
   2.1.2 Strategies of Inquiry ............................................................................................................. 10
   2.1.3 Research Method ................................................................................................................. 12
PART II: .............................................................................................................................................. 13
2.2 The Trilateral Truth in Social Research ........................................................................................ 13
2.3 General Research Ethics of Subject ............................................................................................. 15
   2.4 What is the Use of this Research? ........................................................................................... 16
      2.4.1. Pre-existing Understanding of Approach ............................................................................ 16
      2.4.2 Overall-Objectivity of the Author ......................................................................................... 17
PART III .............................................................................................................................................. 18
2.5 Research Realism – Critical Awareness ....................................................................................... 18
   2.5.1 Specific Research Ethics – data collection and interpretation ............................................. 18
   2.5.2 Frame of Reference – Secondary Literary Data ................................................................. 19
   2.5.3. Construction of the Frame of Reference ............................................................................. 19
   2.5.4 Reliability and Credibility of the frameworks ....................................................................... 20
   2.5.5 Validity of the frameworks ................................................................................................... 21
   2.5.6 Attribute of Generalization .................................................................................................. 22
PART IV .............................................................................................................................................. 23
2.6 The empirical study ..................................................................................................................... 23
   2.6.1 Quantitative Method – the Survey ....................................................................................... 24
   2.6.4. Construction of the Questionnaires .................................................................................... 24
   The pilot testing ............................................................................................................................. 26
   2.6.2 Strength of Survey .............................................................................................................. 27
Table of figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>p.7</td>
</tr>
<tr>
<td>Figure 2</td>
<td>p.15</td>
</tr>
<tr>
<td>Figure 3</td>
<td>p.33</td>
</tr>
<tr>
<td>Figure 4</td>
<td>p.46</td>
</tr>
<tr>
<td>Figure 5</td>
<td>p.58</td>
</tr>
<tr>
<td>Figure 6</td>
<td>p.59</td>
</tr>
<tr>
<td>Figure 7</td>
<td>p.63</td>
</tr>
<tr>
<td>Figure 8</td>
<td>p.70</td>
</tr>
<tr>
<td>Figure 9</td>
<td>p.89</td>
</tr>
<tr>
<td>Figure 10</td>
<td>p.90</td>
</tr>
<tr>
<td>Figure 11</td>
<td>p.92</td>
</tr>
<tr>
<td>Figure 12a</td>
<td>p.93</td>
</tr>
<tr>
<td>Figure 12b</td>
<td>p.94</td>
</tr>
<tr>
<td>Figure 13</td>
<td>p.96</td>
</tr>
<tr>
<td>Figure 14</td>
<td>p.97</td>
</tr>
<tr>
<td>Figure 15</td>
<td>p.99</td>
</tr>
<tr>
<td>Figure 16</td>
<td>p.102</td>
</tr>
</tbody>
</table>
**Abbreviation index**

CE – Concurrent Engineering

CFI – Cross-Functional Integration

CLM – Council of Logistics Management

CSCMP – Council of Supply Chain Management Professionals

EDI – Electronic Data Interchange

ERP – Enterprise Resource Planning (System)

GSCF – Global Supply Chain Forum

Helcat – Helecon Online Library database, HSE Student Library

HSE – Helsinki School of Economics

JIT – Just in Time

LiUB – Linköping University Library

NPD/PD – New Product Development

SC – Supply Chain

SCI – Supply Chain Integration

SCM - Supply Chain Management

SCO – Supply Chain Orientation
Chapter 1: Introduction

This chapter serves as an introduction to the field of research as well as states the aim and research questions of the dissertation. The chapter aims at creating an understanding of the underlying need for further research on internal integration in addition to explaining why current knowledge is misaligned and contradictory.

“It is important to realize [...] that supply chains exist whether they are managed or not.”

- Mentzer et al, 2001¹

1.1 Background: SCM today

The rules of the game have changed. Trading and production environment is becoming more competitive, necessitating constant attention to stay ahead of competitors.² Today, defect-free products at your doorstep reliably, faster and without damage are not part of competitive advantage over your competitors; it is a necessity to even stay in the game. With this, tighter coordination with suppliers and distributors is now needed.³ It is a significant paradigm shift that companies today compete as supply chains instead of one on one.⁴ But as Karen Spens points out, there are two ways to higher performance; external integration and internal integration.⁵

¹ Mentzer et al (2001) p.4
² Nabi & Luthria (2002) p.1
⁴ Lambert & Cooper (2000) p.65
⁵ Spens (2006) p.232
Once companies are motivated to increase their competitiveness, they need to focus on developing their abilities, such as use, adapt and innovate on existing technologies, ability to attract, build and retain appropriate human capital, and the ability to manage logistics and improve the supply chain network, which are key to improving competitiveness. Nevertheless, in this (still) decade of need, SCM academia is following rather than leading. A study by Ramdas and Spekman added “credence to the view that moving towards integrated supply chains and leveraging the skills of supply chain partners to achieve end-customer satisfaction are sources of competitive advantage.”

Despite this need, there is much rhetoric about supply chain management (SCM), turning it into a buzzword. SCM is a relatively new approach and thus its boundaries of practice are still evolving. As such, there remains confusion as to what Supply Chain Management actually means, despite popular use of the term in both academia and practice: The views differ, e.g. from operational terms or management process to management philosophy. “[Companies] compete through the efficiencies and the adaptability of the supply chains of which they are a part.” As already mentioned, once companies are motivated to increase their competitiveness, they need to focus on developing skills, such as improving their supply chain network. The advantage for individual supply chain members is that through coordination of their value-creating activities, the entities involved create more value together than they would have working independently.

1.2 Background: SCM and competitive integration

The concept of working together, supply chain management, made its debut during the 1980s evolving from logistics. Yet nearly three decades later, supply chain management is as diffuse as documented and sometimes difficult to separate from logistics. Halldórson et al even dispute whether supply chain management can even be implemented or if it actually

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6 Nabi & Luthria (2002) p.18  
7 Lambert & Cooper (2000) p.65  
8 Ramdas & Spekman (2000) p.21  
10 Fawcett & Magnan (2002) p.358  
12 Nabi & Luthria (2002) p.150  
13 Nabi & Luthria (2002) p.18  
16 Lambert & Cooper (2000) p.5
is more of a *phenomenon* that takes shape with time as more technology and collaboration comes into the mix.\textsuperscript{17}

There is nonetheless consensus that supply chain management is about integration of activities\textsuperscript{18} but there is lacking specifics and delineation of what integration means. Several stages, or levels, of integration have been identified\textsuperscript{19} but there is debate on how these stages relate to one another, or if there is even a relationship between their implementations.\textsuperscript{20} Nevertheless, on the topic of SCM benefits, there is solid agreement: Adopting supply chain management is working towards increased competitive advantage.\textsuperscript{21}

On the stages of integration, nevertheless, there can be considerable advancement in what has yet to become a sharp competitive tool for management. Lambert and Cooper have identified what they refer to as the nine management components for successful supply chain management.\textsuperscript{22} Be that as it may, “there are significant differences in adoption of SCM integration components, such as IT.”\textsuperscript{23} The rate and efficiency of IT adoption in high-tech, auto manufacturing or consumer packaged goods is much stronger than the adoption of IT (systems, software, gadgets, etc) in for instance health care.\textsuperscript{24}

But little, if anything generally applicable, has been recorded about internal integration. There has not even been a consensus on what internal integration actually means. Depending on who is asked, internal integration means concurrent engineering (CE; Kouteros et al), new product development (NPD; Pagell), cross-functional integration (CFI; Troy et al), or simply another type of collaboration and/or cooperation within a firm (Lambert and Cooper, Chen et al, Simatupang, Lee, Nabi and Luthria, Barratt). Nevertheless, collaboration has three basic areas; between companies (such as suppliers and customers), but also within and between *departments*.\textsuperscript{25} Rewards of integration are nonetheless limited by lacking focus on planning and design activities integration and not just collaborative

\textsuperscript{17} Halldórson et al (2008) p.138
\textsuperscript{18} Lambert & Cooper, Halldórson et al, Barratt, Chen et al, Mentzer et al
\textsuperscript{19} Rushton et al, Lambert & Cooper, Fawcett & Magnan, Koskinen
\textsuperscript{20} Fawcett & Magnan, Chen et al
\textsuperscript{21} Mentzer et al, Spens, Lambert & Cooper...
\textsuperscript{22} Lambert & Cooper (2000), p.77
\textsuperscript{23} Spens (2006) p.243
\textsuperscript{24} Spens (2006) p.243
\textsuperscript{25} Ajmera & Cook (2009) p.39
efforts integration. As such, internal integration activities are and will continue to be a major challenge for top management.

Definitions of internal integration is a “pick’n’mix” of authors identifying components, and as such, one can understand the confusion about the concept: If internal integration is a form of SCM, one could argue that it, like any other evolved form, would contain the building blocks of its original state. As such, internal integration would mean some sort of micro-chain in a supply chain that is located within one of the units (companies) of the overall chain; a kind of spin-off on Evans concept of internal customers in a company. What then, is actual internal integration?

At least on the “physical” boundaries of internal integration there is agreement; internal integration takes place within a firm. The reason behind striving for internal integration is also clear; its adoption improves lead times, reduces the probability of stock-outs, reduces costs, and thus makes a firm (and the supply chain in which it operates) more competitive. Nevertheless, today there is no sure way of knowing, even academically, how widespread and/or successful companies have been with adopting internal integration. Rushton et al argue that some have achieved “an element of full internal integration,” whereas Barratt disagrees saying few have achieved complete integration, despite there having been efforts made according to Bowersox et al. Fawcett and Magnan see an indication that managers are more comfortable adopting internal integration, but this is contradicted by Chen et al who in their study saw that externally oriented collaborations were easier to achieve than internally aligned processes. So when is internal integration achieved?

In order to know whether or not internal integration has been, or is being, achieved, there must first be consensus on what internal integration means. When is a company in a state of

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26 Ajmera & Cook (2009) p.38
27 Trkman & Groznik (2006) p.6
28 Evans (2006) p.17
29 Chen et al, Kouteros, Barratt, Lambert and Cooper
30 Chen et al (2009) p.28
33 Bowersox et al (2007) p.369
34 Fawcett & Magnan (2002) p.345
internal integration? Is it when they collaborate across functions coordinately, or is internal integration a state of mind where there are no functions but internal processes? What forms internal integration?

1.3 Aim

The aim of this thesis is to identify internal integration through determining the most prominent building blocks of the concept and thus identify a state of integration. This is done to add to the understanding of what internal integration is and what it is made up of.

1.4 Research Questions

In order to define internal integration, its boundaries are defined by constructing a boundary framework, defining the state of internal integration by presenting its scope, essence and elements in the state of internal integration. This construction is aided through the use of five research questions;

1. What is meant by integration in literature?
2. What is internal? (Where are the boundaries for the concept “internal”?)
3. What are the most prominent features of internal integration in literature?
4. What are the most prominent features of internal integration according to academia?
5. What makes internal integration different from internal collaboration or internal cooperation?

1.5 The target audience and use of the findings

This thesis was constructed to be of benefit first and foremost to academia and managers dealing with integration issues on a tactical and operational basis. In finding the building blocks of internal integration there is delimitation by defining when a state of internal integration exists. The findings should be an aid to managers to pinpoint how their internal processes relate to internal integration, i.e. if they have achieved or are on the right track to achieving internal integration.
1.6 Delimitations

First and foremost it is of explicit importance to state that this is an indicative study. The framework is exploratory in nature as more time and information is needed to stand on firmer grounds regarding the true form of the framework. Nevertheless, this is not to say that there is naught to gain from this study: the boundaries will still be considerately more mapped than before. Thus, it lays the ground for further research both by determinations through empirical studies and theoretical adjustments of the framework structure as knowledge about internal integration evolves. The indicative framework starts off from SCM literature, as this is the core concept (the umbrella framework if you will) to internal integration. Adding literature from other fields of study, such as organizational structure and design, psychology/sociology, or management (such as HRM), could significantly affect the structure and/or content of the boundary framework. But it would not change the core of the boundary framework, as it is constituted by SCM, regardless of focus.

This research is structured around mapping the boundaries of internal integration, by looking at its application to supply chain management, specifically, the managerial aspect within a supply chain. This domain will be constructed through theories, which implies a shift in boundaries as theories and knowledge on the subject evolves. It is imperative to stress that this is an indicative framework and therefore will not have had the opportunity to be tested rigorously either in entirety or in focus areas. As seen in figure 1, below, this thesis is about finding the domain of internal integration – its boundaries, and this is done through constructing an indicative boundary framework.

![Figure 1: The application of theories; determining focus area within a domain](image)

Alvesson and Sköldberg (1996) p. 32
When searching for this domain, integration is not restricted to “for-profit business” only, or to manufacturing firms. As such, there is no agenda to make the findings business industry specific. The theoretical boundaries of integration are not specified, and thus, neither is there such an attempt here. At the same time there is no accounting for organizational structures and their correlation to integrative measures adoption success levels, or “easiness”. Simultaneously there is no attempt to prioritize or stress any elements found or correlate elements to levels of success if implemented.

As mentioned, there is no specific supply chain chosen, nor any specific industry, as this would compromise the possibility to find general building blocks that make the base for a state of internal integration. Concentrating on a specific industry would not provide nor produce general building blocks, as literature on internal integration is not thorough enough to provide a balance to industry specific building blocks, if such exist. In addition, there is no attention given to the actual achievability, or probability of existence of an internally integrated company. In addition, the impact of internal integration on the overall supply chain, or the firm itself, is not stressed though included. This also includes an exclusion of the consequences of implementing and adopting internal integration in any form or at any level.

Finally, there is no attempt to decide on whether one state of integrated chain comes, or should come, before another, even though functional integration has been placed before internal integration. The reason for this is that there is a dominant position that moving towards internal integration is evolving away from functional processes within a firm. Focus is solely on internal integration, and as such does not account for any impact made on internal integration by the simultaneous adoption or existing integration strategies, such as external integration. The sole focus on internal integration also means that there is no accounting for or consideration of integration hybrids either.

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Chapter 2: Methodology

In this chapter the structure combines the philosophical ideas with the approach taken to research and the implementation of specific procedures, namely, the method\(^{38}\). In the interest of structure and clear train of thought the chapter is divided into four parts. Part one in the chapter has been structured with emphasis on Creswell’s research design\(^{39}\) and concerns the ontology, strategies of inquiries, and the research method of this thesis. Part II concerns the ethics and pre-understanding of this research. Part III explores critical awareness of what has been recorded, and part IV concerns the collecting of empirical data.

PART I

2.1 Introduction

As pointed out by Derek Swetnam, research, in all its forms, will always be a compromise between “what is desirable and what is possible.”\(^{40}\) To show the interrelated levels of decisions present in the design of research,\(^{41}\) Creswell stress three questions of his own, that he finds central to the design of the research:

1. What knowledge claims are being made by the researcher?
2. What strategies of inquiry will inform the procedures?
3. What methods of data collection and analysis will be used?\(^{42}\)

“Starting a knowledge claim means that researchers start a project with certain assumptions about how they will learn and what they will learn during their inquiry.”\(^{43}\) In other words, the researcher acknowledges and records their approach on ontology (what is knowledge, or

\(^{38}\) Creswell (2003) p.4
\(^{39}\) Creswell (2003) pp. 1-23
\(^{40}\) Swetnam (2004) p.2
\(^{41}\) Creswell (2003) p.5
\(^{42}\) Questions quoted in their entirety from Creswell, Research Design, page 5
\(^{43}\) Creswell (2003) p.6
rather, what is the nature of reality\textsuperscript{44}, epistemology (how things can be known), and axiology (what values goes into knowledge, or rather, the personal values and ethics of the researcher\textsuperscript{45}), rhetoric (how knowledge is recorded), and methodology (the process for studying knowledge). \textsuperscript{46}

\textbf{2.1.1 Knowledge Claims – Ontology:}

According to Alvesson and Sköldberg it is not methodology which defines good social science research, but rather ontology and epistemology.\textsuperscript{47} Engaging in multi-paradigmatic research, and re-analyzing data of different epistemological perspectives gives a more rounded perspective on the phenomenon being studied.\textsuperscript{48} This thesis has been created with a strong sense of post positivism, as there is personal belief in the unattainability of absolute truth\textsuperscript{49} and the absolute necessity of objectivity to assure competent inquiry\textsuperscript{50} presiding with the researcher.\textsuperscript{51} Nevertheless, according to positivism, data or facts should be observable.\textsuperscript{52} It is my personal belief that there is always another side to the coin, and thus, reality alters with the modification of angle.

In addition to adopting a post positivistic approach, there is also a significant belief in “cause-effect”; a deterministic philosophy, where outcomes are by probability determined by causes, i.e. there is, likely, no random variable.\textsuperscript{53} Nevertheless, the researcher does, to a high degree, agree with the social constructivist belief that “individuals seek understanding of the world in which they live and work” and that through experience individuals develop subjective meanings that are varied and multiple, and as such, meanings hold complexity and cannot be narrowed down into “a few categories or ideas.”\textsuperscript{54} A constructionist view stresses the perceptions of reality as an expression of or indication of deeper phenomenon.\textsuperscript{55} Furthermore, the approach taken in this thesis must be acknowledged to be

\textsuperscript{44} Hart (2006) p.81
\textsuperscript{45} Hart (2006) p.81
\textsuperscript{46} Creswell (2003) p.6
\textsuperscript{47} Alvesson & Sköldberg (1996) p.11
\textsuperscript{48} Cassell & Symon (2004), p.6
\textsuperscript{49} Creswell (2003) p 7
\textsuperscript{50} Creswell (2003) p.8
\textsuperscript{51} The exclusion of the first person singular (I, me, myself) is done out of personal preference. Any reference to researcher should hence be assumed to relate to the author of the thesis, unless expressly recorded otherwise.
\textsuperscript{52} Alvesson & Sköldberg (1996) p.25
\textsuperscript{53} Creswell (2003) p7
\textsuperscript{54} Both quotes from Creswell (2003) p.8
\textsuperscript{55} Alvesson & Sköldberg (1996) p.26
subject to the existence of influenced interpretations, i.e. that interpretations of findings are subject to the researcher’s own experiences (personal, cultural, and historical).\textsuperscript{56} Nevertheless, this thesis will rely foremost on existing theories, and as such, cannot take the social “constructivistic” approach wholly to heart, as this would constitute inductive approach (findings come from data in the field form theory), and not deductive (theory being tested by data from the field).\textsuperscript{57}

Perhaps it is adding to the mix of views, though it is with clear conviction, it can be stated that due to the absolute absence of political influence and or political agenda in this research, this excludes the advocacy/participatory approach from being a possible viewpoint.\textsuperscript{58} The researcher all the same agrees with the pragmatic belief\textsuperscript{59} that there should be a foremost focus on the problem itself, and the solution to it. There will be a cause and effect, but the answer to the problem, which becomes a further understanding of the situation or phenomena itself, must come from all available means of investigating and understanding, in order to fully see the entire complexity of the thing studied. It cannot be denied that research will always be done in social and other contexts.\textsuperscript{60} Therefore, as pragmatists advocate the use of mixed methods to capture the fullest understanding of the thing studied, including both qualitative and quantitative\textsuperscript{61}, being free to borrow from both post positivism and social constructivism, it seems only logical given my own disposition as a researcher that this be the prominent ontology in this thesis.

\textbf{2.1.2 Strategies of Inquiry}

As the method of experiment does not apply here, given the theoretical focus, surveys play the more complementing role: This strategy includes the use of questionnaires and semi-structured interviews as means of obtaining data, where a current population is used to identify indicative data on the concept of internal integration.\textsuperscript{62} Nevertheless, the attributes of mixed method approach is lesser well known in comparison to quantitative and

\begin{footnotesize}
\begin{enumerate}
\item Creswell (2003) p8-9
\item Creswell (2003) p.9
\item Creswell (2003) p.9
\item Creswell (2003) p.11
\item Creswell (2003) p.12
\item Creswell (2003) p.12
\item Creswell (2003) p.14
\end{enumerate}
\end{footnotesize}
The strategy constitutes mixing of different methods in order to cancel out biases in one single method by use of another in the same study. Creswell focuses on three general strategies known as sequential procedures, concurrent procedures, and transformative procedures. Transformative procedure approach, where a theoretical framework provides structure for topic of interest, data collection methods, etc, was adopted with a concurrent procedure. Concurrent procedure means collecting both quantitative and qualitative strategies at the same time and then using both equally when interpreting the overall results of the study. Given the theoretical emphasis of this report, and the chosen pragmatic ontology, the most fitting strategy of inquiry given the constraints of this thesis is a concurrent procedure where data is simultaneously collected from survey and interview. The reason for shying away from an expressively quantitative strategy is the slippery slope of mistakenly turning the thesis from theoretically investigative to purely practice-based. Theoretical concepts by nature cannot be explained through quantitative understanding, rather gets stronger support by qualitative research, a focus of deeper understanding of the concepts and theories studied. It is felt that this approach will provide the most rounded empirical indications.

There is also the matter of contextual constructivist position; the assumption that “there are always multiple interpretations to be made of any phenomenon, which depend on the position of the researcher and the context of the research.” In this context one can go in different directions on how to use the theories, either by use of verification (corroborating the ontology and epistemology chosen), or falsification (indicating validity through dismissing all else). Nevertheless, instead of focusing on falsification or verification there can be a focus on domains. This employs the question “when is it valid?” In this research this translates as the defining of the boundaries of internal integration – when is the concept internal integration valid? Adopting verification or falsification would provide one hay

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63 Creswell (2003) p.15
64 Creswell (2003) p.15
65 Creswell (2003) p.16
66 Creswell (2003) p.16
68 Alvesson & Sköldberg (1996) p.27-28
69 Alvesson & Sköldberg (1996) p.31
70 Alvesson & Sköldberg (1996) p.31
straw to the hay stack, whereas focus on the domain will provide the possibility to define the concept of internal integration as narrow or broad as necessary.

To that effect, as this research is focused on the state of internal integration, it is important to acknowledge that the domains are theoretic constructions. Alvesson and Sköldberg advocate studying of the domain’s compatibility with reality as domains are constructed by theories: the accepted focus areas to which the truths about the domain applies. Here there will only be a focus on constructing the domain boundaries – the focus areas will have to be applied in further research to test and remodel the boundary framework.

The approach of domain also coincides with the overall direction given by adoption of either inductive or deductive approach. This research is first and foremost theoretically based, meaning it is of deductive nature as the starting point of deduction is theory, not empirical as with inductive studies. Deductive approach stems from a general rule that is claimed to explain the outcome of a particular object. This means a cause-and-effect deductive, constructionist view but this shows that both sides of the ontology spectrum are present in this thesis. The groundwork is based on deductive, constructionist approach (the construction of the literature framework), but is analyzed in a post positivistic, pragmatic light.

### 2.1.3 Research Method

When it then comes to the third question in Creswell’s research design, there is a clear three-way divide of research methods as well into quantitative, qualitative, and mixed method research method. The choice of which is determined by the intent of the researcher: whether the information to be collected should be specified in advance of the study, or if it should emerge during the project. As such, it boils down to post positivistic quantitative approach, constructivist qualitative approach or mixed method that contains elements from both post positivism and constructivism. Out of the three, as presented by Creswell, it is the mixed method approach that concurs with the essence in this thesis: there

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71 Alvesson & Sköldberg (1996) p.33  
72 Alvesson & Sköldberg (1996) p.34  
73 Alvesson & Sköldberg (1996) p.42  
74 Alvesson & Sköldberg (1996) p.41  
75 Creswell (2003) p. 17  
76 Creswell (2003) p.17  
77 Creswell (2003) p.18
is a pragmatic knowledge claim, which according to Creswell employs sequential, concurrent or transformative strategies of inquiry, employing both quantitative and qualitative method practices. The collection of “diverse types of data” will provide the best understanding of the research problem. Here, it is the combination of literature review, a survey, and interviews.

The choice of mixed method approach comes with an understanding of the ambiguity it brings with it, but there have been extensive efforts to remove this ambiguity by keeping a clear view of what is being denoted throughout the thesis. This finds other theoretical support as Buchanan and Bryman argue that organizational research has evolved into a multi-paradigmatic profile: Organizational research has seen a popularity of mixed methods which has problematized “the relationship between epistemology and method.” This increasingly discourages “rigid adherence to epistemological positions and [encourages] a more pragmatic ‘do whatever necessary’, or ‘pick and choose’ approach to method choice.” Additionally, Alvesson and Sköldberg concede that sometimes research warrants a combination of qualitative and quantitative research. Even in predominantly qualitative research it is sometimes sensible to include some, simple quantifications. To sum it up; in this thesis, there is a mixed approach and a mixed ontology and epistemology approach – the subjective mix and match – with a combination of qualitative and quantitative research.

**PART II:**

**2.2 The Trilateral Truth in Social Research**

Alvesson and Sköldberg stress the importance of balance of the concept of ‘truth’ to ensure the most prosperous research outcome of a research. The balance of truth comes from acknowledgement and incorporation of correspondence of truth, the meaning of truth, and the applicability of truth, depicted in the picture below:

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78 Creswell (2003) p.19
79 Creswell (2003) p.21
82 Alvesson & Sköldberg (1996) p.11
83 Alvesson & Sköldberg (1996) p.35-36
The correspondence of the theoretical truth refers to how the truth found in literature corresponds to reality. In this thesis this corresponding is compared through the use of an indicative survey and qualitative interviews. The meaning of theoretical truth means the underlying knowledge/meaning that there is for the concept being studied. Here it means that there either are or are no boundaries of internal integration to be found in theories. The implication of boundaries means that there is confinement of the phenomenon, and that the knowledge of boundaries can then be addressed by the applicability of theoretical truth; how boundaries of internal integration can be used to make the implementation and utilization of internal process focus more rewarding. The dots within the triangle represent the possible positions within a research, or its possible skewing of the results. Theories can stress different sides of the trilateral truth triangle. All of them should nonetheless be integrated into a research process to assure the most prosperous research outcome.

In this thesis the theories that have been included revolve more around correspondence of internal integration phenomenon with real implementation (success), and the applicability of internal integration. Theoretically, there does not seem to be much stress on the meaning behind internal integration. However, that angle is provided in this thesis by the aim and focus. As such, the trilateral triangle becomes balanced.

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84 Alvesson & Sköldberg (1996) p.35-36
85 Alvesson & Sköldberg (1996) p.38
2.3 General Research Ethics of Subject

As defined by Bell and Wray-Bliss, academic research is scholarly detachment from the focus of study. Proper research contains rational, dispassion, and the absence of personal, emotional or ideological endeavors. Research ethics is more than falsification of data or the abuse of subjects like political views or biases, and concerns the minimization of “tainting” of the pursuit of knowledge. Bell and Wray-Bliss discuss the underlying matters of organizational research - such as the belief that the rightful purpose of any organizational research is to provide better understanding to make organizations more rational and efficient.

Nevertheless, a critic of organizational research, Zygmunt Bauman, has questioned the beneficence of modern organizational forms by linking procedural focus and removal of personal sentiment from efficient performance with the potential erosions of moral responsibility in an organization. His point was that the legitimacy of organizational research implicitly lies on the goal of more efficient or rational organizations, which cannot be taken for granted as being “an unquestionable good”. True is, that the implicit goal of the research undertaken for this thesis was to be used in such a way as to facilitate “better” internal integration of a company in a supply chain through greater understanding of its concept (state) and its building blocks. As for the societal and ethical impact of this thesis in singular it would seem to hold slight impact at large. However, given that this field is explored in greater detail, say through a number of significant researches, there might be call for an ethical re-evaluation of the impact of such study on society and industry as a whole.

As for research ethics in general for this thesis, the perception of research conduct, there has been care in making such that objectivity is first and foremost prioritized, both in structuring this thesis, structuring and administrating surveys, as well as with the planning and conducting of interviews, and also the focus in/on, exploration and inclusion of secondary data.
2.4 What is the Use of this Research?

Clarity of thought, an academic buzzword, according to Turner, can be applied to many things, logic being the prominent context. As internal integration is such a fuzzy subject at this moment, there is need for clarity and logic in the concept. Thus the research is of use to those who study, work with, or are otherwise interested in specific SCM integrations. Nevertheless, it will not be of use if the findings do not hold any significance within both the theoretical realm as well as in practical sense. Levin stresses the trade-off between complexity and applicability: the need to embrace complexity, without making it too complicated, but still to keep things simple enough to be applicable to more than theoretical conception. To summarize, the intended use of this research is for furthering the understanding of internal integration of a company in a supply chain, so that it can be more readily understood and thus perhaps more positively implemented in a supply chain. This is done by constructing an indicative boundary framework that in it, defines the state and building blocks of internal integration.

2.4.1. Pre-existing Understanding of Approach

Critics argue that culture, language, selective perception, subjective forms of cognition, social conventions, politics, ideology, power and narration in complicated ways penetrate scientific reality. No one enters a research process empty handed idea-wise. According to Creswell, there are three considerations that affect the decision of approach: “the research problem, the personal experience of the researcher, and the audience(s) for whom the report will be written.”

Creswell advocates a qualitative approach for concepts about which little has been written, or there thus is little understanding of or knowledge about the important variables that should be studied. Now this is where the choice of approach for this study comes to a most definitive crossroad: What constitutes “little”? There is much written on the subject of supply chain integration, and some on internal integration – but is it of such magnitude as to

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90 Joan Turner (2002) p.72
91 Concept highlighted and explained by Levin (2005) p. 15
92 Alvesson & Sköldberg (1996) p.8
93 Alvesson & Sköldberg (1996) p.23
94 Creswell (2003) p.21
95 Creswell (2003) p.22
be categorized as little? As there is confusion as to the state and definition of the concept, and very little to find when it comes to research articles, and such, the subjective interpretation is that yes, there is little written on this particular subject, or there would be a well established understanding of it. There is a greatly varied understanding of the concept of supply chain integration –does that constitute that there is little understanding of important variables even in literature? If there was a vast understanding, would practice also have a good understanding of supply chain integration? There had to be a just decision made on this point, as in order to ensure that there will be a reliable conclusion to the study, a mixed method design has been chosen as it captures the best of both a quantitative and a qualitative approach, and thus provides a broader understanding of the research problem.96

In terms of personal experience, mixed method is appropriate as both the structured procedures and rules of quantitative research and the innovative and more open nature of qualitative research are already known. Nonetheless, the choice of mixed method comes with extra time to collect data and analyze it.97 This has been considered and it is believed that neither method (quantitative or qualitative) has been more or less emphasized than the other but has been given equal focus and importance in this study. Then, in terms of audience, the readers of this thesis will most probably be familiar with both methods as they are believed to have a more extensive academic background, such as university students, professors, and (higher level) managers at organizations. As previously mentioned, this would in general apply to those who study, work with, or are otherwise interested in specific SCM integrations.

2.4.2 Overall-Objectivity of the Author

As previously written, Alvesson and Sköldberg argue that no author enters the research process “empty-headed.” Similarly, John McAuley argues that “researchers bring an intellectual pre-understanding”98 to their research processes: Prior research and literature bring loose boundaries into the developing scene and of these boundaries “some steer into what is being explored.”99 This is a true story even here: This master’s research focus is the

96 Creswell (2003) p.22
97 Creswell (2003) p.23
result of the interest and confusion about the subject which arose during the writing of the prior Bachelor Thesis on integration implementation stages.100

Schwab talks about the casual relationship and places emphasis on the word *expected* in this context: Many actions are based on expected casual relationships “doing *this* will bring about *that*”. However, these expectations may not be correct.101 The construction of this thesis is nonetheless built on exactly that sort of judgment: Doing this research has the intention of bringing about a clear finding on *what internal integration is, and how it is structured*. These expectations, however, though identified, were not consciously prevalent in the interpretation of the data, but without doubt in the selection of base for this research: It was regrettably unavoidable. Nevertheless, as the expectations of the author held no prior knowledge of the true nature or building blocks of internal integration of a company in a supply chain, there can only have been negligent influence on the outcome of this project.

**PART III**

2.5 Research Realism – Critical Awareness

No research is without its imperfections. Realizing where the research may be or is at fault provides a more realistic understanding and interpretation of the findings. As such, part III examines the reliability, credibility, and the generalization of the frame of reference and its construction, as well as the empirical data and the analysis.

2.5.1 Specific Research Ethics – data collection and interpretation

There is much more than the ethics behind the chosen subject to consider during a research process. Considerable focus must be put at ensuring that more specific research ethics is upheld as well, especially when dealing with the construction of the thesis frameworks (substance). During the stage of data collection there must be respect for the participants of both the survey and the interviews. Research ethics include the upkeep of privacy of possible and actual participants. There must be a confidential handling of the data provided by the participants. Additionally, there must be an acknowledgement of the effects the researcher might have on the participants and their provided information, as well as their

100 “Change Management and Supply Chain Management: Employee issues in implementation processes of SCM – The action and re-action related to changes in each stage of an implementation process” LiU/2008

101 Schwab (2005) p.4
influence on the researcher and the construction of surveys and or interview questions. This aspect is explored more in part IV of this chapter.

### 2.5.2 Frame of Reference – Secondary Literary Data

Secondary data is such which have been collected and reported for other purposes than for the study in which they are here included.\(^{102}\) Looking outside of academic reliability of procedures of measurements, the literary dependability must additionally be addressed, namely sources used. “All subject-specific books date rapidly,” and thus Swetnam advocates great care when dealing with sources more than 5 years of date.\(^{103}\) In this particular study, any limitation of such would have come to the exclusion of prominent writers within the field of SCM, SCI and process issues. This would have resulted in sure loss of highly relevant theories and thoughts on supply chain management and different types of integration. Therefore, instead of focusing on release dates of the literature, their being included in the frame of reference is done so due to the value they hold for the study, both in general and specific sense. Were the literary review to be conducted anew the probability of a near similar result would be expected as there must be variations allowed by subjectivity of the interpreter. Evident in the literature review, authors within all subchapters of SCM tend to quote each other. As such, there is a prevalent recycling of interpretations and agendas that works in favor of similar results regardless of literary sources. Even so, the concept of internal integration is under development, as is SCM, meaning that there is hope that there would, were there to be another survey and review, not only be the results shown here, but also be a development in understanding of both practice and concept. As stated by Cooper et al, Lee, Mentzner, Fisher (and alike) there is a variety of understanding of the concept of SCM, so for the similarity in result one must also assume the use of generalities and the generalizing of this integration. But this does not relate to specifics to the same extent.

### 2.5.3. Construction of the Frame of Reference

Conducting a literature review is important because “without it you will not acquire an understanding of [the] topic, of what has already been done on it, how it has been researched, and what the key issues are”\(^{104}\). To generate a target focus and collect as much

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\(^{102}\) Schwab (2005) p.40  
\(^{103}\) Swetnam (2004) p.49  
\(^{104}\) Hart (2005) p.1
usable information as possible there was no discrimination of literary source (books, journals, e-library). Yet, there had to be a rational of finding and sorting the information available, and as such, it began by narrowing the initial search, the starting point, to books on SCM and SCM integration, and the Internet (search word “Internal integration”), and then expanding on to more specific sources of information, such as integration specific dissertations, articles and reports. This has concluded in a conscious bias of sources. The theoretical framework is foremost built on subject-specific articles than on books. The reason for this is quite simply the adopted delimitation of availability. There has been no purchasing of clearance to online journals, but instead use of e-facilities such as Helecon databases at Helsinki School of Economics, and LiUB at Linköping University, such as Ebscohost. This was also done with the purpose of attaining as new sources as possible, the very latest in written form, to adhere from including theories or other knowledge that could prove falsified or modified. The element of error still exists, but in minimized form nonetheless.

2.5.4 Reliability and Credibility of the frameworks

Reliability means acquiring the same result time and time again were the same procedures, actions or experiments to be executed/implemented anew\(^{105}\) and indicate to which degree the research is free from random errors.\(^{106}\) In this situation, however, it is again important to acknowledge the effects of building an indicative framework: The result will invariably vary as the concept of internal integration evolves with time, technology and understanding and field of study. Nevertheless, the groundwork laid by this framework should hold, though focus studies might conclude in remodeling or restructuring of elements. The theoretical framework is not indicative, but will also evolve as technology and understanding of internal integration improves. As one of the interview subjects pointed out; SCM literature tends to leave the negatives of integration out of the equation (such as the price tag), focusing on gains rather than realism. This means that as the concept evolves, the frame of reference will probably become more in tune with reality and “real implementation” of integration mechanisms. Nevertheless, the reliability as it stands today is strong, given to the justifications stated in the earlier sub-chapter on secondary data.

\(^{105}\) Swetnam (2004) p. 23
\(^{106}\) Schwab (2005) p.32
Nevertheless, reliability does not show if there is a presence of deception or deficiencies in the answers.\textsuperscript{107} However, in this study, the data provided by academics is, as mentioned, of indicative nature and thus holds severe limitations as to the real state of things. The reliability is indicated more by the concurrence of the empirical data with the literature framework at this point – but even here much more exploration is needed to even begin to say that the integration framework is concurrent with genuine empirical data. To strengthen the empirical data in this study, both interview participants have a strong background in integration issues, both from an academic and professional point of view. Their backgrounds are presented in part IV of this chapter.

As such, the credibility of both frameworks comes foremost from the use of sources. The literature framework relies solely on SCM literature, to keep the framework as coherent and simple as possible as the concept in itself is confusing within this field of study. Furthermore, the use of SCM academia in the empirical framework ensures that there is the same angle of approach in the answers collected: those who have read SCM literature are the ones answering the survey. The in-depth interviews then serve both as the back-up and the voice of critical awareness. Here the backgrounds of the interview subjects allowed for an understanding of the SCM approach.

2.5.5 Validity of the frameworks

Are the observations or measurements correctly attributed to the claim? “Are we actually measuring or observing what we claim to be?”\textsuperscript{108} When it comes to the frame of reference, validity is expressed through the narrowing structure: from SCM to SCM integration, to internal integration. It ensures that the frame of reference is on topic, relevant, and thus valid to use in the analysis. The aim is to define internal integration state and building blocks, and this is reflected in the frame of reference.

The academia framework is constructed in much a similar way, having been focused entirely on the two research questions “what is internal integration?” – and “when is internal integration reached?”. This includes a focus on the building blocks, classified as essence and elements. Elements represent the aspects in the framework that can be tangibly controlled

\textsuperscript{107} Schwab (2005) p.32
\textsuperscript{108} Swetnam (2004) p. 23
by those within the organization. It is important to note that the empirical framework is constructed solely as indicative measure and was done so to be of use in shaping the framework part which deals only with internal integration. The empirical framework will not hold any bearing on the SCM elements or the SCM integration elements. Validity is thus confirmed by the sole focus on internal integration state and building blocks.

The questionnaire looked at the concept of internal integration, how it was perceived to be definable, and what elements are present at internal integration. The interviews, on the other hand, were based more on the essence of the thesis by asking open rather than specific questions and thus keeping to a more general approach to the concept at hand.

### 2.5.6 Attribute of Generalization

Generalizations of qualitative research are usually questioned. This is perceived as a weakness in comparison to quantitative research. Alvesson and Sköldberg attribute this to the adopted epistemological viewpoint, and what is meant by “generalization.”\(^{109}\) But Swetnam defines this attribute as the ability of the report to be applied to other situations and be used by people in a useful manner.\(^{110}\) It has been the intent of this study that the findings concur with the attributes of generalization: that there be an understanding of internal integration that is not limited to one scenario, industry or context alone, but serves as a foundation for further understanding and research in any type of internal integration. The internal integration framework serves this purpose as any possible specifics have been categorized as “specifics” thus not risking specifics being categorized as generals, making the framework indicatively supply chain specific. This generally means the actual implementation of any of the identified elements, but the idea behind the construction is thoroughly explained at the start of the analysis in chapter 5.

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\(^{109}\) Alvesson & Sköldberg (1996) p.39

\(^{110}\) Swetnam (2004) p. 23
PART IV

2.6 The empirical study

Alvesson and Sköldeberg argue that defining quantitative research is not straightforward. Acknowledged and focused upon equivocality, empirical finding is thus a central criterion.\(^{111}\) To Schwab, empirical research requires measures, scores and observations.\(^{112}\) Nevertheless, Schwab recognizes limitations, weaknesses, with empirical research. Assumptions and expectation of the researcher, the methods used both in measuring (obtaining data) and analysis, limit the research and thus its findings.\(^{113}\) This study, nevertheless, is indicative, but will still be used to show relationships between variables in the internal integration framework. This will be done by identifying building blocks, such as elements and mechanisms, to identify the state of internal integration, and through that, define it.

Whereas quantitative empirical study focuses on measurements, scores, and analysis, qualitative empirical study involves more subjective interpretation.\(^{114}\) Yet, the foremost difference between questionnaires and interviews is the way in which the information is obtained.\(^{115}\) Therefore, there must be an evaluation of the two methods separately, done below.

Before that there should be a short note on empirical research collection ethics: In terms of the participants there must be an assured consent not only to collect the data, but also on how to handle and interpret the findings. There must also be consideration of the confidentiality and anonymity of the participants. The assurance of privacy was secured by coding the answers provided (including the interviews) as “A” and “B” (interviews) and 1-10 (survey) in the order that they are received. This is to eliminate any possibility that any participant can be or feels recognizable in the presentation of the data.\(^{116}\)

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\(^{111}\) Alvesson & Sköldberg (1996) p.10
\(^{112}\) Schwab (2005) p.6
\(^{113}\) Schwab (2005) p. 8
\(^{114}\) Schwab (2005) p.6-7
\(^{115}\) Schwab (2005) p.41
\(^{116}\) Saunders et al (2003) p.131
2.6.1 Quantitative Method – the Survey

The applicability of quantitative findings in social science is questioned by Alvesson and Sköldberg, as it can be too strictly quantified approach.\textsuperscript{117} Schwab stresses two advantages with quantitative empirical research; systematical addressing of the questions and its transparency, given that research is conducted and reported properly and thus is a public process\textsuperscript{118}. Nonetheless, one study alone cannot answer questions in definite terms. Again, it is important to remember that this is an indicative study, tentative, and as such, the findings will have limitations.

As questionnaires are designed to obtain individuals' answers on a series of set questions, the survey used in this thesis holds elements of both self-report questionnaires and observer questionnaires. They are self-questionnaires (opinion and knowledge seeking) because the answers aim at landing information on the personal understanding of the concept of internal integration. However, they are observer questionnaires because they also seek to get the answerer's description and evaluation of internal integration of a supply chain.\textsuperscript{119}

2.6.4. Construction of the Questionnaires

"Questionnaire construction is invariably an imperfect research activity."\textsuperscript{120} First, there was a decision on what was the information that was being sought, and how would it be coded.\textsuperscript{121} With emphasis on the research questions, the focus on the questionnaires would be the essence and building blocks of internal integration of a company in a supply chain. \textit{When is the company internally integrated, and what must be present to categorize the integration as complete?} In addition, it was of interest to see if the answers given different with position within organization, the length of study of the subject (i.e. for how many year the participants had been in contact with the phenomena either through literature or practice), as well as their personal belief in the realism of reaching a complete state of internal integration. This additional information will invariably show whether there were variations in the understanding and belief in internal integration, that was not dependent on the

\begin{itemize}
\item \textsuperscript{117} Alvesson & Sköldberg (1996) p.10
\item \textsuperscript{118} Schwab (2005) p.8
\item \textsuperscript{119} Schwab (2005) p.39
\item \textsuperscript{120} Schwab (2005) p. 39
\item \textsuperscript{121} Schwab (2005) p.42
\end{itemize}
individual’s answers alone, but their background as well.\textsuperscript{122} No such connection was found in the end that would have had a bearing or significance to the results of the study.

The first question was used to indicate the perception of collaboration, coordination and cooperation in relation to internal integration as well as state and elements. Then the second question was used to indicate the perceived structure of the integration framework. This showed how the variables are perceived to relate to reality.

The third question addressed the nature of internal integration. It reflects the academic management approach of strategic thinking, as well as the idea and or nature of internal integration that was proposed by Halldórsson et al; that integration evolves with time.

The final question showed all different elements of the determinants that have been put forth by/ in the literature review. The added choices have a difference in wordings, which was done to show indication of if academia e.g. sees internal integration as a process that concern some parts of the company (\textit{key} business processes), or if internal integration concerns the company through and through (\textit{all} key processes). All four questions can be seen in appendix A, and the summarized table of answers is presented in appendix B.

\textsuperscript{122} The idea of additional information was given by Schwab (2005) p. 43
Great care was taken to ensure that the questionnaire did not “stray of topic.” The focus lay solely on the understanding of the state of internal integration (its concept) and the building blocks that form it. When it came to item wording, Schwab’s four recommendations served as base for constructing the questions: The correspondent’s knowledge and interest in the topic was kept in mind, as well as willingness to answer the questions; the questions were kept simple to minimize complications such as misunderstandings or ineptitude to answer; the questions were kept specific; and the questionnaire was constructed with a guard against bias of element of “leading” the participant in his/her answers. The questionnaire was short, but did lead the participants by providing options, though this was off-set to some degree by including options that were opposite one another (e.g. internal integration regards some functions versus all functions).

The personal information was, in contrast to Schwab’s recommendation, placed first in the questionnaire. This was done to make the start of the questionnaire as easy and enticing as possible. To make sure that the anonymity of the participants was ensured, only general information about the participant was sought, such as gender, field of teaching (Logistics/SCM), how much theoretical knowledge about integration and internal integration they fell they have, and if they have worked with companies on integration issues.

In addition, the questions were dominantly close-ended responses, which an element of open-ended response to them by the addition of the alternative “other:_______” This addition allowed for added information that the participant felt was relevant and proved a very useful addition.

The pilot testing

The pilot testing showed that in addition to reader friendliness design issues there were possible misinterpretation issues, especially with regards to question 2. Nevertheless, only one participant addressed the issue in the end, the other participants reported no problems. Interestingly the one participant that thought the options in question 2 were unclear was the one that had extensive knowledge of working with integration issues with a competitive

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123 Schwab (2005) p.43-44
124 Schwab (2005) p.44
125 Schwab (2005) p.44
environment. Nevertheless, it was still flawed by state versus mechanisms intermixing in the participants’ answers, meaning they were not clearly separated, or expressed, in the questionnaire.

2.6.2 Strength of Survey

Generally, questionnaires allow for better uniformity of administration of questions and minimize the influence of the researcher on the answers given by the participants. Their form allow for a higher degree of data collection given tighter time restrictions. In addition, they allow for greater dispersion of collection given the by the researcher set parameters. In this study, the surveys contributed the largest amount of data collection, though given, not the deepest. The use of surveys allowed for a greater number of participants from whom to gather information and thus a wider range of data collection that would not have been available otherwise. The strength with the survey was that SCM academia could be concentrated, but still geographically scattered, and thus indicative of Finnish academia. The survey showed a variety of understandings and do hold tentative validity as the answers collectively show the equivocality of SCM integration. Adding to the strength was the conciseness of the survey, as it was only made up out of four questions.

2.6.3 Weakness with Survey

Generally, characteristics of the participant as well as the environment in which the questionnaire is complete has shown to influence the scores obtained from a survey. With electronic surveys there is thus no possibility of checking the environment nor get a feel for the personality of the participant. Another general problem with surveys is the element of social desirability, “the tendency to present oneself in a publicly favorable light,” that may influence the participant. This is a questionnaire directed to individuals that are publicly seen as professionals, well-read and informed individuals within supply chain management and integration issues. As such, the risk of social desirability is considered moderate to high in this questionnaire, as the nature of the questionnaire (the search for information on the constitution of a state of a company in a supply chain) signifies that the participant should have an informed opinion on the matter. Nevertheless, there were issues with the

126 Schwab (2005) p. 42
127 Schwab (2005) p. 45
128 Schwab (2005) p. 45
participants’ understanding of the concept versus mechanisms when answering the study. Respondents thought of the state of internal integration at some questions, but also equaled the state with the mechanisms at other. This is, however, expected as the very point of the essay is to battle this confusing adoption by academia and literature, by defining the relationship between state and mechanisms in the framework.

Furthermore, the questionnaires did not to a greater extent allow for deeper or longer answers from the participants, except with the “other:” options. This proved a useful tool, and could have been added to the last question to capture any element of internal integration that could have shown involuntary omission from the literature review. The interviews did to some extent outweigh the survey weakness, but as they are used for indicative purposes, they are nonetheless equally valid for interpretation. This would, nevertheless, be required in further, more extensive, research on internal integration boundaries.

**A peculiar Finnish cultural trait**

It may seem unorthodox, but at this point in the report there is substantial need to stress one particular cultural trait of the Finnish culture, namely, the trait of “informed answers.” Starting with an example made by Heidi Avellan, political editor-in-charge at Sydsvenskan\(^{129}\), who in her address at the Finnish-Swedish information seminar on the 16.11.2009\(^{130}\) said that there is a considerable difference in how Finns and Swedes in general answer direct questions given to them: During her earlier days working as a “street” reporter in Sweden (having moved to Sweden from Finland), Avellan noticed that Swedes, when given a direct question, would have a naturally strong belief in themselves and their “right” to have an opinion, however uninformed, on the subject at hand. Regardless of the question, a Swede would answer as he or she saw the truth to be, regardless of their background information on the subject. Drawing on her experience as a street reporter in Finland, Avellan compared that a Finnish person, nonetheless, would not answer a given question if he or she felt that they possessed insufficient information on the subject at hand.

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\(^{129}\) Swedish daily newspaper, Malmö, Sweden

\(^{130}\) Heidi Avellan, Chefredaktör for Sydsvenskan, Bonnier Förlag, at Hanaholmen Kulturcentrum, 16.11.2009 at the seminar “Sverigepaket 2009, introductory adress in “Sverige nu- samhället i litteraturen”
To highlight this trait in the Finnish culture in a more professional setting/environment, one can look to Eero Kostamo, a prominent figure when it comes to leadership management and techniques drawing from 40 years of working with Finnish leadership issues on managerial level(s), also prominent within Finnish leadership development and coaching. He is the author of three books on forming strategies, executing them, and overall leadership and teaching material, as well as co-author of published articles. When describing his fellow countrymen and their traits, he highlights “humbleness,” as an intricate part of the Finnish culture. This does not mean bowing for every fellow man, but a respect for facts and the preservation of situational understanding and knowledge and how things relate to one another. This concurs with the cultural trait that Finnish people see it as given that they be assessed and judged on their achievements, not their position or status within a company. Here it means that they would not perceive a right to call themselves “sufficiently informed” within integration issues just because they teach SCM/Logistics at tertiary level education centers, and might have done so for a significant period of time: The concept of appropriateness/relevance and assessment on achievement are key elements strongly embedded within the Finnish psyche.

This Finnish cultural phenomenon did play an unsuspected significant role in the gathering of the empirical data: When lobbying for survey participation and interview subjects, individuals (all with Finnish backgrounds either as citizens or long-time residents) who were, by all academic standards, well qualified and well-educated on the subject (authors of research articles, books, compendiums, etc, and/or had much working experience as SCM/Logistics lecturer and or researcher on different kinds of issues), still considered themselves ill-qualified to participate in studies on definitions. Their insight would have been validated by their expertise, but as their field of research was not specifically integration/internal integration, they declined to participate with the motivation of being insufficiently experienced in this area, despite being informed that it was their level of

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133 Eero Kostamo (2004) p.47 concept of “tosiasioiden kunnioittamista sekä tilannetietoisuus ja suhteellisuudentajun säilyttämistä”
135 “Asiallisuus”
136 “Arvioiminen tulosten perusteella”
137 Eero Kostamo (2004) p.54
expertise in SCM/Logistics that made them more than qualified. This phenomenon could of course, be in part, contributed to the social desirability effect as well, though only to a small degree.

There is a strong belief that this phenomenon holds true for the survey as well, as respondents while handing in their answers nearly all commented on their “lack of expertise” or warned of possible biases they felt that they could have due to their background in SCM/Logistics... On the other hand, those who did participate did so willingly and enthusiastically which was evident in fast replies, and openness when answering the questions. And the survey did provide a strong indicative insight to the perception of internal integration.

2.6.4 Population Identification Technique

Ideally, the survey sample would be the population. Nevertheless, this survey is under constraints\textsuperscript{138}: it would be impracticable to try to include everyone in the study. There has been a geographical restriction to the population, Finland. Additionally there is a budget constraint and a desire to get the answers during a one month answer period. The answer period was set at one month owing to the experience from previous research, and to allow for clear rules on submission of answers. By limiting the population these constraints are under control. The focus was how tertiary level academia perceives the concept of internal integration. Nevertheless, all academia are not appropriate, nor attainable, as such, there must be a sub-group; SCM/Logistics academia. By sub-sampling, the survey becomes more manageable.\textsuperscript{139}

Nevertheless, as probable sampling does not apply here, as there is not a possibility to acquire a suitable sample size, non-probability sampling is used instead. There is a recommendation that if the population is less than 50, the entire population should be sampled.\textsuperscript{140} The population of SCM/Logistics academia is a shifting population: Finding all academia is thus flawed: it is comprised out of guest lecturers, researchers, and full-tenured professors and lecturers of which some perhaps are on research sabbatical, etc, and thus, the population cannot be identified easily. Instead, by using an adopted non-probability

\textsuperscript{138} Saunders et al (2003) p.151

\textsuperscript{139} Saunders et al (2003) p.152

\textsuperscript{140} Saunders et al (2003) p.153
sampling technique, this approach in finding the survey population can be explained. Note, though, that this is not the technique that was actually used, but a representation of the principles behind it!

The most important aspect of the survey is representation of the population. With the focus chosen, the sample size is undeterminable as academia at higher level shifts variably. The population varies with every year, even with semesters at some education centers, and as such, there are only current populations to consider. The current population is impossible to determine as teachers at universities range from tenure, seasoned professors, to researchers, and guest lecturers. In addition, lecturers on the Logistics department as listed on university or schools of economics web pages are not always up to date: the lecturer can be on leave, be from another department, or simply not be updated to the web page yet. Therefore, a representation by sample would not be possible in this thesis.

Additionally, there must be anticipation of non-response. There are several causes of non-response refusal to participate, such as ineligibility to participate and inability to participate. The reasons behind non-responses in the survey, in addition to the mentioned cultural attribute, are believed to be due to the time period: Christmas holidays were just around the corner, meaning that most schools of higher education are preparing or dealing with end of year examinations as well as preparing for the holiday break and the ensuring spring semester. This was unfortunate, and a lesson for future research.

2.6.5 The technique of non-probability population

But when a sample framework is unavailable, as it is in this case (it is impossible to accurately know who are teaching at tertiary education level in positions that regard SCM or integration issues) and not feasible that there could be a sample size of a few hundred, one must resort to non-probable sampling (see figure below). Purposive sampling is often used when the researcher wish to select cases that are particularly informative. Nevertheless, using non-probability sampling means that there is no statistical representation of the population, just an indication. Here, it means that the population was purposively identified and picked out by the researcher, and can therefore hold no stronger value than

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tentative value. Note, again, that though this was used, instead of identifying a sample, there was an identification of the total current population, as far as possible.

Non-probability sampling means that there cannot be a statistically chosen at random as non-probability statistics sample is based on subjective judgment.\textsuperscript{144} Having determined that there must be non-probability sampling, there must be a choice of method: As seen in the figure below, this (regardless of inference priority) the most appropriate choice is homogenous sampling.

![Diagram of selecting a non-probability sampling technique by Saunders et al.\textsuperscript{145}](image)

\textsuperscript{144} Saunders et al (2003) p.170
\textsuperscript{145} Saunders et al (2003) p.171
Homogenous sampling provides focus on “one particular subgroup (here now acting as the academia population with extensive knowledge about SCM integration) in which all the sample members are similar. This enables [the researcher] to study the group in great depth.” In this case, the choice of focus on academia is one of the more appropriate as academia is involved in teaching the theories that are used in the frame of reference. In addition, lecturers at tertiary education level are often involved in and knowledgeable about integration in the “real” world. As such, they are informed and familiar with both the theoretical side and the practical side of internal integration and its issues. The principle is thus quite simple: the population was identified by the researcher as lecturers at tertiary level education centers (universities, schools of economics, etc) that had an SCM/Logistics faculty.

The choice of narrowing the population to those who explicitly work at the SCM/Logistics faculty /department/unit was done solely for reliability. As mentioned before, this is a thesis that is written from an SCM perspective, with SCM/ Logistics literature, and as such, should be interpreted by those who have more knowledge of this field of study. At all tertiary level education centers in Finland 52 people were identified as being employed at SCM/Logistics departments. Surveys were sent to 48 people, as interviews were requested from four professors. Out of these, 10 answered the survey and two interviews were booked. Cancellations by two of the potential survey participants were both done by expressed lack of qualifications to participate. Participants were not allowed to be a part of both methods, as to avoid possible tainting of the answers by the knowledge about the information in the other method.

2.7 Qualitative Method – the Interviews

It has been suggested that “good qualitative research should demonstrate sensitivity to context (such as epistemological commitments of the research), commitment, rigor, transparency, and coherence (completion of the data collection and analysis […] and intellectual coherence of the arguments presented through the analysis) and impact and importance in terms of the substance and worth of the work in relation to earlier theory and

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147 In some cases this translated to “Tuotantotalous” sort of “production economics”, encompassing SCM and Logistics.
the specific issue being explored.”148 Another important feature of qualitative research is its adoption of the perspective of the research subject rather than stemming from the researcher’s own ideas regarding what dimensions and categories are important and should be focused upon, as is usual in quantitative research.149 This was already covered more extensively in the subchapter “2.4.1 Pre-existing understanding of approach”.

During the stage of analysis the researcher should acknowledge the possible relationship between the interviewee and the interviewer.150 To maximize the objectivity of the analysis the researcher should ensure that the data collection is accurate and fully conducted.151 The data collected is recorded (surveys, and interview), and has been verified by the interviewee in writing to assure that the data recorded is correct and presented in full form in the empirical framework, chapter 4. This verification should help keep the analysis on the right track: Objectivity during the analysis is vital to avoid misinterpreting the data which would distort the conclusions.152 This includes being careful when interpreting the answers of participants: Even though they cannot be indentified in the data presentation, they can still recognize their own answers and be affected by how it has been used.153

Interviews are the most popular method for collecting data in qualitative research.154 It is “a purposeful discussion between two or more people.”155 Through interviews there is greater depth to the data, though it is reflected through the interviewee’s perception of the phenomena studied.156 The approach taken in this thesis is the use of phenomenological interviews, where there is an inherent need for the researcher to “bracket” his or her presuppositions about the phenomenon that is being studied.157 In order to truly come to defining the state and building blocks of internal integration accurately, it was felt that this approach of putting pre-existing prejudice about the state of internal integration and its building blocks “on hold” would give a more objective outcome of data collection from the interviews.

149 Alvesson & Sköldberg (1996) p.10
154 Cassell & Symon (2004). Chapter two written by Nigel King, p.11
156 Cassell & Symon (2004) Chapter two written by Nigel King, p.11
157 Cassell & Symon (2004), Chapter two written by Nigel King, p.12-13
Catherine Cassell discusses how interviews today can also be a process where the meaning searched can be co-constructed between the interviewee and the interviewer, an approach that resonance most notably with the view of social constructionist epistemology.\textsuperscript{158} Throughout the interview the interaction of the interviewer and the interviewee construct and interpret the process and then come to a conclusion, or two if differencing.\textsuperscript{159} It would be deception to deny the prevalent temptation of acquiescing to such a method, but it would surely greatly have influenced the views and interpretation of the author and as such have been a great breach of objectivity. In any case, the interview went in such a way that most of the information/talking was provided by the interviewee.

### 2.7.1 Construction of the interview and interview questions

There are three choices when planning an interview, structured, semi-structured, or unstructured, all related to their degree of formality and structure.\textsuperscript{160} A structured interview contains the identical set of questions for every participant and requires an identical presentation of the questions to each participant. Semi-structured interviews use non-standardized questions but themes or general questions which can be omitted or added depending on the development of the research process and the interview itself.\textsuperscript{161} Structured and semi-structured interviews are both respondent in nature where the conversation is steered entirely by the interviewer. The choice of which type of interview was potentially tricky: If the interviewees would be asked on internal integration building blocks there could be a presumption discarding Halldórsson’s idea of SCM being a phenomenon that evolves with time. If the question “what is internal collaboration?” is asked, it could lead to misunderstandings or be a focus on processes rather than state of a firm, etc., and thus be of little use for this research. But if the questions are not asked, but rather the participant is free to devout on whatever he/she likes on the topic internal integration, this could provide an indication on the underlying views and understanding of internal integration – and thus give new indications to building blocks.

Still, there are different elements to the research. There is an exploratory side, which in interviews would provide answers to what is happening. Descriptive interviews (which are

\begin{flushleft}
\textsuperscript{158} Cassell (2009). \textit{The SAGE Handbook}, Chapter 29, p.506
\textsuperscript{159} Cassell (2009). \textit{The SAGE Handbook}, Chapter 29, p.506
\textsuperscript{160} Saunders et al (2003) p.246
\textsuperscript{161} Saunders et al (2003) p.247
\end{flushleft}
structured) would identify general patterns, whereas explanatory interviews would be semi-structured and show relationships between variables. It is clear that explanatory interviews cannot be used as the variables are unknown. Here there was clear disagreement as to the validity of such a statement: in the end two subject-specific questions were presented to the interviewees, with freedom to structure the answer to the interviewee’s discretion.

### 2.7.2 Construction and Conducting of Interviews

Interviews generally have a low degree of structure, and focus on specific situations rather than on general opinions.\(^{162}\) There was considerable care in phrasing the questions, being guided by the same agenda as with the surveys: the questions are kept open, inexplicit, but were steered onto topics to allow for greater depth and understanding as well as guard from leading the answers of the interviewee. Chen, Daugherty and Landy and their research on supply chain integration (SCI) functioned as base:

Chen, Daugherty and Landy asked two questions in their semi-structured interview 2009\(^{163}\):

1. What does SCI mean to you?
2. In your opinion, what are the key drivers of SCI?

This leads to the two semi-structured interview questions used in this thesis:

1. What does internal integration mean to you?
2. When has a company reached the state of internal integration?

Nevertheless, to ensure that participants in the interviews were not given any knowledge of the identity of other participants, interviews were carried out individually after interviewees were contacted by personal email, as to not reveal the email address of other participants. As mentioned, the interviews were coded “A” and “B” dependent on the order in which they were conducted. The dates of interviews were set by the participants meaning that it was random coding of the participants. The background of “Professor A” is higher level education teaching of SCM processes and technological applications, e.g. ERP in SCM at a private university of applied sciences owned by the Finnish trade and industry. The background of “Professor B” comes from organization structure and design, with expertise in

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\(^{162}\) Cassell & Symon (2004) Chapter two written by Nigel King, p.11

\(^{163}\) Chen et al (Landry) (2009) p.29
linking strategy and operations among others, published author of many academic journal articles, and teaching material.

Participants were given both the interview questions and some time to prepare for the interview. This, as recommended by Saunders et al, allows the interviewee to collect information about the themes of the interview, which promotes the credibility of the interviews. Nevertheless, Saunders et al do warn about revealing your agenda with the research prior or during the interview. Here there is a deviating perception as to the real risk of “interference” of the answers by providing the agenda of the thesis to the interviewee. Explaining the agenda of the thesis not only made the answers more specific, they seem to have a positive effect on the participants in both the survey and the interviews.

On the topic of other things the interviewer should be aware of when conducting an interview; the interviewer should take care to avoid overzealous questioning or pressing the interviewee for a response. Given the nature of the interviews, this risk did not present itself though it was considered throughout the sessions.

2.7.3 Strength with Interviews

Interviews are most advantageous when the questions at hand are complex. Greater understanding of participants’ answers can be obtained if needed by asking additional, probing questions. The answers and behavior of the respondent can be recorded to an extent not allowed by the nature of questionnaires. In this report, the interviews serve as a window into further understanding of both state and building blocks of internal integration which would not have been prevalent without them. The written interview provided the information black on white. The interpretation thus comes down to semantics. The telephone interview allowed for distance from the interviewee, minimizing the risk of the interviewer affecting the answers of the interviewee. Having a telephone interview also allowed for the interviewee to be interviewed at a self-chosen location, at a personally chosen time, adding to the comfort of the interviewee, minimizing stress which could affect the answers. Nevertheless, there was a loss of the possibility to interpret body language of

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168 Schwab (2005) p. 41
the interviewee during the interview, but there is no sense of loss, as there was no
substantial indication that the interviewee would have held back information or twisted it to
suit me at any point. On the contrary, Professor B was very straightforward with the
answers and information, clearly separating personal experience, and opinions from one
another. Professor A on the other hand, felt that it only a few lines were needed to explain
the concept of internal integration, but did mention that there could be bias or non
qualifications enough in the answers to be of true support, further example of the previously
presented Finnish cultural characteristic.

2.7.4 Weakness with Interviews

The interaction between interviewer and interviewee can result in differing administration
of questions, and the conscious or subconscious influence by the interviewer on the person
being interviewed.169 There is no such thing as “relationship-free interviews.”170 This
element to interviews requires a systematic approach by the interviewer.171 The weakness
with the written interview is that there can be no other interpretation than the one given by
semantics. As English is not the mother tongue of either participant semantics becomes a
risky game as there can be wordings that had been different, had the interviewee spoken in
his/her mother tongue. It is assumed, however, that given their profession, there will have
been extensive exposure to English literature, the dominant language within Logistics/SCM,
and as such, the wordings are believed to be fully as intended. In addition, conducting the
interview via phone eliminated the possibility of interpreting the body language used by the
interviewee during the answering of the questions. The specific weakness with the
telephone interview was the fact that not all ideas could be registered as notes were taken
instead of the conversation being recorded, but Professor B has verified the abridgement
made on the discussion. In the end, there were only two interviews. But out of those
identified, the four to whom requests were sent had the strongest background, and as there
was a desire to avoid tainting of information, interview requests could not be sent to survey
participants.

169 Schwab (2005) p.42
170 Cassell & Symon (2004) Chapter two written by Nigel King, p.11
171 Schwab (2005) p.42
2.7.5 Additional thoughts on the interviews

There must be an understanding of why interviewees agreed to participate in the study, as well as what their attitudes and opinions on the matter are.\textsuperscript{172} It is clear that the more prominent diversion of opinions on the matter was found in the interview with Professor B. Nevertheless, Professor B comes from a different background than the thesis angle, namely organization structure and design, which would bring with it a different take and angle on the subject at hand. His background, nevertheless, makes Professor B a strong figure in Finnish academia, and gives strong credibility to his answers. Interviews can suffer from interviewer bias, which is the influence of tone-of-voice, dress code, non-verbal behavior and comments made by the interviewer as well as a possible bias in interpretations. Interviewee bias on the other hand stems from the interviewee’s perception of the subject at hand.\textsuperscript{173} There is no real fear of interviewer bias given the little actual interaction between Professor B and me during the interview, but more so an interviewee bias. The concept of internal integration was explained from an organization structure/design point of view, which is acknowledged to have influenced the importance of some of the elements in the boundary framework. This is due to the way that Professor B stressed them in relation to the other mechanisms that were highlighted. There has been as effort to minimize this bias by heavily concentrating on basing any prominent mechanism as such on the theories used in the framework.

Additionally, data collected by interview only reflects reality at the time of collection.\textsuperscript{174} As the interviewee learns more, his or her perception of internal integration can change, and the ‘truth’ along with it.\textsuperscript{175} There was more knowledge on the subject when the telephone interview with Professor B took place than with Professor A – which did result in more useable information for their concurrent prominence in the empirical framework from interview B.

\textsuperscript{172} Saunders et al (2003) p.250
\textsuperscript{173} Saunders et al (2003) p.252
\textsuperscript{174} Saunders et al (2003) p.253
\textsuperscript{175} Saunders et al (2003) p.253
Chapter 3: Literature Review

According to Halldórsson et al, there is lingering confusion about what SCM actually means and how it is connected to logistics, both in America, Scandinavia and the UK as well as how it relates to logistics. Therefore, this chapter starts off by summarizing the issue at hand before moving on to presenting SCM, its relation to logistics and its definition including defining benefits and stages of SCM. After this the frame of literature focuses onto SCM implementation and integration, continuing on to functional and internal integration.

3.1 Summarization of the issue:

Koskinen uses Lambert and Cooper to classify the main components of a supply chain as supply chain network structure, supply chain processes, and supply chain integration. On that subject Chandra and Grabis state that integration is a problem within SCM. On the other hand, Rushton et al state that many supply chains have evolved into functional integration, with a few having excelled into “an element of full internal integration”. Chandra and Grabis do agree, being of the opinion that a typical supply chain structure is functional with suppliers delivering goods and receiving information from manufacturers, they in turn deliver goods to and receive information from distribution, and distribution then deliver goods to and receive information from customers.

According to Nabi and Luthria, it is information technologies that have made the development of supply chains possible. “However, the balancing of multiple interests and the unequal sharing of risks and rewards make many supply chains inherently unstable.”

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177 Koskinen (2009) p.62
178 Chandra & Grabis (2007) pp.28
180 Chandra & Grabis (2007) p.35
181 Nabi & Luthria (2002) p.155
Analyzing the theoretical framework set forth in his dissertation, Koskinen comes to the conclusion that “Existing supply chain frameworks and managerial guidelines are mainly of conceptual and theoretical character and lack empirical observations of the state of practice.”\(^{183}\) On the topic of integration Koskinen defines the level of integration as lying somewhere between supply chain coordination and full integration.\(^{184}\) As much research stressed relationship integration, backward/forward integration, supplier/customer integration, all integrations between two or more units, how come industries/supply chains are having such a hard time reaching a state of internal integration?

If the most typical chain is in a functional state (as then stated by Rushton et al and Chandra & Grabis), some have moved on to internal integration (according to Rushton et al) yet there can also be any state in between (says Koskinen), then how can companies and supply chains know when they have “moved beyond” functional integration, and reached internal integration? Can the concept and state of internal integration be pinpointed and thus defined? Looking at the existing SCM/Logistics theories on internal integration – are there specific elements that have to be in place in order to be able to say “This is it!”? Or is Halldórsson right in asking if only time can produce such a phenomenon?

The literature review is built in such a way that is starts with SCM, a concept of collaboration and more, and then moves on to SCM integration, which is linking companies/units/departments along and/or within the chain, and also and/or within and across companies. The theories then clearly demark from the general concepts and characteristics to narrow in on functional integration, i.e. organizations working as several departments sharing some information with one another, and internal integration, the concept of linkage within and/or across a company.

3.2 Supply Chain Management

“It is unclear if SCM implementation can really be planned ex-ante, or if it is rather an “emerging” phenomenon; i.e. as the organization adds new technologies, establishes

\(^{183}\) Koskinen (2009) p.25-26
\(^{184}\) Koskinen (2009) p.75
integrative efforts internally and with external parties, the attributes of SCM emerge over time.”


Supply chain management is the management of multiple relationships across the supply chain. The concept was introduced into the world of industry in the early 1980s by consultants but was first seen by academia and practitioners as not thoroughly different from contemporary logistics management. The reason for this “misunderstanding” was that the 1986 definition of logistics stated by the then named the Council of Logistics Management (CLM) already held the same essence of a supply chain as it defined the scope of logistics as encompassing the range from supplier to end consumer. Logistics was/is a functional silo both within a company and also the concept of transporting and storing across the supply chain. It, as can be seen, is part of SCM, only that SCM is more about integrated players rather than functions.

3.2.1 Successful Supply Chain Management

According to Lambert and Cooper, to make SCM successful, a company must have cross-functional integration; and SCM is increasingly known as the “management of multiple relationships across the supply chain.” The managing of a supply chain is nonetheless very difficult and challenging. In a study conducted by Koufteros et al firms experience varying levels of equivocality when it comes to SCM, that is, the presence of multiple and conflicting interpretations of SCM. As such, in SCM there are different beliefs in how to make it successful.

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186 Lambert & Cooper (1998) p.1
187 Lambert & Cooper (2000) p.66
188 Lambert & Cooper (2000) p.67
189 Lambert & Cooper (2000) p.67
190 Lambert & Cooper (2000) p.65
191 Lambert & Cooper (2000) p.65
192 Lambert & Cooper (2000) p.68
On the subject of successful SCM, Lambert and Cooper identify nine essential management components:\footnote{Lambert & Cooper (2000) p.77}

1. Planning and control
2. Work structure
3. Organization structure
4. Product flow facility structure
5. Information flow facility structure
6. Management methods
7. Power and leadership structure
8. Risk and reward structure
9. Culture and attitude

Planning and control of operations moves the company in the right direction through measures such as joint planning. The work structure shows the level of integration and how the company performs tasks and activities. Organizational structure is how the company relates to the rest of the supply chain, such as the use of a process approach, e.g. cross-functional teams. Product flow facility structure is the sourcing, manufacturing, and distribution network in the supply chain. Information flow facility structure is one of the most extensively documented of the management components.\footnote{Lambert & Cooper (2000) p.77-78} For instance, Nabi and Luthria state that information technologies are the reason for supply chain development.\footnote{Nabi & Luthria (2002), p.155} Furthermore, the type of information and the speed of updates strongly influence the efficiency of the supply chain. Management methods can vary within the supply chain in each unit as it is the use of corporate philosophy and the management techniques. The power and leadership structure affects the form of the supply chain - a strong leader company can affect the direction of the supply chain. The long-term commitment of the chain partners is influenced by the sharing of risks and benefits within the supply chain. And culture and attitude concern the compatibility of companies and their ability/the ease with...
which they can form a network. Lambert and Cooper found that depending on the business process, companies decide to integrate and manage different supply chain links.

Nabi and Luthria see successful management of supply chains as a function of the organizational structure of the company and management’s ability to manage activities well. Nonetheless, the authors also see information exchange as "a crucial component in a successful supply chain partnership." However, the balancing of multiple interests and the unequal sharing of risks and rewards make many supply chains inherently unstable.

When it comes to SCM, The Global Supply Chain Forum (GSCF) focuses on key business processes in their definition and their transcendence over functional silos within the company and corporate silos within the supply chain. Mimicked in reality, Lambert and Cooper found in their study that managers had integrated only selected key process links, and were only monitoring some other business process links.

### 3.3 The relationship Between Logistics and Supply Chain Management

But before getting into the defining of SCM, its relationship with Logistics should be explained. There can be confusion about the difference between SCM and logistics. Theoretically there can even be a logistical approach to SCM or a SCM approach to Logistics. If SCM is coordinated activities within the chain – and logistics is coordinated activities between companies, then what really is the difference?

In both supply chain management and logistics the focus of integration means integrating key processes. Halldórsson et al present four perspectives on logistics SCM inter-relation: re-labeling, traditionalist, unionist, and intersectionist. Re-labeling approach holds the belief that logistics is equal to SCM, and there has just been a name change, defining SCM in a

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197 Lambert & Cooper (2000) p.77-78  
198 Lambert & Cooper (2000) p.78  
199 Nabi & Luthria (2002) p.25  
200 Koskinen (2009) p.72  
202 Lambert & Cooper (2000) p.66  
203 Lambert & Cooper (2000) p.80  
204 Spens (2006) p.231
narrow functional way, like logistics.\textsuperscript{205} The traditionalist sees SCM as subset of logistics that covers the outside of the company boundaries, a sort of special logistics that incorporates the suppliers and customers. The unionist, on the other hand, takes the opposite view seeing logistics as a subset of SCM, transportation and warehousing inside and outside the firm. The last approach, the intersectionist believes that the two concepts partially overlap each other.\textsuperscript{206}

Rushton et al believe there is a difference between logistics and supply chains, this difference being shown in the figure below. In words, the clear delineation of logistics from SCM is missing, as logistics is stated as being supply, materials management, and distribution.\textsuperscript{207} It concerns physical and information flows just like SCM, but is distinguished from SCM by logistics partners being seen as fragmented units, rather than one whole chain; focusing on operational systems rather than strategic planning processes; dealing with inventory in very different ways, and the acting in isolation for each of the components where SCM focuses on using integrated information systems suspended throughout the entire supply chain.\textsuperscript{208}

![Figure 4: Logistics and SCM, Rushton et al\textsuperscript{209}](figure4.png)

\textsuperscript{205} Halldorsson et al (2008) p128
\textsuperscript{206} Halldorsson et al (2008) p128
\textsuperscript{207} Rushton et al (2006) p.4
\textsuperscript{208} Rushton et al (2006) p.29-30
\textsuperscript{209} Rushton et al (2006) p.5
3.4 The definition of Supply Chain Management

Supply chain management means anything from cross-functional process integration within a firm to total forward (customer)/backward (supplier) supply chain integration. As clear, SCM is lacking a common perspective and definition among professionals. SCM can be defined in several different ways. For instance, Mentzer et al categorize SCM as an operational term (flows of material and products), as a management philosophy, and as a management process.

According to Chandra and Grabis, supply chain management is an umbrella framework under which must be managed: entity relationships (e.g. customer, product organization), the different types of flows (goods, services, cash and information) as well as objectives, strategies and policies.

Mentzer et al (2001) defines SCM as

“the systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the SC, for the purpose of improving the long-term performance of the individual companies and the SC as a whole.”

On defining SCM, Halldórsson et al refer to Croxton et al who define successful supply chain management as involving the “coordination of activities within the firm and between members of the supply chain.”

As previously mentioned, there consist fuzzy boundaries of the relationship between logistics and SCM. As seen by the definition of SCM made by The Council of Logistics Management (CLM), the definition of SCM is dependent on the focus taken by those defining it: the CLM definition clearly has a more logistical thinking in their definition than The Global Supply Chain Forum. The CLM is nowadays the Council of Supply Chain Management Professionals (CSCMP) and defines SCM as encompassing

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210 Fawcett & Magnan (2002) p.344
211 Halldorsson et al (2008) p130
212 Mentzer et al (2001) p.2
213 Chandra & Grabis (2007) p.17
214 Mentzer et al (2001) p.18
“the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. It also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers.”

Equally correct, The Global Supply Chain Forum (GSCF) defines SCM as

“The integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.”

The GSCF has identified the key processes in a supply chain as customer relationship management, customer service management, demand management, order fulfillment, manufacturing flow management, procurement, product development and commercialization, and returns. Spens on the other hand identify cross-functional processes, such as customer order fulfillment, as essential processes.

3.4.1 Further definitions

The three last definitions do require further definitions of a (business) process, process integration, and supply chain process.

A process orientation means a focus on the value adding activities in the organization. A business process spans several functions in a company. As defined by Davenport, a process is a “structured and measured set of activities designed to produce a specific output for a particular customer or market.” Additionally, Lambert and Cooper explain the concept of business process as “a structured and measured set of activities with specified business outcomes for customers.” Typical business functions are purchasing, manufacturing, and marketing.

216 Lambert & Cooper (2000) p.66
217 Lambert & Cooper (2000) p.72
218 Spens (2006) p.234
221 Chen et al (Landry) (2009) p.28
222 Bergelin (2000) p.5
As explained by Barratt, process integration is the collaborative working “between buyers and suppliers, joint product development, common systems and shared information.”

With that, a supply chain process, as seen from the empirical data in the study by Chen et al, means “a set of continuous restructuring activities aimed at seamlessly linking relevant business processes and reducing redundant or unnecessary processes within and across firms.” Now, a process approach is a focus to meet customer requirements by managing processes effectively.

There are four more concepts that swirl around the concept of SCM; competitive advantage, strategy, collaboration, and alignment. Porter defines competitive advantage as either cost leadership or differentiation. And “strategy is a major organizational plan of action to reach a major organizational objective,” whereas “collaboration is defined as two or more companies sharing the responsibility of exchanging common planning, management, execution, and performance measurement information.” Now according to Carter et al,

“Alignment refers to common visions, goals, purpose and objectives across organizations, functions and processes in the supply chain. Alignment ensures that there is consistency in the direction and objectives as these plans and decisions are made.”

“Firms are also experiencing varying levels of equivocality. Equivocality is the presence of multiple and conflicting interpretations about a phenomenon. [...] Many times this confusion stems from the presence of complexity. [...] Equivocality is portrayed as being similar to uncertainty but [it] presumes a messy, unclear field and an information stimulus that may have several interpretations.”

3.4.2 Benefits of Supply Chain Management

There are substantial gains to make from adopting SCM. Supply chain management is not only equaled to, but the generator of synchronized activities within both the company and

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224 Chen et al (Landry) (2009) p.29
225 Chen et al (Landry) (2009) p.28
226 Mentzer et al (2001) p.15
227 Chen et al (Landry) (2009) p.32
229 Carter et al (2009) p.6
the supply chain. There are several other kinds of captured values that can be realized by those participating in a well-designed supply chain: improved quality control in the chain, shortened order-to-delivery cycle, reduced product losses during storage and transportation, and improved knowledge transfer efficiency. Superior SC performance not only facilitates efficient inventory turns, enhanced revenue, reduced cost, and increased cash, but also benefits investors, employees and customers.

The advantage for individual supply chain members is that through coordination of their value-creating activities, the entities involved create more value together than they would have working independently. In working as a united entity, the benefits and risks are shared among participants enforcing “internal mechanisms” and the development of “chain-wide incentives for ensuring timely production and delivery.” Xu and Beamon agree, equaling high performance with rapid response and high quality. On the other hand, the result of not integrating is much friction, and through that, a waste of valuable resources.

3.4.3 Supply Chain Difficulties

It can be argued that the focus of SCM has shifted from functional area emphasis to adopting a network perspective. Despite a supply chain being about everyone being “in it together” so to speak, most companies focus more on their own activities than on the behavior of supply chain partners while building up supply chains. Firms act in ways that maximize their own interests, wrongly assuming that as they do so, they also maximize the interests of the entire supply chain. The further level of complexity that comes with supply chain management will become apparent in the subchapters about SCM implementations and SCM integration.

231 Nabi & Luthria, 2002, p.23
232 Nabi & Luthria, 2002, p.25
233 Ajmera & Cook (2009) p.38
235 Nabi & Luthria (2002) p.25
236 Xu & Beamon (2006) p. 4
237 Lambert & Cooper (2000) p.81
238 Spens (2006) p.233
239 Narayanan & Raman (2004) p.96
3.5 Stages of Supply Chain Management

As supply chain management is a rather young field of study it is, as mentioned, still looking for its boundaries and depth. Nonetheless, the fundamental changes of the global business environment together with the changes in new technology are drivers of supply chain development.²⁴⁰ As companies adopt SCM and evolve with it, Nabi and Luthria discuss how SCM evolves in breadth from a narrow logistic scope, to becoming more of a multiple function phenomenon as suggested by Metz: Stage one of development involves integrating transportation and warehousing functions, called physical distribution. The second stage is named logistics, in which the procurement, manufacturing, and order management functions are added to SCM. The scope in the third stage takes an outward turn, into integrated SCM, where both suppliers and customers become a part of the scope. The fourth stage, named “super” SCM, involves even further functions such as marketing, product development (PD), and customer service.²⁴¹

Poirier, nevertheless, has another view on supply chain evolution, which he presents as a five level concept:²⁴² Level one is called enterprise integration, where the company adopts a functional/process focus. Level two, named corporate excellence, is where the focus turns intra-enterprise, expanding beyond the functional borders. The third level is known as partner collaboration where the company expands its focus outwards to a more inter-enterprise nature. The fourth level is called value chain collaboration where there is a total external focus. Level five, the full network connectivity level, is complete when the company adopts a total business system focus.

However, the defined stages of SCM integration stages do not end there: The SCOR (Supply-Chain Operations Reference) model was developed by the Supply Chain Council, and is a benchmarking method within SCM. There are four categories, each representing their own level of business processes. The first level, called disconnected processes, is characterized by independent processes engaging in functional (silo) strategies, with a lack of clear SCM processes and measurements, or then measurements are not aligned with the rest of the

²⁴⁰ Nabi & Luthria (2002) p.155
²⁴² Poirier & Quinn (2006) p.35
company/units. Due to the functional nature of this level, there is a low or no degree of integration.243

Level two is called internal integration and is characterized by functional organization and the degree of integration is high. There is use of Central Planning, Forecast and Replenishment (CPFR) or other common forecast methods, and decision are made in integrated key functional areas, such as sales, manufacturing, and logistics. Some functional information is integrated to decrease inventory and improve efficiency and there is the use of key measurements used departmentally.244

The third level is known as intracompany integration and limited external integration. This level includes cross-functional organization involving key suppliers and customers being a part of the decision-making processes. At this point decisions are optimized throughout the internal supply chain, with use of sophisticated processes that involve all relevant internal organizations in the supply chain.245

The highest level, level four, goes by the name of multi-enterprise integration. At this integrative stage multi-enterprise processes are used together with common business objectives, and there is an extensive knowledge of the business environments of both suppliers and customers. This level is where the organization works as one virtual corporation with collaboration throughout the whole supply chain, there are key service and financial goals both internally and externally, and there are measures in place linking supply chain results directly to company goals.246

### 3.6 A supply chain

Defining a supply chain (SC) is as easy as defining supply chain management in absolute terms: Definitions vary with authors and thus, a more comprehensive overall picture of a supply chain offers more use than trying to define it in absolute terms.

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Nevertheless, one way to look at a supply chain is as a network of multiple businesses and relationships.\textsuperscript{247} Fawcett and Magnan concluded from their study that SC practice rarely looks like the theoretical ideal.\textsuperscript{248} Nonetheless, a typical SC according to Simchi-Levi et al includes raw material procurement, production of goods at one or more facilities, transportation and warehousing, and then delivery to retailers or customers.\textsuperscript{249} Chandra and Grabis also present a SC as containing suppliers, manufacturers, warehouses, distributors, and retailers working together.\textsuperscript{250} Regardless of their actual compositions, Narayanan and Raman advocates the periodic study by management of all supply chains, as the alignment of incentives within the chain can shift due to changes in technology or business conditions, whether it is a top-performing network or not.\textsuperscript{251}

Antecedents of a supply chain are trust (commitment), cooperation, organizational compatibility, (“complementary goals and objectives\textsuperscript{252}”), agreement on vision and key processes, and operational philosophy, as well as cooperative culture, leader company (a so called “Kingmaker” that coordinates and oversees the SC) and top management support.\textsuperscript{253}

Trust was identified as one of the major supply chain enablers by Carter et al in their study on supply chain integration challenges and good practices. Carter et al state that

“Trust is at the heart of breaking down the functional and organizational barriers that impede true integration. Without trust and the willingness to collaborate, it is impossible to achieve aligned, consistent decision-making and actions required for the integrated supply chain.”\textsuperscript{254}

\textbf{3.6.1 An Integrated Supply Chain}

Regardless of the antecedents of a supply chain, there are dominant problems in integrated chains: In addition to low flexibility to market changes and supply chain complexity there are

\begin{itemize}
\item \textsuperscript{247} Lambert & Cooper (1998) p.1
\item \textsuperscript{248} Fawcett & Magnan (2002) p.339
\item \textsuperscript{249} Simchi-Levi et al (2008) p.1
\item \textsuperscript{250} Chandra & Grabis (2007) p.18
\item \textsuperscript{251} Narayanan & Raman (2004) p.102
\item \textsuperscript{252} Mentzer et al (2001) p.13
\item \textsuperscript{253} Mentzer et al (2001) p.12-14
\item \textsuperscript{254} Carter et al (2009) p.7
\end{itemize}
also problems in “controlling a supply chain, power conflicts between supply chain partners and cultural issues.”\textsuperscript{255}

### 3.6.2 Supply chain members

SCM is also seen as a cross-functional activity.\textsuperscript{256} Nevertheless, academic literature seems to assume that everyone naturally knows who is a part of the chain.\textsuperscript{257} This could be because, “all firms participate in a supply chain, from the raw materials to the ultimate consumer.”\textsuperscript{258} A company is rarely involved in just one, single chain\textsuperscript{259}, illustrating the complexity of adopting SCM. “Normally, several independent firms are involved in manufacturing a product and placing it in the hands of the end user in a supply chain – raw material and component producers, product assemblers, wholesalers, retailer merchants and transportation companies are all members of a supply chain.”\textsuperscript{260}

The members in a supply chain are thus the organizations that the focal company is in contact with, directly or indirectly, from suppliers to consumers.\textsuperscript{261} A focal company is one that is the central company, the one that managers use as their starting point. Therefore, in just one chain, there are several focal companies, several chains interacting, but still only one approach for all companies: they are the focal company, connected to their suppliers and customers.

To sum it up, there are multiple firms in every supply chain. There is upstream (supply) and downstream (distribution), as well as the ultimate consumers.\textsuperscript{262}

### 3.7 Implementation of SCM

The implementation of SCM first requires the presence of supply chain orientation (SCO),\textsuperscript{263} which is a management philosophy; and SCM is all overt managerial actions taken to realize it.\textsuperscript{264} SCO is “the recognition by an organization of the systemic, strategic implications of the

\begin{itemize}
  \item \textsuperscript{255} Koskinen (2009) p.78
  \item \textsuperscript{256} Halldorsson et al (2008) p129
  \item \textsuperscript{257} Lambert & Cooper (2000) p.68
  \item \textsuperscript{258} Lambert & Cooper (2000) p.69
  \item \textsuperscript{259} Lambert & Cooper (2000) p.69
  \item \textsuperscript{260} Mentzer et al (2001) p.3
  \item \textsuperscript{261} Lambert & Cooper (2000) p.70
  \item \textsuperscript{262} Mentzer et al (2001) p.3
  \item \textsuperscript{263} Mentzer et al (2000) p.11
  \item \textsuperscript{264} Mentzer et al (2001) p.11
\end{itemize}
tactical activities involved in managing the various flows in a supply chain.” There must be “both directions” recognition and not just looking in only one direction. Nonetheless, SCO is required by several or all members across a supply chain if it is to be implemented. (Disjointed) supply chain tactics cannot be called supply chain management unless they are coordinated across the supply chain. This means the presences of both strategic orientation and systematic orientation within/across the chain. Implementation of SCM, the integration of business processes, will only be successful if it makes sense for those involved. In the end, the best supply chain has a win-win approach baked into it.

3.7.1 Facilitators and Obstacles to SCM implementation

In their conducted study, Halldórsson et al found that both American and Scandinavian managers rate top management support as the most important facilitator of SCM implementation. Additionally, organizational matters such as organizational re-structuring are seen by both groups as the leading SCM facilitators together with internal or downstream relationships, such as integrated logistics. Both groups rated the organizational issue “functional silos” as the strongest barrier to SCM implementation. In the same category there were also misalignment of different SCM perspectives and the complexity of supply chain management.

3.8 Supply Chain Integration

The article by Lee and Whang highlights that supply chain integration incorporates greater coordination and collaboration, touching upon the concepts of processes and cross-borders. The same wording is used when talking about internal integration. Spens also discuss the concept of integration stressing that integration can mean both internal

265 Mentzer et al (2001) p.11
266 Mentzer et al (2001) p.11
268 Lambert & Cooper (2000) p.72
269 Lambert & Cooper (2000) p.74
273 Lee & Whang (2001) p.2
“Integration is a key component of SCM” and refers to “linking major business functions and business processes within and across companies into a cohesive and high-performance business model.” As “SCM is the integration of business processes” from end users to original suppliers, “a process view of management is fundamental.” Spens found that there is an indication that SCM integration concerns business processes. Be that as it may, integration is “mutual responsiveness and collaboration between distinct activities or processes.” This discussion includes reference to Alter, who identified five levels (components) to integration: common culture, common standards, information sharing, coordination and collaboration.

Of course, as an unfortunate prevalent feature with SCM, there is no one definition of supply chain integration (SCI). Gattorna and Walters define this concept as developed linkages between partners in a supply chain who share ways of operating to make working together come easily. These relationships are formed at various (important) levels between the organizations. Chen et al, on the other hand, define SCI from the standpoint of ownership stating the boundaries of integration as “the ownership of business processes and activities.” Nonetheless, according to Troy et al integration can occur both inside and overall in a company; at team (project) level or at the organizational (functional) level. According to Ajmera and Cook, integrating is sharing resources, which brings about lowered costs. The authors are of the opinion that integration should occur on several levels in the organization; operational, tactical and strategic. With this, there should also be an integration of activities such as research, design, production, marketing or logistics.
In short, supply chain integration describes the nature and intensity of supply chain relationships. The ultimate, true integration is where the entire supply chain works with aligned objectives, open and candid information, pooled resources and a simultaneous sharing of risks and rewards. This is a very rare state. Be that as it may, greater understanding is still needed about what is involved in SCI.

### 3.8.1 Challenges to SCM integration

Carter et al identified fourteen key challenges in their study which must be met to gain true supply chain integration. The first is finding a vision of financial and non-financial results to improve the supply chain integration. The second is developing elements that support the vision: people, organization, and culture. Thirdly the organization must develop customer-centric metrics, and fourthly develop multiple supply chains, chains either for segments and or customers.

The fifth key challenge is identified as correctly positioning work globally, which is followed by the sixth challenge, namely applying supply chain orientation into product and service design decisions. The seventh key challenge is making sourcing a first level priority and then focus and stay consistent in relationships with customers and suppliers is the eighth challenge. A company then has to create efficient sales and operations processes and develop databases in which data and information are valid and reliable as ninth and tenth challenges. The eleventh challenge is developing capabilities and tools to support decisions in a more complex and risky environment followed by challenge number twelve: build trust within and across organizations in the supply chain. As number thirteen is shared risks equitably among the partners in the supply chain. And finally, as fourteenth challenge comes sharing rewards equitably among supply chain partners.

### 3.8.2 Integration benefits

Success of integration is “predicated on close cooperation inspired by a perception of mutual benefits.” Integration has to do with the competitive edge of those committed to the supply chain: Supply chain integration is motivated by increase in supply chain competitive

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288 Chen et al (2009) p.75
289 All 14 challenges presented by Carter et al (2009) p.8
290 Lee & Whang (2001) p.5
advantage. Closs and Savitskie have identified that several recent studies have identified internal and external supply chain dimensions as critical to achieving performance-related competitive advantage.” Integration is important as it is desired for its capability of bringing about better performance at lower cost.

### 3.8.3 Integration Levels and Dimensions

According to Koskinen, and as seen in this chapter, the level of integration can vary between supply chain coordination and full integration. Now Lambert and Cooper advocate that the drivers for integration differ from process link to process link and are thus situational and as such, the level of integration “should vary from link to link and over time.” Processes on an operative level can be integrated, but if tactical and strategic levels are not integrated performance benefits of integration are limited. In contrast, Troy et al advocate that “when integration occurs at the organizational level rather than at the team level, the impact of the integration is diminished.”

![Figure 5: The four levels of integration as given by Rushton et al](image)

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291 Mentzer et al (2001) p.15  
292 Closs & Savitskie (2003) p.64  
293 Spens (2006) p.235  
294 Koskinen (2009) p.75  
295 Lambert & Cooper (2000) p.74  
Rushton et al advocates the most conventional perception of integration evolution in supply chains: from baseline chain to externally integrated supply chain, as can be seen in figure 5, above.299

But talking about integration dimensions, Lee and Whang identify four key dimensions of supply chain integration.300 The four dimensions increase by degree of integration and coordination. First come information integration, which focuses on data and information that can influence actions and performance of other members in the supply chain (such as demand data, inventory, capacity, schedules and plans, both in real-time and online). The second is called planning synchronization, where the step up in coordination and integration now is expressed through product introduction, forecast, replenishment coordination through joint design and execution. Actions are coordinated through focusing on what is done with the information (such as order fulfillment).

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Elements</th>
<th>Benefits</th>
</tr>
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<tbody>
<tr>
<td>Information Integration</td>
<td>Information sharing &amp; transparency</td>
<td>Reduced bullwhip effect</td>
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<tr>
<td></td>
<td>Direct &amp; real-time accessibility</td>
<td>Early problem detection</td>
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<td></td>
<td>Faster response</td>
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<td></td>
<td></td>
<td>Trust building</td>
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<tr>
<td>Synchronized Planning</td>
<td>Collaborative planning, forecasting &amp;</td>
<td>Reduced bullwhip effect</td>
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<td></td>
<td>replenishment</td>
<td>Lower cost</td>
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<td></td>
<td>Joint design</td>
<td>Optimized capacity utilization</td>
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<td></td>
<td></td>
<td>Improved service</td>
</tr>
<tr>
<td>Workflow Coordination</td>
<td>Coordinated production planning &amp; operations, procurement, order processing, engineering change &amp; design Integrated, automated business processes</td>
<td>Efficiency &amp; accuracy gains</td>
</tr>
<tr>
<td></td>
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<td>Fast response</td>
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<td>Improved service</td>
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<td>Earlier time to market</td>
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<td>Expanded network</td>
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<tr>
<td>New Business Models</td>
<td>Virtual resources</td>
<td>Better asset utilization</td>
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<td></td>
<td>Logistics restructuring</td>
<td>Higher efficiency</td>
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<td></td>
<td>Mass customization</td>
<td>Penetrate new markets</td>
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<td></td>
<td>New services</td>
<td>Create new products</td>
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<td></td>
<td>Click-and-mortar models</td>
<td></td>
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</tbody>
</table>

Figure 6: Supply chain integration Dimensions by Lee and Whang301

The third dimension is called workflow coordination, which focuses on how to use the information. Workflows are streamlined and automated through the information shared.

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300 Lee & Whang (2001) p. 3-4
301 Lee & Whang (2001) p.3
Examples are procurement and supplier; accuracy, time, and cost. The fourth dimension is known as new business models, where a whole new approach to conducting business is found. This step includes finding new business that previously was unavailable. There is change possibility in roles and responsibilities among the chain partners, such as adopting new products, or mass customization.  

### 3.8.4 Integration types

There are many different types of integration in SCM, a problem of diffusion, confusion and complexity for academia and managers.

Fawcett and Magnan present four primary integration types:\(^{303}\):

1. **Internal, cross-functional process integration** – the crux of SC initiatives. An example of cross-functional processes is customer order fulfillment (an overall tasks)\(^ {304}\)
2. **Backward integration**: 1\(^{st}\) tier suppliers – this state is the most common form according to Fawcett and Magnan
3. **Forwards integration**: 1\(^{st}\) tier customers
4. **Complete backward/forward integration**: suppliers’ supplier to customers’ customer – this is very rare and more theoretical ideal than reality

Other SCI types are provided by Bowersox, Closs and Stank (1999) who proposed a framework with six categories of SCI: customer integration, internal integration, material service supplier integration, technology and planning integration, measurement integration, and relationship integration.\(^ {305}\) Chen et al consider these conceptual overlaps (customer/supplier integration versus relationship integration) as possible sources of confusion during implementation.\(^ {306}\)

Chen et al found that prevalent in literature when focusing on SCI research are the two ideas of internal-external perspective and holding a process view.\(^ {307}\) Now “internal and external dimensions are often used when examining the relative contribution of collaboration,

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\(^{302}\) Lee & Whang (2001) p.3-4  
\(^{303}\) Fawcett & Magnan (2002) p.344  
\(^{304}\) Spens (2006) p.234  
\(^{305}\) Chen et al (Landry) (2009) p.28  
\(^{306}\) Chen et al (Landry) (2009) p.28  
\(^{307}\) Chen et al (Landry) (2009) p.28
coordination, or integration." It is then important to remember that integration dimensions, internally or externally oriented, can be tangible (e.g. regard product flows) or intangible (e.g. information sharing).

There is not just one flow to integration in any type of integration. Ajmera and Cook stress that all four flows; cash, product, information and returns, are imperative to integrate. A supply chain that facilitates collaboration is also imperative, and is often done so by exploiting technology.

3.8.5 Integration and the company

There are thousands of activities performed and coordinated within the company. Perhaps correlated, efficient implementation of integration remains mysterious to many companies. "A greater number of functions can cause confusion and make it increasingly difficult to increase goal congruity or a collaborative climate." This receives support by findings made by Troy et al in their conducted study: more functions can contribute to greater creativity and idea for new products, but increased confusion and conflict can also result as more divergent viewpoints come together. The implication is that managers should consider forming teams with a smaller number of key functions rather than longer, more diverse teams. Lambert and Cooper discuss the probable variation of the number of business processes that are "critical and/or beneficial to integrate and manage between companies" In some supply chains linking just one key process might be more appropriate, as linking of multiple or all business processes might be more appropriate in others. Still, this variation might cause varying levels of equivocality, which "may contribute to a varying need for internal and external integration."

In order to achieve integration, focus in functional values should be on universal capabilities. There must be the knowledge and set goals essential to nurture integrated performance.

308 Closs & Savitskie (2003) p.64  
310 Ajmera & Cook (2009) p. 38  
311 Lambert & Cooper (2000) p.76  
312 Chen et al (Landry) (2009) p.27  
315 Lambert & Cooper (1998) p.10  
316 Lambert & Cooper (1998) p.10  
This knowledge of integration is the underlying understanding of why integration (work) is being performed in contrast to having a functional perspective, which is how integration (work) is performed. “The capability reflects the value contribution of the work. Inherent in a capability is the application of integrative principles that allow multiple functions to be synchronized into value-creating competencies.”318

Adopting SCM successfully necessitates changing from having individual functions to managing integrated activities in key supply chain processes. The supply chain has usually been interacting up/downstream in the supply chain as disconnected companies with irregular information flows over time.319 Successful SCM and integrated supply chain processes are facilitated through continuous information flows.320

3.8.6 Organizational structure shift

Organizational structure shapes interactions between people and how they relate to one another in an enterprise. The wrong organizational structure can inhibit the collaboration needed for alignment. “Working within the organization structure, the skills and capabilities of people are critical to successfully integrating a supply chain.”321 Moving from functions to integrated processes means a change in organizational structure from function-based (presented in subchapter 3.10 Functional integration) to process oriented. Figure 7 below shows the process flows of an organization working in “matrix” form.

319 Lambert & Cooper (2000) p.72
320 Lambert & Cooper (2000) p.72
The use of more of a matrix approach is done so to increase visibility within the chain, and “enable an integrated supply chain response.”\textsuperscript{323}

### 3.9 Integration building blocks 101

What then makes up integration? In regards to this question Ayers refers to Lee, who says that there are three components to SCI. The first is information followed by organizational linkage, and then the third is coordination. The first regards the sharing of information and knowledge, such as forecasts to coordinate action among supply chain partners. Organizational linkage refers to means of communication, such as meetings or EDI (electronic data interface). Coordination is about resources, work and decision rights in the supply chain.\textsuperscript{324} Fawcett and Magnan backs up coordination as a building block calling it critical among functions to facilitate effective SCI.\textsuperscript{325} The authors then point out cross-functional teams as basic building blocks for initiating SCI.\textsuperscript{326}

In terms of building blocks, Koskinen refers to Sohal et al. who list the main components of integration as being cooperation, collaboration, information sharing, trust, partnership, and shared technology. Referring further to include Towill, he looks at the organizational view

\textsuperscript{322} Rushton et al (2006) p168-169
\textsuperscript{323} Rushton et al (2006) p.167
\textsuperscript{324} Ayers (2001) p.266
\textsuperscript{325} Fawcett & Magnan (2002) p.347
\textsuperscript{326} Fawcett & Magnan (2002) p.347
and states that integration is when companies have no borders and basically function as being a part of one single organization. Koskinen prefers Bask and Jugas definition of integration as a collaborative role between business partners. Christopher suggests integration is “collaborative working between buyers and suppliers, joint product development, common systems, and shared information.”

And then there is Stern who defines 6 SC integration components: development of customer service standards, the selection of transportation modes, the determination of the optimal number and location of warehousing facilities, the setting of inventory management and control procedures, the determinations of production scheduling involving the quantity and kind of finished products to be produced and, the design of order processing and information systems. The difference in adopted views between Koskinen’s allies and Stern could not be a more quintessential example of the equivocality in SCI: The authors in the former paragraph think of integration in terms of management and organization, whereas Stern adopts the process view.

**3.9.1 Identified Building Block A: Collaboration, coordination and cooperation**

Before presenting the opinions on how these three concepts coordinate with integration, it is better to first state how they relate to one another: Spekman et al provide categorization in intensity of cooperation, coordination, and collaboration:

1. Cooperation is where it all starts: it is the threshold level of interaction.
2. Coordination is where specified workflows and information is shared to such a degree that is becomes possible to use JIT systems, EDI and other mechanisms of linkage between and among partners.
3. Collaboration is when the machinery is up and running: there is a “high level of trust, commitment and information sharing among supply chain partners” and a shared vision of the future.

327 Koskinen (2009) p.76  
328 Spens (2006) p.234  
329 Koskinen (2009) p.76-77  
331 For clarification of the names JIT, or EDI, please see abbreviation list after table of contents.
Fawcett and Magnan are of the opinion that better words to describe integration are cooperation and collaboration. \(^{332}\) Chen et al concur stating that integration is often equal to coordination and collaboration, \(^{333}\) or that integration is often put as the same as collaboration or coordination. \(^{334}\) Lee and Whang equal integration to cooperation, not collaboration or coordination. \(^{335}\) Xu and Beamon stress that “the importance of coordination cannot be overemphasized.” \(^{336}\) Min et al state that collaboration is the ultimate core capability as it is being referred to as a driving force behind effective SCM. \(^{337}\) Nevertheless, Hirunyawipada and Vahie state that cross-functional integration can be classified as the supportive climate for collaboration. \(^{338}\) This, as will be seen, would make CFI, which is equaled by many to internal integration, a building block of collaboration, meaning that internal integration is a building block of collaboration, not the other way around.

Collaboration is defined by Ajmera and Cook as a process which is interactive, constructive, and knowledge based encompassing many participants with complementary skills and assets. Collaboration brings about an outcome that is pursued collectively, and which could not have been achieved individually. It goes beyond individual capacity and willingness. \(^{339}\) Collaboration has three basic areas: within and across departments, and between companies. \(^{340}\)

Simatupang et al have identified four levels of coordination \(^{341}\): logistics synchronization, information sharing, incentive alignment, and collective learning. Synchronizing of logistics might lie outside of the domain range of internal integration, however level two, information sharing, level three, incentive alignment, and level four, collective learning, are relevant to internal integration. These three will be presented as the literature continues in their appropriate subchapters.

\(^{332}\) Fawcett & Magnan (2002) p.355  
\(^{333}\) Chen et al (Landry) (2009) p.27  
\(^{334}\) Chen et al (2009) p.64  
\(^{335}\) Lee & Whang (2001) p.4  
\(^{336}\) Xu & Beamon (2006) p.4  
\(^{337}\) Min et al (2005) p.237  
\(^{338}\) Hirunyawipada & Vahie (2005) summary p.183  
\(^{340}\) Ajmera & Cook (2009) p.39  
\(^{341}\) Simatupang et al (2002)
But to Min et al, collaboration is “strategic intent, internal alignments, relationship orientation, and investments, free flow of information /heightened communication, and formalization.” Nevertheless, according to Ajmera and Cook, the effectiveness of information sharing is dependent on and correlates to the levels of integration and collaboration.

While on the subject of alignment and strategic intent, Lee states that great companies make sure to align supply chain members’ interests with their own, the criticality in this being that every firm aims at maximizing their own interests regardless of their position in the chain (e.g. supplier, assembler or retailer). Misalignment of interests within the supply chain will not lead to one company’s actions guided by self interest to overall maximization of the performance of the chain. The result of misaligned interest can wreak havoc “even if supply chain partners are divisions of the same company.”

**Collaboration and managers**

A study by Fawcett and Magnan shows that, in practice, SCM is synonymous with collaboration. But few companies actually engage in such extensive SCI. Managers communicate collaboration’s potential benefits as though collaboration was a part of the company value structure. Nevertheless, “it seems that few companies are actually engaged in the level of integration that collaboration suggests.”

“Like most managerial concepts, supply chain integration is a dynamic situation that must be continuously reevaluated.” Nevertheless, managers are generally “far more experienced in competition than they are in collaboration.” “Integrative practice tends to span only a triad of companies – typically the company plus one tier up and downstream.”

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342 Min et al (2005) p.242  
343 Ajmera & Cook (2009) p.38  
349 Fawcett & Magnan (2002) p.358
3.9.2 Identified Building Block B: Organizational linkage and information sharing

Simatupang et al look at information sharing as a vital part of a supply chain referring to information as being “relevant, accurate and timely information available to the decision makers” 350 Nevertheless, members of the chain often hold different private information that they do not often share with one another. 351 Still, Simatupang et al advocates that supply chain integration coordination must be supported by a willing use of the information that is given. 352 Nevertheless, according to Chandra and Grabis, information sharing is a common problem encountered among various enterprise partners. 353

Koskinen points out that customer service is a big part in successful SCI. 354 But the incentive alignment, which Simatupang et al defines as the reward/penalization scheme adopted to link responsibility with the decision makers, influence the behavior of individual members and their interactions with other partners. 355 As such, creating tacit capabilities, such as Koskinen’s customer service mind frame, is created through collective learning. Simatupang et al see collective learning as minimizing the effect of incoherency of initiation and diffusion of knowledge adherent in companies. They place special emphasis on practical learning from one another, in order to understand and create tacit capabilities across the chain. 356

Nevertheless, information sharing is crucial in countering out the bullwhip effect. 357 This effect is considered one of the biggest causes of inefficiency in supply chains. 358 Lee and Whang found in a recent study that out of 100 manufacturers and 100 retailers, the ones that reported “higher than average profits were the ones who were engaged in higher levels of information sharing.” 359 Nevertheless, success in handling variability in demand is “directly proportional to the degree of information sharing.” 360 But regardless of

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353 Chandra & Grabis (2007) p.28
354 Koskinen (2009) p.77
357 Lee & Whang (2001) p.5 the bullwhip effect is demand information distortion that gets worse the further up the chain it travels, causing misalignment with production, inventory and demand
358 Lee & Whang (2001) p.6
360 Ajmera & Cook (2009) p.38
implementation level of an enterprise, problems with coordination and synchronization of activities and resources will occur, according to Chandra and Grabis. The authors argue that problematic information sharing often lead to under- or misutilization of resources and have an effect on scarce resources in the company, such as capacity.361

3.9.3 Identified Building Block C: Integration and technology: information system

The importance of information technology is stressed by Lee and Whang as according to them, it is the tool to “further” supply chain integration goals.362 Connectivity and simplicity are the two most crucial and basic elements of integration according to Chen et al.363 A common mistake is to assume that integration has to mean new technology: The consequence of leaping to this conclusion could be a lengthy, expensive, and ultimately unsuccessful endeavor. But technology is too important to ignore on the journey toward integration. Turning it to competitive advantage will be important in surviving in the upcoming decade. This will be particularly true as technology users turn to proactive systems to improve integration of decision making.364

IT is a major driver of supply chain integration.365 Lee and Whang take a slightly different tone by saying that IT is a major factor in pursuing SCI.366 Nevertheless, “information integration is the foundation of supply chain integration,” as it allows for timely alignment of product, financial, and information flows.367 According to Ajmera and Cook, integration through IT enhances internal coordination and improves information sharing as seen in studies on information sharing, which showed improved management through accurate planning, cost transparency, and improved visibility.368 Benefits from integration increase when companies move beyond information sharing to JDM (joint decision making) and

361 Chandra & Grabis (2007) p.10
362 Lee & Whang (2001) p.2
363 Chen et al (2009) p.3
364 Ayers (2001) p.267
365 Ajmera & Cook (2009) p.38
367 Lee & Whang (2001) p.5
368 Ajmera & Cook (2009) p.37
benefits sharing. The authors note, however, that SCM synchronization is usually reserved for the most powerful in the chain.\textsuperscript{369}

Koskinen emphasizes that IT systems and mutually decided reporting systems are a fundamental part of supply chain integration together with the aligning of management philosophies among the supply chain members.\textsuperscript{370}

Barratt talks about how collaboration does not need to be built on technology: simplistic technologies like emails are usually more effective and cost a lot less than collaboration tools that are pushed onto the market today. There is a criticism that the obsession with technology is one of the greatest barriers to collaboration.\textsuperscript{371}

Organizational relationships (cooperation) is done through well defined and maintained channels of communication, specified and monitored performance measures and accountability for supply chain members and alignment of incentives for all members.\textsuperscript{372}

Nevertheless, “the mere use of IT applications is insufficient to realize the benefits,” coordination of activities is also crucial to allow for strategic utilization of the information.\textsuperscript{373}

When it comes to communications and E-systems, Carter et al stress that information and data should be collected, shared and utilized at all levels in the organization.\textsuperscript{374} Trkman and Groznik sum it up as “regardless of the number of difficulties and problems in SCM, the core concept of successful SCM is efficient information sharing.”\textsuperscript{375}

### 3.10 Functional integration

According to Chandra and Grabis a typical supply chain structure is functional in nature. This means that the flow of information and goods go from one stage to another without clear overview of the entire company. This means that the flows are contained between two units, such as suppliers/manufacturers, manufacturers/distribution, and distribution/customers.\textsuperscript{376} Rushton et al concurs stating that many companies have adopted

\begin{itemize}
  \item \textsuperscript{369} Ajmera & Cook (2009) p.37
  \item \textsuperscript{370} Koskinen (2009) p.62
  \item \textsuperscript{371} Barratt (2004) p.39
  \item \textsuperscript{372} Lee & Whang (2001) p.4-5
  \item \textsuperscript{373} Trkman & Groznik (2006) p.39
  \item \textsuperscript{374} Carter et al (2009) p.7
  \item \textsuperscript{375} Trkman & Groznik (2006) p.38
  \item \textsuperscript{376} Chandra and Grabis (2007) p.35
\end{itemize}

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functional integration. Barratt also acknowledge the existing functional silos that exist within companies, and corporate silos that are found across the chain (where instead of going from unit to unit, flows of information and goods are contained between companies). This silo structure is the adopted metaphor of what is referred to as the “silo-m mentality,” where interaction and activities are coordinated within silos rather than as processes that expand the entire chain. This silo mentality is a functional barrier to integration and collaboration in SCM. Seeing the industries differently, Fawcett and Magnan are of the opinion that most companies are at the stage of inter-relations collaboration.

As mentioned, in a functional structure, departments keep more to themselves, with information flows kept between units rather than shared across the entire firm. In the figure below, the information flow is represented by the arrows, and as can be seen there is generally few who see the overall picture of the company.

![Figure 8: A traditional silo-based organizational structure. Adapted from Rushton et al](image)

The functional structure can create a barrier to integration as they, the silos, are functional and focused inwards, with “power barons” at the top of each function fighting not to lose their power base. These structures are not process oriented, as with functional silos there

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378 Barratt (2004) p.31
379 Barratt (2004) p.31
380 Chen et al (Landry) (2009) p.27
is a general understanding of the representation of each function, such as marketing, and manufacturing.\textsuperscript{383}

Fawcett and Magnan point out that though companies are trying to move from functional structure to more “seamless” value-adding processes the lack of clear and consistent communication and cooperation among functional areas is creating a persisting anxiety in making this transition.\textsuperscript{384}

### 3.11 Internal integration

Internal integration contributes to cost reductions, the reduction of stock-outs and lead time, as well as competitive advantage.\textsuperscript{385} As there is a move towards more seamless process the focus is put on achieving internal integration. The academia have not reached an agreement on the order of integration, if internal facilitates external integration, or is external integration constitutes internal integration, or if the two can coincide and exist and evolve independent of one another. This contributes to the equivocality of integration – if those who study it cannot say how things evolve, how can managers know what to expect and plan for?

#### 3.11.1 Internal integration and its correlation to external integration

Both Rushton et al and Simchi-Levi advocate the integration evolution as going from functional to internal to external integration.\textsuperscript{386} Some of those advocating a relationship between internal and external integration are Chen et al who conclude that with true supply chain integration (already explained in a previous subchapter on integration as complete alignment of objectives and shared resources as well as shared benefits and risks), there is both upstream (supplier \(\rightarrow\)) and downstream (distributor \(\rightarrow\)) players and “internal integration provides the foundation for both.”\textsuperscript{387} Interestingly in another article published the same year, Chen et al explain that external integration (integration between a focal company and its external partners) would include backward (supplier) integration and forward integration (distributor) as well as customer/supplier integration. There is no

\begin{itemize}
  \item \textsuperscript{383} Lambert & Cooper (2000) p.76
  \item \textsuperscript{384} Fawcett & Magnan (2002) p.351
  \item \textsuperscript{385} Chen et al (Landry) (2009) p.28
  \item \textsuperscript{387} Chen et al (Landry) (2009) p.28
\end{itemize}
mentioning of internal integration as having any influence or prejudice on this state of integration. In fact, Chen et al state that one of these integrations [external or internal] can happen before the other or the focus can lie on either one: As such, there is no relationship or dependence on one or the other.

Koufteros et al have a differing view stating that internal integration can have an effect on external integration and vice versa. One can facilitate the other as knowledge about processes is accumulated within the firm. Nevertheless, in their study they found indications that “internal integration is an important enabler of external integration, that is, customer and supplier integration.” Koufteros et al conclude that “internal integration means an internal system which facilitates external integration.”

3.11.2 Defining internal integration

Chen et al noticed in their literature review that there is a “lack of a clear delineation of the concept [internal integration]”. Quoting Lawrence and Lorsch, Chen et al presents internal integration as being equal to collaboration among departments. Their literature review shows that in early Logistics/SCM literature, internal integration was understood as activities within the firm. In another article published by Chen et al, this view is consistent stating that internal integration happens within a firm. Internal integration consists of “traditional cross-functional management practices” according to Johnson and Filippini. The authors indicate that internal integration is used primarily when focus is on developing new products, i.e. NPD.

Cross-functional integration, CFI, is comprised of internal integration and inter-functional climate authors Hirunyawipada and Vahie find as a result of their study measuring the correlation between CFI and NPD. According to the authors, internal integration captures the

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388 Chen et al (2009) p.6
391 Koufteros et al (2005) p.121
393 Chen et al (Landry) (2009) p.27
394 Chen et al (Landry) (2009) p.28
395 Chen et al (Landry) (2009) p.28
396 Chen et al (2009) p.6
397 Johnson & Filippini (2009) p.16
398 Johnson & Filippini (2009) p.16
physical interactivities between functions present in CFI, whereas the norm that encourages the trust and relationship among different functions is captured by inter-functional climate. Johnson and Filippini also highlight the use of cross-functional teams as internal integration of departments.

On the other hand, Koufteros et al equals internal integration with concurrent engineering, CE, which means “early involvement of a cross-functional team in a process to plan product design process design, and manufacturing activities simultaneously. It has been operationalized to include cross-functional teams, concurrent work flows, and early involvement.” The gist would be the capture of the value of early information. Simchi-Levi asks what level of integration is needed within a company. Troy et al use a different approach saying that internal integration relates to cross-functional integration, “the degree of interaction, communication, information-sharing, or coordination across functions” On an entirely different note, Parker et al identify internal integration as organizational integration.

3.11.3 Internal integration and NDP

As seen by the just-mentioned study by Hirunyawipada and Vahie, internal integration is often linked to New Product Development (NPD). Pagell explores definitions and areas of study used in SCM by prominent authors depending on their adopted level of focus. Of those relating to the internal focus (within the firm), i.e. internal integration, it is usually looked at in terms of product development (PD) (authors cited on the page are Ettlie & Stoll 1990, Alder 1992, Syssman & Dean 1992, Wheelwright & Clark 1992, Gerwin & Barrowman 2002, Swan 2002), marketing in combination with other functions (manufacturing or procurement) (authors cited are Kahn & McDonough 1997, Ellinger et al 2000, Verma et al 2001, O’Leary-Kelly & Flores 2002), or then collaboration (cited Mintzberg 1996), or general supply chains (cited Narasimhan & Kim 2001). The clear dominance within internal integration is its application to product development and marketing. In terms of dominant

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399 Hirunyawipada & Vahie (2005) p.183
400 Johnson & Filippini (2009) p.15
401 Koufteros et al (2005) p.100
404 Parker et al (2008) p.72
wording in the definitions for SCM used the top three are integration, coordination and collaboration. According to Johnson and Filippini, the NPD functions are design, marketing, and production.\footnote{Johnson & Filippini (2009) p.16}

### 3.11.4 The impact of internal integration

Barratt stresses that there are not just gains in adopting internal integration: There could be a development of one large organizational silo.\footnote{Barratt (2004) p.33} In order to avoid a great silo, Barratt says stress should be applied to simultaneously link inner collaboration with external collaboration: “Internal integration must be aligned with the drivers and constraints of the rest of the supply chain.”\footnote{Barratt (2004) p.33} The predominantly mentioned positive impact of internal integration is the alignment of inner processes; other positive impacts have been scarcely mentioned.\footnote{As seen by the cited information by Chen et al, Fawcett and Magnan, Koskinen, Ayers, Simchi-Levi, Rushton} Nevertheless, Lambert and Cooper stress that a company’s success comes down to how successfully management can integrate the intricate network of business relationships in the company.\footnote{Lambert & Cooper (2000) p.65} But there is another side of the coin; O’Leary-Kelly and Flores stress that needed integration mechanisms in internal integration may give rise to costs that are not outweighed by the benefits of implementing them.\footnote{Parker et al (2008) p.79} Fully integrating may become too costly. Johnson and Filippini take it one step further, questioning the very impact of internal integration on time performance.\footnote{Johnson & Filippini (2009) p.17}

### 3.11.5 Internal integration in literature review

When talking about internal integration, it is usual to talk about supply-related functions that should be internally integrated, such as purchasing, manufacturing, and logistics. According to Barratt, there is also a need to include marketing and R&D activities (NPD).\footnote{Barratt (2004) p.33} According to Barratt, internal integration can be enabled through internal collaboration as collaboration can overcome functional myopia.\footnote{Barratt (2004) p.32} However, Lambert and Cooper report that improvement in efficiency of internal supply chain activities such as purchasing,
manufacturing, and logistic, has been sought by organizations for many years. Some authors would suggest that very few organizations have achieved internal integration of their activities. Barratt states:

“There are few if any organizations that have achieved complete internal integration, i.e. purchasing-manufacturing-logistics-marketing. Kahn and Mentzer classify such early forms of integration as predominantly based on interaction, in the sense that functional departments hold meetings and attempt to share more information.”

The collaboration efforts, such as common vision or shared resources, are said to be missing in such meetings. Bowersox et al are of similar opinion stating that there have been efforts to integrate internal functionality by many firms, but that there is much evidence to strongly indicate that there are significant gaps: “Managers often report more success in coordinating with customers than with their own manufacturing, logistical, and marketing operations. The capabilities that support internal integration are cross-functional unification, standardization, simplification, compliance, and structural adaptation.” Therefore, according to Bowersox et al, identification, quantification, and organizational learning of the capabilities that support internal integration have no significance.

A study on the use of CFI found across the world by Johnson and Filippini, showed that “American companies were more likely to use internal integration practices.” Rushton et al verify differing levels by stating that there has indeed been a slow move towards integration within some supply chains and overall there is only fairly limited integration within companies. Simultaneously Rushton et al states that many companies have moved on to functional integration, and some have even achieved an element of full internal integration. Internal processes are undefined however.

Nevertheless, a study by Fawcett and Magnan showed an indication of organizations being more comfortable with internal integration efforts than with external, inter-organizational

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415 Barratt (2004) p.31
416 Barratt (2004) p.31
419 Bowersox et al (2007) p.369
420 Johnson & Filippini (2009) p.15 nB! The study looked at CFI in an NPD context
forms of cooperation. In terms of integration adoption in the companies, 60% of the respondents felt they were doing cross-functional integration within the firm. On the other hand, Chen et al found in their study that it is easier for buyer/supplier integration and logistics managers/customer integration than either group to integrate cross-functionally. In contrast, the Halldorsson et al study uncovered that internal resistance during SCM implementation is more substantial as a barrier than outside/external resistance, and thus the authors suggest that there should first be a focus on internal integration, and then external integration.

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423 Fawcett & Magnan (2002) p.345
This chapter is structured to first introduce the survey answers and then present the interview material. This is to allow for indicative general perceptions before introducing in-depth subjective information.

The survey indications are provided by the ten answers collected from the population of 48 people identified and included in the current population. This gives an answering rate of 20.83%.

**4.1 Defining Internal integration**

Internal integration was mostly identified as the result of a focus on collaboration and coordination of activities within a firm (60%). But 20% identified its building blocks (collaboration and coordination) rather than its state, whereas 20% percent saw that the building blocks equal the state of internal integration. There were nonetheless further thoughts on what internal integration is. As stated by participant number 2:

"Internal integration is] “sharing relevant business information and supportive internal services within a firm in order to create more efficient operations (one information to many users, one service/capability -> many users)”

Participant number five had this to say in addition to agreeing that internal integration is a result of a focus on collaboration and coordination: “integral integration of a supply chain is about aligning logistics tasks within a company, by developing processes, organizational structures and performance measures. It is not the same as cross-functional integration that
is about aligning functions (product design, manufacturing, purchasing etc.) even though these two concepts are overlapping.”

4.2 Defining the boundaries of internal integration

For the second question, which was constructed to highlight how internal integration can be defined, there was equal support for three of the options: According to 30% of the participants, internal integration can be defined to fit all kinds of supply chains. The same percentage of participants finds that internal integration is supply chain specific so that with each new chain there is a new defined boundary. Again, the exact same number of participants answered that internal integration can in part be defined generally, and in part, specifically. This meant, as stated in the question, that there are general criteria for a state of internal integration, but also chain specific criteria. Interestingly, only one of the participants thinks internal integration only applies to specific functions in the firm. One participant chose not to answer.

4.3 Can internal integration be strategically planned?

All participants find that internal integration can be strategically planned. However, two participants also stress that internal integration does evolve over time as technology and practice within the firm improves. Participant number 6 put it in these terms: “it is true that it evolves over time, nevertheless it needs to be planned at strategic levels.”

4.4 Elements present in a state of internal integration

When constructing the questionnaire, all prominent elements and essence(s) highlighted by authors were included into the fourth question answer options together with some reconstructed similar elements and essence(s) to allow for differences and to indicate whether there was a degree of disagreement with the authors’ provided elements. In plainer terms; it was done to see if there was a concurrence with what participants knew and/or believe to be the case, and what the theories have to say.

Out of all the options, internal productivity flow production facility structure, focus on all internal processes, functional organization, limited external integration incorporated into the process, and functional procedures with cross-functional thinking were eliminated: there were no respondents that agreed to these.
Similarly, there was a low response for integrated organizational structure, pooled internal resources, and supply chain orientation being present in a state of internal integration.

On the other hand, internal leadership/power structure collaborating between functions together with internally shared risks and benefits, with an adoption of a single work culture and attitude, a focus on internal key business processes and simplicity in procedures and structures all had support of two participants (20%). The number of participants was one higher (30%) for CFI, a collaborative and coordinated frame of mind across all levels and functions and internal leadership/power structure that transcends all functions.

With the support of 40% of the participants, a state of internal integration contains management relationships across internal functions, cross-functional processes, and an understanding of internal processes throughout all levels and functions. This does correspond with having a leadership/power structure that transcends all functions.

Getting a stronger 50% favor the factor a collaborative and coordinated frame of mind across key levels and functions, indicate that there is a stronger trend towards key process focus rather than all processes focus. The elements that got 60% were shared internal IT systems (such as CPFR) and collaborative and coordinated activities. This indicates a CFI frame of mind, that there should be cross-functional orientation.

4.5 Comments on the survey

The answers provided in the survey will together with the interview material be scrutinized to find indications of scope of internal integration, essence of internal integration, and elements of internal integration. To clear the concept of element and essence; essence is intangible, e.g. behavior, whereas elements can be physically controlled by individuals within an organization. With examples from the survey; collaboration and coordination are said to be the “intangibles,” they are not physically controlled, but actually more of a behavioral pattern. To put it in more direct terms; mechanisms like IT system, procedure manuals, and office layout can generate collaboration and coordination, but collaboration and

427 This is the adopted wording in the structuring of the framework, and are defined and explained out of personal preference. Their naming per se do not matter, but aid to simplify the distinction between what actually happens, what is the seen motive, and through that identify the underlying, true, essence of the framework stages.
coordination cannot generate an IT system. Elements can create essence(s) but not the other way around.

What can further be seen from the survey is that there is indication of several factors being present in a state of internal integration: below they are stated in order of popularity to show which were most emphasized and to give a clear picture that can be analyzed:

1. At the top, with 7 respondents, are “integrated planning and control procedures” and “information exchange across functions”
2. Following, with 6 respondents, are “shared internal IT systems” and collaborated and coordinated activities”
3. Thereafter come, with 5 respondents, “collaborative and coordinated frame of mind across key levels and functions.”
4. Then, with 4 respondents, there is “management relationships across internal functions,” “cross-functional processes,” and “understanding of internal processes throughout all levels and functions”
5. Next, with 3 respondents, comes “cross-functional integration,” “a collaborative and coordinated frame of mind across all levels and functions,” and “internal leadership/power structure that transcends all functions.”
6. After that, with 2 respondents, there is “internal leadership/power structure collaborating between functions,” “internally shared risks and benefits,” “adoption of a single work culture and attitude,” “focus on internal key business processes,” and “simplicity in procedures and structures.”
7. Closing in near the bottom, with 1 respondent, are “integrated organizational structure,” “pooled resources internally,” and “supply chain orientation.”
8. At the bottom of the list, with no respondents, lies “internal productivity flow facility structure,” “focus on all internal processes,” “functional organization,” “limited external integration incorporated into the process,” and “functional procedures but cross-functional procedures.”

Please note that this list serves more to clarify the survey answers for the reader than as any form of analysis.
4.6 The interview material

The semi-structured interview had two questions which are both presented here. The material has not been divided by person but by answer, coded as either Professor A or Professor B. The questions were; “In your opinion, what is internal integration?” and “In your opinion, when has a company reached the state of internal integration?” Below is recorded what each of the professors answered.

4.6.1 What is internal integration?

Upon answering this question, Professor B explained:

“Since my teaching on SCM is very much concentrated on practical issues and information systems - the first thing to come my mind (sic) is ERP system. It’s all about integration. Company that is acting as a part of a supply chain have (sic) to use integrated information system to ensure integration of its business processes.”

Professor A, on the other hand, had more to say to the question, and started off by saying that integration falls under organization design literature; SCM literature then adopts the design concepts. Internal integration refers to the structure of the organization: how tasks are divided and coordinated. It is not about integration *mechanisms* like production planning and coordination systems, but more importantly about joint problem solving. If the task has already been well defined during the planning stage, then much of the integration problems can already have been solved. It depends on the inter-dependencies in the organization - if they are complex then there can be less relying on information systems and planning, but more reliance on joint problem solving.

Internal integration is both planned and organic: as an organization broadens with time, integration is planned/ rehearsed, but the concept must be imbedded into the organization structure; embedded into the organization’s DNA. If it is not it is back to square one with each new individual that joins the team. Structure, on the other hand, sticks with the organization through time.

But you always need people. There is always a question of what is the role of the individual and what is the role of the company – an analogy of which would be asking which is more
important: the front wheels of a car, or the back wheels. Asking which is more important signifies a misguided image: organizations are made up by people, who together turn their actions into processes and practices.

Nevertheless, when talking about internal integration one must define whether it is about integration as an outcome, or integration as activities (i.e. mechanisms, such as information systems, cross-functional integration, production and planning systems, ERP systems, etc). If it regards integration as what is achieved, then there is recommendation to talk to the people in the organization: Do the daily activities get done? If they need to talk to coworkers, does it go smoothly? If the answer is yes, then the organization is well integrated: It is when the individual people have the expertise of the entire organization available to them; then the organization is integrated.

When it comes to mechanisms there are both informal and formal ones at disposal, easiest ones being phone calls and emails.

Some integration problems are solved the first time they appear and others prevail. When business is normal there should be a fundamental capability in the organization to handle some types of integration problems. But say that it is a new situation, such as an extreme NPD project. This requires a whole new set of capabilities as it is a unique problem which needs to be addressed uniquely. It is when the organization has fundamental problems with the same problem over and over again that is it truly worrisome: this situation just turns into a real waste of resources. But even though there are mechanisms to solve integration problems adhering to normal activities, there can be residual problems with one-time projects.

4.6.2 When has a company reached the state of internal integration?

Professor A was of the opinion that a “company is never “fully integrated”. The level of integration will keep growing with help of new technology and better business processes, but I would say it will never totally ready. (sic)”

In addition, Professor A was of the opinion that a company is internally integrated when work gets done on time. Such as with NPD, there can be delays (stemming from communication failures or breakdowns). This is where cross-functional integration comes into play: There is one overall task (such as making a new product), and then there are many subtasks to make
the overall task happen. If the subtasks get done correctly and on time, then there is internal integration in the company.

Professor B, on the other hand, answered that a state of internal integration is reachable. Such a company can be referred to as a well-oiled machinery. If you look at it from a metrics standpoint, it is when the specifications are held during the NPD: There must be a link between functions in the company. If such links exist, then the organization is integrated.

Specifications are important when it comes to internal integration, talking about it in general is too difficult (diffuse). But if you have to look at it from a general point of view one could look at if departments cooperate properly when required. If departments do not cooperated properly then a series of follow-up questions are needed to pinpoint where the problem(s) lie. It can be anything from knowledge transfer problems to information processing problems. One has to look at when and where cooperation is needed and what mechanisms the organization has in place to achieve this, and how successful they are.

Most integration problems are solved at grass-root level; people in subtasks work in smaller teams, departments – very rarely does a top manager come to sort a problem out. Some integration problems and questions are not up to planning, but require other things. In an organization there can be over a thousand issues a day referring to integration. Managers must recognize whether these issues are of similar nature than those before, or if they are new ones. If they are different problems that before they will need a different approach than those that have already been dealt with before. In any case, “treating” integration problems is not holistic, it is like when you go to a doctor: the treatment you will get will be targeted. This is the same for internal integration. You target the problem.

Internal integration does not necessarily have to mean a process (e.g. waterfall process). If you think about NPD, there is a lot of uncertainty. You can try to think in terms of processes, and plan processes, but if it is a radical innovation, then a process is the wrong way to go. In such a case you need smart people engaging in problems-solving. With that you get flexible reactions, feedback and joint problem solving, which is better to ensure success.

It is important to realize that integration is an investment and is very costly. SCM literature and consultants tend to focus only on the benefits of integration, but sometimes the
problems require heavy duty mechanisms that are too costly. As such, there are situations where companies are better off not fully integrated as it costs more than they get out of it. This is a much known issue in organization design literature and practice. SCM is still struggling to understand the price tag.

Another thing is that one should remember that integration is just one of the two sides of a coin. The other side handles task partitioning. In reality, the question of task partitioning and integration are considered simultaneously, managers do not first decide upon task partitioning and only subsequently address integration, and they weigh the two simultaneously: “If we were to divide tasks like this, what would the integration challenge look like.” Task partitioning is oftentimes an iterative trial-and-error type process, not a one-time decision. Just two days ago, [Professor B] was talking to a CEO who was rethinking task partitioning in order to ease the integration challenge in his organization.

One key question by which top management create a way to divide tasks. Nevertheless, they should be careful not to divide the overall task into too many subtasks, as this makes integration over-difficult. Dividing the overall task in a smart way can take care of many following integration issues.

Most crucial is recognizing and identifying interdependencies between tasks: Dependencies should be placed in close proximity, such as in subunits, departments, or teams. This is seen in such departments as R&D, and sales and marketing. Image if the inefficiency if they were scattered! Having the same people doing the same kinds of tasks solves many integration issues. One way to work away from this is asking why organizational tasks are divided the way they are.
Chapter 5 – Analysis

This chapter is constructed in such a way, that the focus is put on answering the research questions through building the boundary framework step by step. Research questions 1 relates to part II of the framework and the remaining research questions relate to part IV of the framework.

5.1 Introduction to the analysis

The analysis is constructed in the following way: Focus lies on answering the research questions by building the boundary framework of internal integration. By constructing this framework the domain (boundaries) of internal integration is defined and hence its state. This is done by constructing the boundary in four stages, called states, starting with the base state, the state of SCM. The base is constituted by SCM as it is the most general core of internal integration. Internal integration is a specific form of SCM and must thus hold some of the same attributes as SCM. It is like looking at a personality: a personality is a specific form of all traits of human behavior. Beneath the individual pattern (here internal integration) is the core of human behavioral traits (here SCM). The analysis is thus constructed so that the boundary states narrow down from general SCM to SCM integration, to integration levels, and then finally to internal integration, just as the literature review. This is just to make is clearer to the reader how the framework fits together.

The four states are built on identifying three things: the scope of the state, the essence of the state, and the elements of the state. Recall that essences are intangibles, whereas elements can be physically controlled by individuals in the company. The construction of the base (or core), the SCM state, is done without referencing to the research questions. This is more of a general nature of any integration and thus expands further than the focus of this
thesis: But then, each of the research questions is answered in turn as the states are defined and narrowed down to internal integration.

5.2 Construction of the Base: the SCM State

To define internal integration one must first define its base, origin, i.e. to find the SCM state. This is done through the focus on the literature review. Easiest is to look at the scope of SCM, but concentrate it to a company and not to the whole supply chain. As stated in the thesis introduction, any internal SCM would function as a micro-scale of the overall supply chain SCM; meaning here thus that the words are adapted to a company.

Starting off with the Global Supply Chain Forum (GSCF) they define the scope of SCM as spanning key business processes which relate to providing products, services, and information, transcending functional silos within the company. They define these processes as customer relationship management, customer service management, demand management, order fulfillment, manufacturing flows management, procurement, product development and commercializing, and returns. Lambert and Cooper strengthen this view with their findings that managers only look at selected process links in their company. Spens also agrees saying SCM spans internal key processes such as order fulfillment.

Mentzer takes a slightly different approach by narrowing the SCM scope to encompassing traditional business functions, within a company, combining them with the tactics for each function. This is somewhat broader than CSCMP who narrow SCM down to all activities involved in sourcing and procurement, conversion and all logistics management activities.

As such, it is clear that the scope of the SCM base regards selected key processes and business functions within a firm and all activities related to the chosen functions or processes.

Knowing the scope one can now look at the prevalent essence of SCM; traits which invariably will also be present on a micro-scale, as supported among other things by Evans concept of the internal customer: That every department supplies to another department who are then as customers. Spens advocates that SCM has cross-functional processes, and Fawcett and Magnan agree with cross-functional process integration. Chandra and Grabis say SCM
contains entity relationships and management of the four different flows (product, service, cash and information) as well as aligned objectives, strategies and policies. Planning and management of activities is backed up by CSCMP (though they relate these two concepts to sourcing and procurement, etc.), but Mentzer and Halldórsson take a differing approach: SCM essence to Mentzer is coordination of functions, whereas Halldórsson call for coordination of activities.

All authors above concentrate on planning and management focus that facilitate transcendence (CF), and coordination, and thus, these are the two underlying essences of an SCM state: The focus of the essence is actually quite clear: relationships across departments mean *transcending* beyond units (be it departments or companies), means adopting the supply chain orientation view, seeing the whole chain (or company) rather than just your specific activities. The same is seen in handling all flows and objectives, strategies, and policies; they transcend the entire organization (or supply chain). Everybody is guided by the same operational and strategic rules and guidelines. What Halldórsson and the GSCF stress is planning that coordinate activities within the company/supply chain. *Coordination* also gets support from aligned handling of all flows, objectives, strategies, and policies.

Now that both scope and essence have been defined, it is time to account for the prominent elements of SCM, the general specifics, so to say: This category includes Lambert and Coopers management components; work structure, power and leadership structure, information flow facility structure, organizational structure, production flow facility structure, management methods, risk and reward sharing, and planning and control. If categorizing these in connection to the scope and essence of SCM, it is clear that the flow structures, planning and control as well as management methods offer the strongest links in terms of SCM essence. This gets support from Nabi and Luthria who stress management of activities.

But in terms of connection to (internal) integration, work structure (which shows the level of integration in the company and the performance of tasks and activities according to Lambert and Cooper) and power and leadership structure (which affects the direction of the supply chain, here influencing the direction within the company) are strongly linked. Nabi and
Luthria does stress the management of activities, as previously mentioned, which influence the concept of work structure.

Nevertheless, information sharing is the most well-documented management component according to Lambert and Cooper, and does hold strong significance to the performance and stability of a supply chain and a company and the integration of a company, perhaps giving information sharing an equally strong link to (internal) integration. On the other hand it is clear that organizational structure poses somewhat of a question mark in whether it is a prominent element in SCM or not when relating to integration: Lambert and Cooper say organizational structure shows how a company relates to other companies, but Nabi and Luthria stress organizational structure as a component of successful SCM. Though biased by professional background, Professor B was also very adamant in stating that organizational structure and design is the base for integration. Therefore it should perhaps be placed next to the other prominent elements, but not be considered among the front, strongest ones.

However it is clear that risk and reward sharing is not the strongest link in SCM elements to scope both more so to essence, integration and element: It should rather be the glue, the essence of the win-win approach that is vital in SCM. For it is the underlying “motive” to SCM partnership between functions in a company: working together and sharing what comes together. It is nevertheless a planned concept, sharing risks and rewards are not done haphazardly, but through the planned and coordinated collaboration of activities and procedures. As such this element also acts as an essence, and is accordingly placed in between the essence and the elements in the SCM state.

With this, the construction of the base of the boundary framework is complete and presented below:
5.3 Constructing level two: the SCI State

According to Chen et al (Landry) this state is of serious importance as it is a key component of SCM. This state is constructed through answering the first research questions: “What is meant by integration?”

Integration can regard either the whole supply chain or concern just one company according to Spens and Chen et al (Landry), but Gattorna and Walters say integration only happens between supply chain partners. The scope in Chen et al takes another approach by saying it spans the ownership of business processes and activities. However, Lambert and Cooper address the probable variation of critical and/or beneficial business processes, which would mean that the integration scope depends on the actual situation of the company and/or supply chain.

It seems this idea of varying degrees of integration within a company is quite widespread as both Troy et al, Simchi-Levi, and Ajmera and Cook also address it. Troy et al say integration
can be within and across a company, e.g. at team level and organizational level and advocates that the number of teams and business processes be kept simple to minimize the level of complexity. Simchi-Levi is on the same track but on a more similar side as Lambert and Cooper asking which level of integration is necessary in a company. Ajmera and Cook highlight that integration should take place on all three (operational, tactical, and strategic) levels in the organization.

So clearly integration spans from within parts of a company, or across the company, all the way to the whole chain, and does so at various levels within the company. This concept of “degrees” of integration (both span and level), must be accounted for in the SCI state part of the framework. It is done so by the dividing of the scope square and their relationship to one another is represented by a double arrow: Companies can integrate only key business processes on only two or three levels (though not sure how successful it would be), or it can for instance integrate all three levels across the whole company. The dividing of the scope square this signifies the two magnitudes of integration.

![Figure 10: The scope of SCI in the SCI state part of the framework, showing both degrees of integration.](image)

Now that the scope of integration has been defined, its essence and elements are still needed to be able to answer the research question “What is meant by integration?” And when it comes to the essence of SCI, many concepts are presented in the literature review. This could account for the equivocality of ‘real’ SCI, as there seems to be a lot of general concepts but no clear agreement or specifics: The analysis of the essence is thus easiest if it is adapted to the three identified building blocks of SCI in the literature review: collaboration, coordination and cooperation; organizational linkage and information sharing, and integration technology: IT systems.
Starting with collaboration, coordination and cooperation, there is Bowersox et al who say integration is a focus on continuous universal capabilities, understanding “why” to integrate. Fawcett and Magnan say integration has cross-functional teams which support coordination. Fawcett and Magnan also found in their study that SCI is equal to collaboration. Sohal says integration has cooperation, collaboration, trust and partnerships whereas Towill take the essence of integration further, describing it as “no borders” but working together as one unit. Bask and Juga are on the same track saying integration is collaborative working, to which Carter et al agree with their “willingness to collaborate” and trust. Lee and Whang say the essence of integration is coordination and collaboration, to which Spens also adds mutual responsiveness among functions and processes. Gattorna and Walters also stress integration as a shared way of working to make working together easier. Further support for coordination, collaboration and cooperation comes from Simatupang et al, who say integration holds tacit capability generation through collective learning.

So how prominent is each of the “three Cs”? Collaboration, Spekman’s highest level of working together, has support from five author teams, whereas coordination, the second highest level of working together, has support from four author teams. And actually, the only support for cooperation comes from one author team. Cooperation was said to be more of a “functional” level of working together, so it is logical that there is more focus and stress on collaboration and coordination when it comes to SCI (as SCI is transcending functions).

With that it is clear that one of the underlying essences of SCI is “working together” with a “team work frame of mind”. The authors all point at different forms of bringing people together as one united group (with or without subgroups), which facilitates easier coordination of activities.

The second essence of SCI is found when looking at the second identified building block organizational linkage and information sharing. Information sharing is advocated by Sohal as a concept and linkage by Chen et al (Landry). Spens and Gattorna and Walters, Ajmera and Cook also advocate linkage through integration of activities, for instance of research, design, production, marketing, or logistics. On the other hand, information sharing is also advocated by Simatupang et al (by collective learning), as long as it is relevant, accurate, and timely. Lee and Whang agree, stressing communication.
And that is the second essence right there; communication, which makes sense as you cannot work together completely unless you communicate with one another and understand what it is that you are going to accomplish together.

So finally, the third essence must be identified from the third identified building block: integration technology/IT systems. Both Ajmera and Cook and Lee and Whang stress that IT furthers SCI development. Ajmera and Cook say it does so by enhancing internal coordination and improves information sharing. On information sharing Barratt points out that information technology need to be too costly or complicated; emails are both cost- and time-efficient and easy to use. Chen et al are on similar wavelengths as they advocate simplicity and connectivity as the top two recommended technology attributes.

As such the third underlying essence stands quite clear: visibility. Enhancing and improving coordination and information sharing and doing it with means that are both easily accessible and easy to use by everyone in the company means focusing and improving on visibility throughout the company. That visibility can be achieved at a lower cost is of course a bonus. Visibility is the aid to working together as technology systems are a complement to coordination and collaboration. The essences are hence added to the SCI state part of the boundary framework, below:

<table>
<thead>
<tr>
<th>The scope of SCI</th>
<th>The scope of SCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranging from within the company to spanning across the whole supply chain</td>
<td>Ranging from one of the three levels (operational, tactical, strategic) to encompassing all three</td>
</tr>
</tbody>
</table>

The Essence of SCI
- Working together with a teamwork frame of mind (coordination and collaboration)
- Communication (information sharing and organizational linkage)
- Visibility (information technology: IT systems)

Figure 11: The SCI state scope and essence

Then it is just a matter of identifying the elements of SCI in order to have answered the first research question “What is meant by internal integration?”
As it turns out the elements of SCI are quite a few, which again shows how much is encompassed under SCI in literature (adding to the equivocality of SCM and SCI). Information sharing as an element (e.g. planning and control such as information procedures) is given by Alter, Ajmera and Cook, Bask and Juga, and Ayers (such as information and knowledge in forms of forecasts). Ayers also say elements of integration are those controlled in organizational linkages, i.e. means of communication such as EDI, meetings, mails and phone calls, and organizational structure, e.g. resources and work structure. Ajmera and Cook also mention pooling and sharing of resources, and Carter et al also emphasize the need for organizational structure to support SCI.

Continuing with the spirit of sharing things in SCI; Alter states the importance of sharing a common culture and standards while Ajmera and Cook advocate sharing of risks and rewards, and aligned objectives. Bask and Juga also stress the element of common systems, which concurs with Sohal’s stress on shared IT and technology.

<table>
<thead>
<tr>
<th>The scope of SCI</th>
<th>The scope of SCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranging from within the company to spanning across the whole supply chain</td>
<td>Ranging from one of the three levels (operational, tactical, strategic) to encompassing all three</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Essence of SCI</th>
<th>The Essence of SCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Working together with a teamwork frame of mind (coordination and collaboration)</td>
<td>✓ Communication (information sharing and organizational linkage)</td>
</tr>
<tr>
<td>✓ Visibility (information technology: IT systems)</td>
<td>✓ Visibility (information technology: IT systems)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elements of SCI</th>
<th>Examples of specifics of SCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common culture and standards</td>
<td>Mail system, EDI, Forecasting software</td>
</tr>
<tr>
<td>Shared risks and rewards</td>
<td></td>
</tr>
<tr>
<td>Aligned objectives</td>
<td></td>
</tr>
<tr>
<td>Pooled/shared resources</td>
<td></td>
</tr>
<tr>
<td>Common systems/IT/Technology</td>
<td></td>
</tr>
</tbody>
</table>

Figure 12a: The scope, essence, and elements of SCI

With that, the elements of SCI have been defined and the complete SCI state can be defined, shown in figure 12, below:
Figure 12b: The SCI state in the boundary framework of internal integration

**SCM Core**

- **Scope of SCM**
  - Selected key processes and business functions within a firm and all activities related to the chosen process/function

- **Essence of SCM**
  - TRANSCENDENCE and COORDINATION

- **Shared risks and rewards**

**Elements of SCM**

- Work structure, power and leadership structure, information flow, facility structure, organizational structure, production flow, facility structure, management methods, planning and control

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**SCM STATE**

**Antecedent**

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**The Magnitude of Integration**

- **The scope of SCI**
  - Ranging from within the company to spanning across the whole supply chain

- **The essence of SCI**
  - Working together with a teamwork frame of mind (coordination and collaboration)
  - Communication (information sharing and organizational linkage)
  - Visibility (information technology: IT systems)

- **Elements of SCI**
  - Common culture and standards
  - Shared risks and rewards
  - Aligned objectives
  - Pooled/shared resources
  - Common systems/IT/Technology

- **Examples of specifics of SCI**
  - Mail system, EDI, Forecasting software

---

**SCI State**
5.4 Constructing level three: the Integration Crossroad in SCM

It is at this point in the boundary framework that there is visible detachment from the general attributes of SCM and SCI, to narrowing the framework towards internal integration. The third level is known as the integration crossroad in SCM. This is where the different roads of integration a company can be at and plan for stands visible. The point of this level is to place internal integration within context to the integration stages and the way that they become attainable to the organization; from functional to overall chain integration. This is done by identifying the phases of integration and what they contain.

First there is baseline integration (Rushton et al), which is a phase that predates functional integration. The second integration phase is functional integration (Rushton et al), also known as enterprise integration (Poirier), or disconnected processes (SCOR by GSCF). This phase encompasses keeping within functional borders. The third phase is known as internal integration (Rushton et al), corporate excellence (Poirier), or internal integration (SCOR by GSCF). This phase is characterized by integration beyond functional borders into more of a functional organization. This means starting to use mechanisms like CPFR and integrating key functional areas like sales, manufacturing and logistics. After this comes external integration (Rushton et al), Partner Collaboration (Poirier), or Intra-Company integration (SCOR by GSCF). This step involves collaborating with first tier customers and suppliers to little or great extent. The fifth level is external integration (Rushton et al), value-chain collaboration (Poirier), or Multi-enterprise integration (SCOR by GSCF). This stage means taking on more supply chain partners into the collaboration. The final phase is known as external integration (Rushton et al) or Full network connectivity level (Poirier). Here companies are integrated through all tiers. Knowing the different stages and mechanisms, places internal integration as level three in the evolution of SCM integration:
In figure 14, below, the center of the internal integration boundary framework is starting to take shape. These are the three parts that are present and part of internal integration, but not the concept of internal integration itself. In the figure, the core is made up by SCM, seen by the light green dotted line that defines the boundaries of SCM. Then one step away from the core lays the SCI state, which encompasses the features of the SCM state (which is signified by the neon green dotted line that encompasses both SCM and SCI), as well as has specific features of its own. However part three, the integrated crossroad of SCM, is not based on any essence or elements, but defines the levels, and in a way scope, of internal integration. By defining the level and scope the position of internal integration on the development ladder is defined, and by looking at what level of integration a company seems to correspond with, also shows the development stage of integration in the company, as well as the supply chain.
5.5 Constructing level four: the State of Internal Integration

In the literature review, internal integration is frequently and strongly linked to NPD. As such, the literature strongly suggests that internal integration is a focus on key functions, activities, or processes within the firm (which concurs with the basic SCM essence). Koufteros et al says internal integration concerns product design and manufacturing.
Johnson and Filippini state that IT regards the NPD functions, i.e. design, marketing, and production. Pagell’s review concurs, but also includes a prominent focus on marketing. Bowersox et al say internal integration concerns manufacturing, logistics, and marketing functions, whereas Barratt says internal integration is complete only when purchasing, manufacturing, logistics, marketing, and R&D activities are linked. Lambert and Cooper agree with the purchasing, logistics, and manufacturing functions and Koufteros et al call for the linking of product design and manufacturing.

As such, it is quite strongly indicated that internal integration primarily means a focus on key functions and activities in a company. The key functions range from logistics functions (purchasing, manufacturing, and logistics) to also including marketing and R&D.

Speaking of magnitude of linkages in the company, this brings up the strongly indicated essence of internal integration; the usual link to dealing with NPD, namely, cross-functionality. Hirunyawipada and Vahie limit cross-functionality in internal integration to physical interactivities between functions. Johnson and Filippini say internal integration is integration of departments (design, marketing and production), whereas Koufteros et al say internal integration is concurrent engineering that aims at early involvement. And not surprisingly, Troy et al say internal integration is CFI, but that is depends on the degree of interaction, communication, information sharing, or coordination across functions. This would mean that internal integration can be “isotopes” with the same basic building blocks but at various degrees: Either one of these four could, at the right degree, constitute internal integration.

When this is analyzed it is clear that the underlying essence of cross-functionality means further cross-departmental interaction, a stronger team-work approach than that in a functionally integrated company. This correlated with the other attributes of internal integration, Fawcett and Magnan calling it a more seamless process: Chen et al (Landry), calls for collaboration among departments, and Koufteros et al call internal integration an internal system. This would mean that internal integration essence is collaboration and coordination to such a degree that functional borders become fuzzy. This would correspond with Barratt’s claim that internal collaboration counteracts functional myopia, and also
corresponds to the top two words associated with internal integration is Pagell’s literature review; coordination and collaboration.

That having been said, the elements of internal integration in literature are rather few but clear as all are pertaining to the concept of cross-functionality: Johnson and Filippini call for traditional cross-functional management practices and cross-functional teams. Koufteros et al also call for cross-functional teams in addition to concurrent workflows. Bowersox et al, are a bit more specific; cross-functional unification, standardization, simplification, compliance, and structural adaptation.

And with this the shape of internal integration is starting to take shape even more, with the literature scope, essence, and elements shown in figure 15, below, it is now time to adjust it with the empirical findings.

<table>
<thead>
<tr>
<th>The literary scope of internal integration</th>
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</thead>
<tbody>
<tr>
<td>Key activities (from purchasing, manufacturing, logistics to also including marketing and R&amp;D)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The literary essence of internal integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teamwork based on coordination and collaboration to such a degree that processes within and across the company is enabled to such a degree that functional borders become ‘fuzzy’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The literary elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional management practices, cross-functional teams, concurrent workflows, unification, standardization, simplification, compliance, and structural adaptation</td>
</tr>
</tbody>
</table>

Figure 15: Defining internal integration based on the literature review

5.5.1 Adjusting the internal integration concept with empirical data

Looking for the scope of internal integration in the empirical material, it is at first glance very similar to that found in the literature review. Nevertheless, only one participant was of the
opinion that internal integration only concerns specific functions in the company. Instead there was equal support for internal integration being supply chain specific, meaning that the scope would be defined by each company’s specific situation, that it can be defined in general terms to fit all supply chains, and that some parts are supply chain specific, other not.

Contrary to obvious clarity perhaps, all three would be correct: general definitions stem from the scope and essence(s) of internal integration (and SCM/SCI), such as collaboration and information sharing (or the underlying essence of working together and communicating). This is in such general terms that it would, in fact, apply to any form of integration. But, also taking into account that which would make internal integration of any company specific, namely the adaption of the elements, then all of a sudden you would not be able to take one company’s adapted version of internal integration, and apply it to another: One supply chain’s technology, procedures and information system, which is business environment specific, would not work for another company nor supply chain.

The fact then, that near all participants relate internal integration to more than specific functions, means that there is support for relating activities: Participant number two and five provide support for this as participant number two addresses the need for supportive services, and participant number five says it is not about functions but processes. In short, it is not about departments, but about departments becoming “invisible,” and everyone working as part of a process rather than in a department. This coincides with the extent of teamwork defined from the literature review, and specifically by the notion of seamless processes (Fawcett and Magnan) and an internal system (Koufteros et al). The scope is thus revised as such: Key activities (from purchasing, manufacturing, and logistics, to also including marketing and R&D as well as all related supportive services and activities.

When it then comes to the empirical essence of internal integration information exchange across functions is still emphasized with seven votes out of ten, as well as a collaborative and coordinated frame of mind. This is not equaled with a single work culture or attitude, but does concur with Professor B’s addressing of joint problem solving. Though there is some support for cross-functional processes sharing risks and rewards nevertheless does not seem as strongly emphasized on a company level in a supply chain. It would suggest that sharing
risks and rewards is not as strong a motivator for intracompany collaboration as intercompany collaboration.

It would seem then, that in internal integration there is a strong essence of smoothness. This is backed up by Professor B’s address of joint problem solving. If the daily activities get done, and on time, then there is integration within the company. In addition to smoothness, another essence is the prevailing teamwork spirit, emphasized though collaboration and coordination of activities together with joint problem solving. This seems to come with a stronger intensity in internal integration than in SCM or SCI: Information exchange that facilitates joint problem solving are given much more weight, like Professor B explained: If one person in the company has the expertise of the entire company available to him/her, then there is integration. To be able to have smoothness (be able to talk to coworkers without difficulties no matter what it regards), you would also have to have a higher degree of sharing; i.e. more openness and more availability within the company. Openness and availability also concurs with the SCM/SCI essences of communication and visibility: with a more unrestricted flow of information there can be better understanding and visibility across the company.

Hence, the essence of internal integration is adjusted to: teamwork based on such a degree of open and available collaboration and coordination that the processes within and across the company is enabled to such a degree that functional border become fuzzy.

The empirical elements are then all that is needed before the boundary framework can be completed. They are quite similar for some reason, but show strong linkage to the essence of internal integration: Integrated planning and control procedures were highest on the survey list, which is strongly supported by Professor B’s emphasis on management’s task partitioning and reevaluations. Information exchange at functions though internal IT systems concurs with the total essence of internal integration, and are also advocated by Professor A and B, both also mentioning ERP systems. The trend in elements is supportive of information exchange, i.e. communication, and visibility to technology systems.

And with that the boundary framework of internal integration can be completed, as seen in figure 16, below:
As can be seen in figure 16, internal integration is made up by more than just its own state. It also holds characteristics of SCM and SCI, which combined with its unique integration state, gives it a boundary that not only reflects the levels and degrees of possible integration, but highlights the difficulty of equivocality in supply chain management today. Looking at this indicative boundary framework internal integration becomes somewhat untangled from the concept of collaboration and coordination.
This leaves only one research question unanswered; what makes internal integration different from internal collaboration and internal coordination? Internal collaboration and internal coordination are not exclusive to the integration concept. They are, nevertheless, a crucial essence of internal integration. They are building blocks without which the state of internal integration could not exist. The difference between internal collaboration and internal coordination and internal integration is that internal integration stems from SCM and SCI, and is dependent on the two former to exist to any degree or at any level in the organization. It is like Barratt stated; that internal collaboration can enable internal integration. In conclusion, internal integration differs from internal collaboration and internal coordination as it is a concept that sets conditions on collaboration and coordination, in form of degree and levels as well as in part of the company, or across the entire organization.
Chapter 6: Conclusion

This chapter presents the overall findings and thoughts on further research.

Internal integration holds a modest presence on the competitive market today, but by looking at how it is built up there can perhaps be a better understanding of what internal integration means. This thesis has made such an attempt by structuring an indicative boundary framework for internal integration, thereby defining it. Internal integration does not necessarily have to span an entire company. In short, internal integration spans from linking purchasing, manufacturing and logistics to including marketing and R&D too, as well as including the supportive services and activities that are connected with the chosen functions. This linkage is done through teamwork that is facilitated by such a degree of open and available collaboration and coordination that department borders become unclear or indistinct. In more practical terms, elements like cross-functional teams and an internal IT system help create visibility through communication throughout the processes, functions, or company. Internal integration cannot be defined without also acknowledging supply chain management practices and integration characteristics, but offers a way for a company to work together more intensely with a higher degree of coordination and collaboration than before.

And that is what makes internal integration different from internal collaboration and internal coordination: internal integration puts requirements on collaboration and coordination. But more research is needed to conclude more carefully where the requirements lie and to what degree, and what other factors might play a role in defining internal integration. For internal integration is part of the future, a future we can either meet with functional cooperation, or teamwork.

In conclusion, what can be said on internal integration is that it is far more complex than what was initially thought at the start of this research. Instead of finding a rather straightforward answer in literature and practice, internal integration had to be sought out,
equivocality or contradiction ever present in new pieces of information: This characteristic of SCM needs to change; it might be difficult to find more rigid definitions, or it might prove easier as time goes along. But even though equivocality can mean an available variety in addressing SCM and supply chain integration, it also offers a world of confusion.
Appendix A: The survey questions

1. Internal integration is ...
   ___a result of a focus on collaboration and coordination of activities within a firm
   ___ built through collaborative and cooperative alignment
   ___ not related to collaboration and/or coordination activities
   ___is interchangeable (equal) with collaboration and coordination activities
   ___something else, namely:

2. Internal integration...
   ___ can be defined to fit all kinds of supply chains
   ___ is supply chain specific (with each new chain there is a new defined internal integration)
   ___ is restricted to specific functions in the firm
   ___ can in part be defined generally, and in part specifically (there are general criteria for a state of
      internal integration, but also supply chain specific criteria)
   ___ can also be defined as:

3. Can internal integration be strategically planned?
   ___yes ___no, it evolves over time as technology and practice within the firm improves
4. Which of the following are present when a company has reached internal integration? (Internal = within the whole firm)

- management relationships across internal functions
- cross-functional integration
- integrated planning and control procedures
- integrated organizational structure
- internal productivity flow production facility structure
- a collaborative and coordinated frame of mind across all levels and functions
- a collaborative and coordinated frame of mind across key levels and functions
- internal leadership/power structure that transcends all functions
- internal leadership/power structure collaborating between functions
- internally shared risks and benefits
- adoption of a single work culture and attitude
- shared internal IT system (such as CPFR)
- pooled resources internally
- information exchange across functions
- cross-functional processes
- collaborative and coordinated activities
- focus on internal key business processes
- focus on all internal processes
- functional organization
- limited external integration incorporated into the processes
- supply chain orientation
- simplicity in procedures and structured
- understanding of internal processes throughout all levels and functions
- functional procedures but cross-functional thinking
APPENDIX B: SURVEY RESPONSES 1-10 – Tabulated Table

indicative statistics: (respondents coded by number in order of answer submission)

80% Male (2,3,4,5,7,8,9,10)  20% Female (1,6)

In my job I teach SCM and supply chain integration issues

20% no, I teach Logistics only (9,6)  20% I teach SCM only (10,2)
60% I teach both Logistics and SCM (8,7,5,4,3,1)

My theoretical knowledge of SCM integration

10% is limited (1)  70% is neither limited nor extensive (6,5,4,3,2,9,10)  20% is extensive (8,7)

My theoretical knowledge of internal integration...

20% is limited (4,3)  50% is neither limited nor extensive (6,5,2,9,10)
30% is extensive (8,7,1)

My work experience with companies on integration issues...

40% is limited (<1 year) (10,4,3,1)  40% I have some experience (1-4 years) (8,6,2,9)
20% is extensive (>4 years) (7,5)
1. Internal integration is ...

60%, a result of a focus on collaboration and coordination of activities within a firm (9,8,7,6,5,1)

20%, built through collaborative and cooperative alignment (5,3)

20%, not related to collaboration and/or coordination activities

20%, is interchangeable (equal) with collaboration and coordination activities (4,10)

something else, namely:

2: Sharing relevant business information and supportive internal services within a firm in order to create more efficient operations (one information to many users, one service/capability -> many users)

5: Integral integration of a supply chain is about aligning logistics tasks within a company, by developing processes, organizational structures and performance measures. It is not the same as cross-functional integration that is about aligning functions (product design, manufacturing, purchasing etc.) even though these two concepts are overlapping.

2. Internal integration...

30%, can be defined to fit all kinds of supply chains (9,8,1)

30%, is supply chain specific (with each new chain there is a new defined internal integration) (10,4,3)

10%, is restricted to specific functions in the firm (3)

30%, can in part be defined generally, and in part specifically (there are general criteria for a state of internal integration, but also supply chain specific criteria) (7,6,2)

something else, namely:

3. Can internal integration be strategically planned?

“100%” yes (10,9,8,7,6,5,4,3,2,1)

“20%” no, it evolves over time as technology and practice within the firm improves (7)

6: it is true that it evolves over time, nevertheless it needs to be planned at strategic levels
4. Which of the following are present when a company has reached internal integration?

(Internal = within the whole firm) (ANSWERS SHOW BY HOW MANY AND BY WHOM CHOSEN)

4. management relationships across internal functions (9,8,6,3)

3. cross-functional integration (7,4,1)

7. integrated planning and control procedures (9,8,6,5,4,2,1)

1. integrated organizational structure (1)

0. internal productivity flow production facility structure

3. a collaborative and coordinated frame of mind across all levels and functions (10,9,1)

5. a collaborative and coordinated frame of mind across key levels and functions (8,7,6,4,2)

3. internal leadership/power structure that transcends all functions (9,6,1)

2. internal leadership/power structure collaborating between functions (6,3)

2. internally shared risks and benefits (3,1)

2. adoption of a single work culture and attitude (9,1)

6. shared internal IT system (such as CPFR) (9,6,5,4,2,1)

1. pooled resources internally (1)

7. information exchange across functions (9,7,6,5,3,2,1)

4. cross-functional processes (7,6,5,4)

6. collaborative and coordinated activities (8,7,6,3,2,1)

2. focus on internal key business processes (6,5)

0. focus on all internal processes

0. functional organization

0. limited external integration incorporated into the processes

1. supply chain orientation (6)

2. simplicity in procedures and structured (9,6)

4. understanding of internal processes throughout all levels and functions (9,5,2,1)
0_functional procedures but cross-functional thinking
Books


**ARTICLES**


112


**DISSERTATIONS**
