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Radical Supply Chain Innovation

Developing a Generic and Actionable Framework

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Preface

This report was produced as the final building block of two students' M.Sc. degree in Industrial engineering and management at Lund University (MTT820 Degree Project in Engineering Logistics). The most important stakeholder and benefactor was Implement Consulting Group, which generously provided input from the industry on where knowledge was lacking and sought-after as well as guiding expertise on supply chain management issues and innovation methods. The authors would like to extend a large measure of gratitude towards Implement Consulting Group for all the time and resources it has provided. Further the authors would like to thank the companies that have participated in the case studies and the validation of the model. Another word of thanks goes to Andreas Norrman, supervisor from the Department of Industrial Management and Logistics of Lund University.

Abstract

Title Radical Supply Chain Innovation
Developing a Generic and Actionable Framework

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Background The topics of supply chain management and innovation have, disjointedly, been in the spotlight for some time. However, the combined topic, supply chain innovation, have only recently begun to attract academic interest, and there is a vast gap between literature and industry demand. Most of the existing research on supply chain innovation concerns incremental innovation; little research exists on radical innovations in supply chains and how to work with it. The authors aim to fill this gap, thus the focus of this study is radical supply chain innovation.

Purpose The purpose of this study is to generate a generic and actionable model of how to achieve radical supply chain innovation.

Methodology To fulfil the purpose, a constructive approach with an embedded multiple case study was used.

Conclusions A generic and actionable model for radical supply chain innovation was created. Five types of radical supply chain innovation were identified, with consecutive outputs. The outputs were found to be competitive advantage of two kinds: added value and cost benefits. In order to achieve radical supply chain innovation, a mix of targeted innovation tools, antecedents to radical supply chain innovation, and generic innovation tools are recommended.

Keywords Supply chain innovation, Radical innovation, Supply chain management

Contents

Glossary

- 3PL - Third Party Logistics
- BI - Business Intelligence
- CODP - Customer Order Decoupling Point
- CPFR - Collaborative Planning, Forecasting and Replenishment
- EDI - Electronic Data Interface
- ERP - Enterprise Resource Planning
- ESCA - Ericsson Supply Chain Academy
- FMCG - Fast Moving Consumer Goods
- ICG - Implement Consulting Group
- IP - Intellectual Property
- KPI - Key Performance Indicator
- MECE - Mutually Exclusive, Collectively Exhaustive
- MIT - Merge-in-Transit
- MO - Market Orientation
- MRP - Material Requirement Planning
- MVP - Minimum Viable Product
- R&D - Research and Development
- ROI - Return on Investment
- RSCI - Radical Supply Chain Innovation
- SC - Supply Chain
- SCI - Supply Chain Innovation
- SCM - Supply Chain Management
- SL - Stockholms Lokaltrafik
- VMI - Vendor Managed Inventory

1 Introduction

The thesis aims at developing a generic and actionable model of how to achieve radical supply chain innovation (RSCI). In this chapter, the background of the study is discussed, key concepts defined, purpose and focus of the study described, followed by a presentation of the structure of the report.

1.1 The Background of Studying Supply Chain Innovation

Practitioners of Supply Chain Management (SCM) have started to express interest in the topic of Supply Chain Innovation (SCI) (Arlbjørn et al. 2011; Storer et al. 2011; Soosay et al. 2008). Notably, the Council of Supply Chain Management Professionals have given out the Supply Chain Innovation Award™since 2005, with the purpose of recognising and sharing success stories of SCI, some of which are displayed in Table 1. With inspiration from prominent actors applying a more flexible and innovative take on their SCM practices, such as Apple, IKEA, Wal-Mart, Carrefour, Zara, HP, Benetton, and Amazon, companies are aspiring to follow in their footsteps and the academic world is gaining interest. However, the knowledge gap is still considerable. Here follows the academic and industrial background to the study, followed by an introduction to key concepts.

Table 1: Winners of the Supply Chain Innovation Award™

Year	Winning Company	Description
2015	Liquor Control Board of Ontario (LCBO)	In-house development of automated palletisation, which was new to the industry and, according to LCBO, new to the world. Resulted in considerable savings.
2014	Flextronics	Innovative, state-of-the-art centre that offers one-stop total supply chain solutions, helping startups and established firms to bring new products to market in days rather than months
2013	Staples, Inc. and Packsize International	Jointly developed packaging technology and processes, allowing for packages customised for the size of the products
2012	Werner Company, Transplace, Convermex, Mohawk Industries/Dal-Tile, and Whirlpool Corp.	Initiated collaborative efforts that consolidated low- and high-density freight onto the same vehicle to reduce demand for transportation resources and costs

1.1.1 Academic Background

Academically, the topic of SCM has been on the rise since the 1990s (K. C. Tan 2001) with more and more research being done. The globalization and the increasing competition put pressure on organisations not only to compete as individual firms, but to compete with

the entire supply chain (Arlbjørn et al. 2011). Following the definition of SCM as stated by The Global Supply Chain Forum (Lambert et al. 1998, p. 1), the work on SCM is well developed:

> *"Supply Chain Management is 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."*

Arlbjørn et al. (2011) agree in stating that a common denominator of SCM frameworks and models is their inter-organisational nature. Supply chains refer to a network of companies working across tiers to produce a product or service of superior value to the end-customer. The research so far has been focused on defining the transition from one organisational form to another (functional to process-oriented), and effectively streamlining the processes involved. The processes of SCM was conceptualised by Croxton et al. (2001) into eight categories with specific activities in each process:

1. Customer relationship management
2. Customer service management
3. Demand management
4. Order fulfillment
5. Manufacturing flow management
6. Supplier relationship management
7. Product development management
8. Returns management

However, the research on how to transform those processes or combine them in novel ways to improve the business is still missing. According to Arlbjørn et al. (2011), the knowledge and systematic research regarding supply chain innovation is underdeveloped. There is extensive literature on SCM and Innovation as separate topics, however, there are few studies made on the combined topic: supply chain innovation (Arlbjørn et al. 2011). On the one hand, Flint et al. (2005) and Grawe (2009) are terrific examples of ventures into exploring SCI, but the methods are not explicit yet and the focus is often more on incremental innovation rather than radical.

The models conceptualising the different parts of innovation do have the common denominator that some sub-parts are more thoroughly researched than others. The process of product development has been carved into methods to follow, but the process of supply chain innovation is uncharted (Arlbjørn et al. 2011).

1.1.2 Industrial Background

The awareness of the inter-linkages between SCM and the business model is on the rise and with it the demand for methods of how to organise the business and tools to achieve SCI. The need for methods were canalised to the authors through Implement Consulting Group

(ICG), a Nordic consultancy firm based in Copenhagen, which instigated this very study. It was the wish of ICG to explore how successful companies approach RSCI, and what choices need to be made along the way. The ultimate goal for ICG would be to be able to use a RSCI model in a client engagement, helping the client to develop novel practices in their supply chain. The focus of the study, and where ICG deems knowledge to be lacking is displayed in Figure 1; the process of RSCI. ICG wanted to understand what inputs one should focus on in order to achieve RSCI, i.e. tools, analyses and antecedents. Another important question was how different RSCI produce different outputs, i.e. how does RSCI affect competitive advantage?

Figure 1: The process of RSCI described as a process consisting of the input, the RSCI produced, and its consecutive output.

1.1.3 Defining Key Concepts

Innovation has been in the academic spotlight for a long time, and has undergone paradigm shifts as well as more incremental developments. The topic can be traced back to one of the pioneers, Schumpeter (e.g. (Schumpeter 1934)), who argued that innovation was the introduction of new products and production methods, the opening of new markets, the discovery of new raw materials, and the implementation of new organisations. Since then, influential thinkers have introduced concepts such as service innovation, which has expanded into thinking about innovation in every part of the business. Different models have been proposed in order to categorise innovation in a way that is mutually exclusive, collectively exhaustive (MECE), for example *The 12 Different Ways for Companies to Innovate* (Sawhney et al. 2006), where Supply Chain (SC) is one of the dimensions in which a business can innovate. However, several of the other dimensions can fall into SCI or at least overlap with the SC dimensions. Another model more compatible with the definition used in this study is the one of Keeley et al. (2013), *Ten Types of Innovation*, which is displayed in Figure 2. The model encourages using a mix of the types to shape a unique offering.

Innovation can be defined as the process of finding, making and commercialising something new (Tidd et al. 2001). The object can be either be a product, process, or service (Narasimhan et al. 2013). Freeman (1974) makes the distinction from an invention in the commercialization of the innovation.

The distinction between radical and incremental innovation is, according to Narasimhan et al. (2013), that radical innovation introduces discontinuities to operational, marketing or technological processes for the entire industry, while incremental innovations introduce

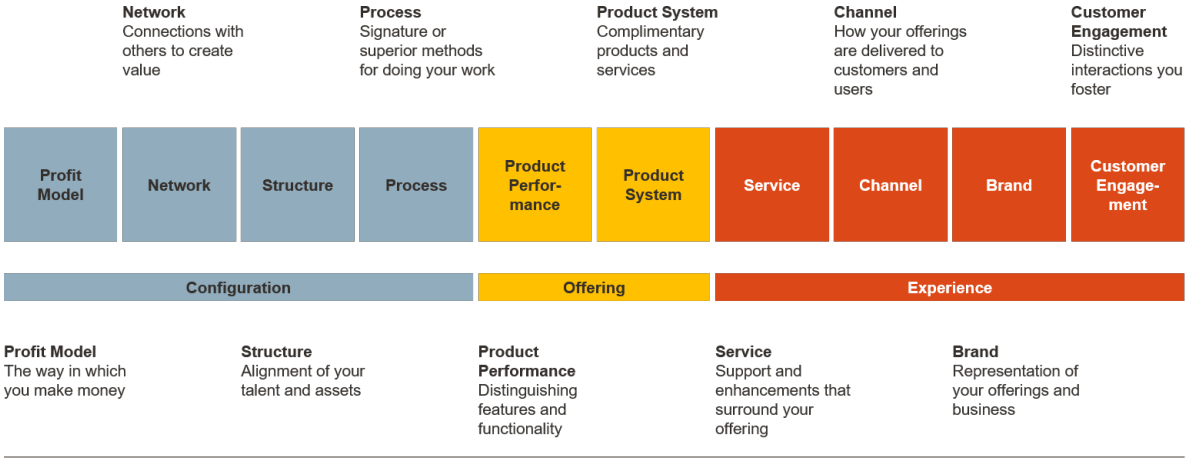

Figure 2: 10 types of innovation as described by Keeley et al. (2013)

discontinuities to operational, marketing or technological processes at the firm level. In the words of the authors: radical innovations are new to the industry, and create enough competitive advantage to break the continuity of practices. The discontinuity is particularly well suited for market conditions where competition cannot be challenged through existing practices and price competition (Storer et al. 2011).

With some background on innovation in mind, radical and incremental, the application for SCM can be done. Arlbjørn et al. (2011, p. 8) defined SCI as:

> *"a change (incremental or radical) within the supply chain network, supply chain technology, or supply chain processes (or combinations of these) that can take place in a company function, within a company, in an industry or in a supply chain in order to enhance new value creation for the stakeholder"*

Value creation for the stakeholder could potentially mean many types of value for many different stakeholders. For the scope of this report, the authors consider the end goal of RSCI to be competitive advantage. The requirement for competitive advantage big enough to create a discontinuity demands considerable impact from the innovation. Competitive advantage has been subject of discussion for a long time since Porter (1985) introduced the concept. From the initial idea that competitive advantages can be long lasting, or sustainable, the accelerating rate of which companies innovate has compressed the time frames. Recently, many thinkers consider competitive advantage to be something you may enjoy for a brief period of time, something transient (i.a. McGrath (2013)), but a competitive advantage nonetheless. As Munksgaard et al. (2014, p. 60) put it:

> *"in order to fully understand the conceptualization of SCI, it is germane that future research investigate the degree of innovation novelty and further explore cases of radical SCI"*

The authors conclude that there is a need for a conceptualisation of RSCI, in academia

as well as industry, which will be the focus of this study. Thereby the authors definition of RSCI follows the definition of SCI above by Arlbjørn et al. (2011), with incremental innovation as well as product innovations excluded:

A radical change within the supply chain network, supply chain technology, or supply chain processes that takes place in a company, company function, or supply chain to enhance new value creation for the stakeholder. Product innovations excluded.

Tying back to the ultimate use of the knowledge in client engagements (described in section 1.1.2), one must further ask what the input into the model will be. Or rather, how can companies actively work in order to enhance their chances of success in RSCI? What analyses need to be made in order to focus resources in the most productive way?

1.2 Purpose of Study

The purpose of this study is to generate a generic and actionable model of how to achieve radical supply chain innovation.

1.3 Problem

The authors identify the following research questions:

RQ_1 What different types of RSCIs can be identified?
RQ_2 How does RSCI affect competitive advantage?
RQ_3 How are different inputs used to produce RSCI?
RQ_4 What analyses should be made in order to choose the right inputs?

1.4 Focus and Delimitations

The literature on SCI innovation has been mostly unsegmented in terms of the degree of innovation so far, with some focusing on incremental innovation. The authors intend to focus on innovation with a high degree of novelty to the industry and impact on competitive advantage - radical SCI. Figure 3 displays the dimensions of innovation and highlights the focus of this thesis. Chapman et al. (2003) put innovations on two-dimensional scale of product versus process innovation and extent of change (from incremental to transformational). The extreme transformational innovation, which are so far-reaching that they change the very function of society, is out of scope as well as the architectural. Architectural innovations are, according to Chapman et al. (2003), novel reconfigurations of existing system components, which may have some overlap as long as it fulfils other prerequisites stated. Product innovations as such will be excluded, as long as they are not supporting products to help the supply chain of the primary product (for example inventing containers

to more effectively deliver the product to the customer). However, service may well change with a radical SCI, which is why it is included in Figure 3.

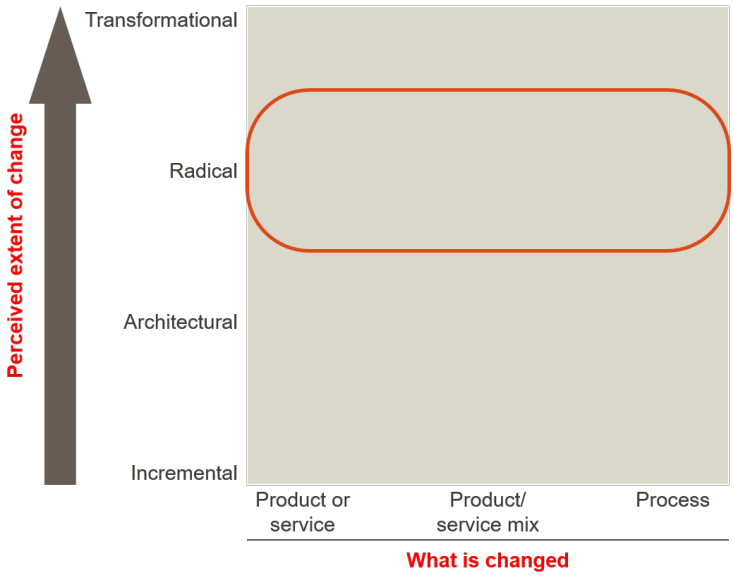

Figure 3: Types of innovation as adapted by Chapman et al. (2003) from Tidd et al. (2001)

The actionability-focus in the purpose of the study excludes environmental factors, which are considered to be given. The authors recognise that companies may choose, or even try to affect their environments. However, the time frame and wide scope of the study make the limitation sensible.

The subject of SCI is considerably wide, as are the adjacent areas of SCM and innovation. Therefore SCI-specific literature will be covered thoroughly, whereas SCM and innovation will be covered selectively. The limitation will materialise in this report as innovation tools to achieve SCI are suggested, since there are most likely many other innovation methods and strategic tools that would aid in SCI.

1.5 Structure of the Report

The report starts off with a review of relevant literature, which feed into the initial model of RSCI. Thereafter, a methodology is set up in order to collect and analyze empirics that can be compared to the theory. An empirical data chapter follows, displaying the results of the empirical approach which are analysed in the subsequent analysis chapter. Conclusions are collected in the final chapter, after which appendices are found. The frame of reference-, empirics and analysis chapters are structured after the elements RSCI, Input and Output.

2 Frame of Reference

The recent studies done on SCI can, somewhat crudely, be categorised into three main groups: input to SCI; types of SCI; and output of SCI. The authors adopt this view for RSCI, as presented in Figure 4. The input consists of targeted RSCI tools, RSCI antecedents, and generic innovation tools. RSCI is divided into types, which are finally connected to outputs. The output of the RSCI is competitive advantage, which comes in two forms: value adding and cost benefits. The three groups of input, RSCI, and output make up the structure for the literature review, which attempts to link the concepts together in response to the demand for actionability and applicability in client engagements. In order to introduce the reader to what RSCI is, the chapter begins with the RSCI section, which is helpful to have in mind when reading the consecutive input and output sections. Finally, the literature review is conceptualised into a model visualising the linkages between the three parts.

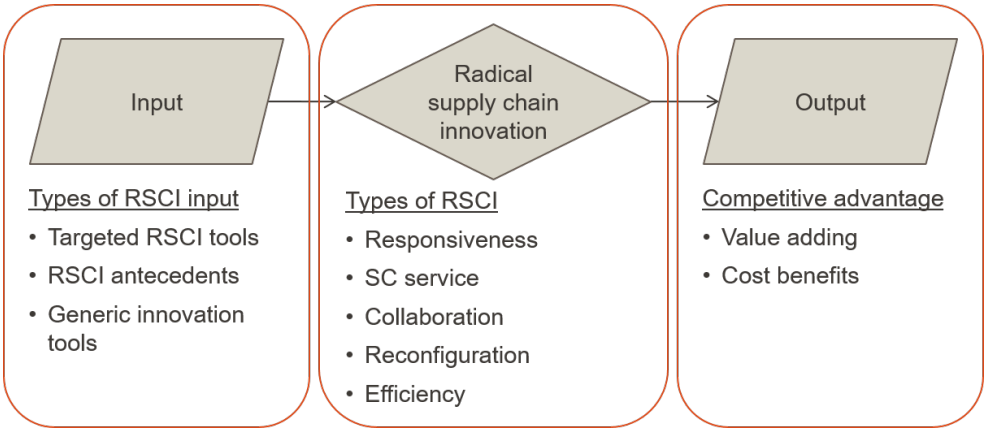

Figure 4: The three parts of RSCI broken down into their sub-components. The input to the process is where actions are taken that produce RSCI; which is broken down in five different types. The consecutive output of RSCI, competitive advantage, is divided into value adding outputs and cost beneficial outputs.

2.1 Radical Supply Chain Innovation

The previous work on SCI has predominantly focused on incremental SCI. For example, Arlbjørn et al. (2011) propose a framework categorising SCI innovation within three categories: (1) Supply chain business processes, (2) supply chain technology and (3) supply chain network structures. The focus is on the content as opposed to process, and thus seeks to answer the question of what SCI is, or what was changed. In this section the authors aim to similarly structure RSCI but, with the purpose of making the model actionable, focus on process and how innovations may be initiated and implemented. Therefore, only elements of SCI that have proven to be potentially radical and exemplified with generalisable managerial decisions will be dealt with here. In other words, in order to target RSCI

effort towards outcome, the structure will be such that the question of what was achieved can be answered. The result should be an actionable model of RSCI, albeit probably not exhaustive.

The outcome of SCI, competitive advantage, described in section 2.5, is considered the high level goal of the organisation, and the following types of RSCI to achieve it: (1) responsiveness, (2) SC service, (3) collaboration, (4) reconfiguration, and (5) efficiency. This structure is inspired by the dynamic capabilities defined by Storer et al. (2011), including SC agility, SC reconfiguration and SC collaboration, where responsiveness is adopted from SC agility. In order to make the categorisation comprehensive, efficiency and SC service are added (inspired by i.a. Arlbjørn et al. (2011)).

The concept of dynamic capabilities were constructed as a categorisation of ways to achieve competitive advantage. Since that is considered the very goal of RSCI, the categorisation is fit for different types of RSCIs as well. The concept of dynamic capabilities and the connection to competitive advantage is described by Menon (2008, p. 29):

> *"Dynamic capabilities were proposed to be the source of competitive advantage. Eisenhardt et al. (2000) extended the thought by stating that competitive advantage lay in the use of dynamic capabilities sooner, more astutely and fortuitously than the competition. They are a necessary but not sufficient condition for competitive advantage."*

If one accepts that these dynamic capabilities are indeed an input to achieve competitive advantage, then the categories coincide with RSCI categories. An advantage is also that the previous research of SCI can often be translated into these categories. A summary of previous categorising work can be viewed in Table 2, where the topics they touch upon are mapped. The categories should be viewed as a complement to the division of for example Arlbjørn et al. (2011), with an attempt on more actionability because of the connection to competitive advantage. The different types of RSCI is further described in the following sections.

Table 2: Types of RSCI

Article	Responsiveness	SC service	Collaboration	Reconfiguration	Efficiency
Nasr et al. (2015)			X		
Gligor (2014)	X				
Keeley et al. (2013)		X			
Arlbjørn et al. (2011)		X			X
Storer et al. (2011)					
Menon (2008)			X		
Soosay et al. (2008)			X		
Srai et al. (2008)				X	
C.-T. Lin et al. (2006)	X				
Min et al. (2005)			X		
Bello et al. (2004)					X
Slone (2004)			X		
Christopher et al. (2001)	X				
Crowston (1997)			X		
Fisher (1997)	X				X

2.1.1 Responsiveness

A responsive supply chain is one that effectively handles market mediation. In other words, a responsive supply chain can meet fluctuating customer demand and preferences. Apart from the apparent value to customers in having their products supplied in a perfect way, a view of alternative costs can also be applied; when demand exceeds supply, lost sales make up a cost; when supply exceeds demand, inventory abundance and mark-downs make up a cost. Responsiveness can reduce those cost, and can be a great competitive advantage in the right business situations (Fisher 1997). Increased responsiveness may be achieved through several different means, for example by reducing lead times, reducing inventory levels in the value chain and thereby cycle time, and also by improved feedback loops and information flow. Moreover, other tactics to increase responsiveness are postponement of differentiation, modularization and to relocate customer order decoupling points. C.-T. Lin et al. (2006) pointed to the enhancement of responsiveness through streamlined operations between companies. A closely related concept is that of agility. One of the most cited definitions (Gligor 2014) is offered by Christopher et al. (2001, p. 38) who define agility as *"the ability of an organisation to respond rapidly to changes in demand, both in terms of volume and variety."* Furthermore, Gligor (2014) points out that a characteristic of agility is the ability to cope with unexpected challenges and to turn changes into opportunities.

In this report, the term responsiveness is used, which may include aspects of agility even though the two may arguably be separated.

2.1.2 Supply Chain Service

Keeley et al. (2013) define service innovation as comprising the additional support and enhancements you provide around your core offering. In union with the definition of RSCI presented in section 1, radical service SCI becomes service innovation, powered by the SC and targeting a need that is very important to the customer. Arlbjørn et al. (2011) also identified *customer service management* as a business process relevant for SCI. An example of SC service innovation would be Hilti, that went from selling their power tools to maintaining a fleet of tools available for lease for the customers. Hilti thus went from selling a power tool to guaranteeing the use and functionality of a modern power tool to a fixed monthly price (Hilti 2016).

2.1.3 Collaboration

Collaboration has been referred to as the driving source for effective SCM (Min et al. 2005), but may also be a source of radical innovations. Collaboration can be described as working together, having a culture of sharing or a partnering relationship between partners in the network (Min et al. 2005). Further, inter-organisational collaboration may refer to firms that agree to mutually achieve goals, share information, invest in common resources, and to jointly make decisions and solve problems. A supply chain strategy is required concerning integration, cooperation and collaboration. This in turn require aligned objectives and incentives, open communication, and sharing of resources, rewards and risks. Collaboration in a SC enable more efficient operations and effective coordination of activities (Soosay et al. 2008).

Innovation through collaboration in supply chains may result in various benefits of innovation such as increased quality, lower costs, more timely delivery, efficient operations and effective coordination of activities. An interesting case is when Whirlpool managed to leverage SC collaboration in order to improve their business. Through information sharing with their retail customers they managed to cut forecasting errors in half (Slone 2004), which can be interpreted as a way to use collaboration as a means to achieving cost benefits and value to the customer through lower stock-outs.

More strategic ways to collaborate are also included, such as integration and strategic coordination. Menon (2008, p. 27) described the two as follows:

> *"While integration specifies the organising principles by which individual input is integrated, coordinating, according to Crowston (1997), is to manage dependencies among resources and tasks to create new ways of performing a set of activities. Coordination has been extensively discussed by Crowston who*

describes it as the ability to manage dependencies among resources; task-task dependency, task-resource dependency and resource dependency. The primary activities involved in coordination are task assignment, resource sharing, and managing dependencies."

However, it should be noted that collaboration in a supply chain relationships may include considerable risks. Information sharing in supply chains may lead to leakage of strategic information to competitors. Technology or key personnel may be stolen, or firms may defect or not fulfill promises. Moreover, collaboration lead to increased dependency between the entities in the SC which result in increased barriers to change (Nasr et al. 2015).

2.1.4 Reconfiguration

Srai et al. (2008) explored the area of SC design, configuration and reconfiguration to develop a definition. Among other findings, two characteristics of *network configuration* were identified: (1) tier structure, shape and location (including key information/material flows); (2) principal unit operations and their internal manufacturing processes. The term *reconfiguration*, was found to include structural change and step-change improvement programmes; change in business scope (mergers and acquisitions, disposals, geographical change); change of product scope; change of infrastructure (new IT systems, service providers) (Srai et al. 2008). Excluding change of product scope and focusing on the first two factors, the authors subscribe to this view. As a clarification, the authors include changes like vertical SC integration, outsourcing, cutting a step of the chain, moving the chain closer to the end user, and similar actions in the term reconfiguration, as long as other criteria in the RSCI definition are fulfilled (described in chapter 1).

There are many examples of companies restructuring their SC in new manners in order to create competitive advantage. Examples of these changes are Netflix and Mathem. Netflix radically changed how movies were rented in the late 1990s, by removing the final step of the SC: the brick-and-mortar shop. Mathem disturbed the Fast Moving Consumer Goods (FMCG) retailing by taking the shopping online. Even though some of these cases were actually new at the time and *configured* their supply chains in novel ways as opposed to *reconfigured*, the authors of this paper consider them to have reconfigured compared to the industries they operate within.

2.1.5 Efficiency

Although most of the other types of RSCI can contribute to cutting costs and making the SC more efficient, the authors identify efficiency as a separate type. Examples here would be IKEA's introduction of flat packaging in order to minimise warehousing and transportation costs, or the emerging industry of automatic retailing, cutting out the costs of personnel. Bello et al. (2004, p. 57-58) viewed supply chain innovations as drivers of

efficiency in themselves, which may fit well with the classic view of SCM as a cost-driver more than a value adding activity:

> *"Supply chain innovations combine developments in information and related technologies with new logistic and marketing procedures to improve operational efficiency and enhance service effectiveness. Innovations include ECR (efficient consumer response), CR (continuous replenishment), automated ordering utilizing scanner data, and many other technology-enhanced processes and procedures in the out-bound supply chain. Importantly, these innovations consist of allocating new investments and activity sets to channel participants to maximize joint profit by reducing costs through greater operational efficiency and by increasing revenue through greater service effectiveness."*

Arlbjørn et al. (2011) listed examples of technology SCI of which several would fall in the efficiency category (i.a. bar coding; radio frequency identification; pick-by-voice technology; electronic data interchange; and e-auctions).

2.2 Targeted Radical Supply Chain Innovation Tools

In order to achieve the type of RSCI a company aspires for, it is important to identify what tools to use. This section attempts to collect literature on tools for RSCI that can be connected to one or more specific type of RSCI described in section 2.1. The distinction from the RSCI antecedents described in section 2.3 and innovation methods in section 2.4 is in the possibility to target a type of RSCI (i.e. the antecedents and innovation methods can work towards any type of RSCI). The data on targeted tools is collected from three types of sources: (1) scientific literature that describes a causal relationship or correlation between a tool and a type of innovation, (2) case descriptions that clearly states that a tool was used in the innovation process of a RSCI type, and (3) cases where a type of innovation could be identified, and an explicit tool for analysis exists in scientific or managerial literature. A summary of the sources used for targeted RSCI tools is displayed in Table 3, with the connected types of RSCI mapped. The numbers represent which targeted tool is considered, listed below:

1. Postponement and modularisation
2. Leverage the sharing economy
3. Information use
4. Customer convenience
5. Offering extension
6. Selling uptime
7. Strategic collaboration
8. Tactical collaboration
9. Operational collaboration
10. Insourcing and outsourcing

11. Node redesign
12. Channel innovation
13. Process redesign
14. Complexity reduction
15. Information technology

Table 3: Connections between primary sources used for targeted tools, and to which type of RSCI they correspond.

Article	Responsiveness	SC Service	Collaboration	Reconfiguration	Efficiency
Lee et al. (1997)	1				
Olhager (2010)	1				
Waller et al. (2000)	1				
Eckhardt et al. (2015)	2				
Kotlik et al. (2015)	3				
Lambert et al. (2000)	3				
Sawhney et al. (2004)		4,5			
Keeley et al. (2013)		6			
Stevens (1989)			7,8,9		
Christopher (2013)			7		
Narayanan et al. (2004)			7		
Slone (2004)			8		
Soosay et al. (2008)			8		
Yücesan (2007)			9		
Pratap (2014)				10	
Slepniov et al. (2013)				11	
Pedersen et al. (2012)				11	
Jackson (2010)				12	
Mendelson (2000)				12	
Hammer (2007)					13
Davenport et al. (1994)					13
Leeuw et al. (2013)					14
Hoole (2005)					14
Kotlik et al. (2015)					15
Keeley et al. (2013)					15

Here follows a more in-depth description of the tools considered, in the following order:

- Responsiveness tools
- SC service tools
- Collaboration tools
- Reconfiguration tools
- Efficiency tools

2.2.1 Responsiveness Tools

Three targeted ways to achieve RSCI through responsiveness have been identified. The concepts of postponement and modularisation, leveraging the shared economy, and information use are elaborated upon below.

Postponement and Modularisation
A common problem companies are facing is the inability to meet customer demands for a wide product portfolio combined with short lead times. One way to improve the ability to meet fluctuating demand is the use of postponement and to move Customer Order Decoupling Points (CODP) downstream in the value chain. CODP is defined as the point in the value chain where the product is linked to a specific customer order. There are several manufacturing situations available that affects the CODP, the basic choices being make-to-stock, assemble-to-order, make-to-order, and engineer-to-order. The CODP divide the material flow, whereas upstream the manufacturing is forecast-driven, while the material flow downstream the CODP is customer order driven. In most cases, the CODP is the point were product specifications gets frozen and the last point at which inventory is held (Olhager 2010). Postponement refers to delaying the tasks differentiating the product, thus keeping the products standardised for as long as possible. This effective mass customisation rests upon three main building blocks: (1) a product needs to consist of independent modules that can be assembled into different final products, (2) manufacturing processes need to consist of independent modules that can be moved easily in the SC, (3) the supply network needs to fulfil the two criteria of (a) supplying customisation centres with basic products cost-effectively and (b) responsively and quickly delivering finished goods to customers (Lee et al. 1997).

A modular product design enables the flexibility sought after in three ways. First, it enables the standardisation of sub-components and thus postponement of assembly. Second, modules can be manufactured separately and in parallel, shortening lead-times. Third, the independent production improves SC visibility, allowing for more precise diagnoses of problems (Lee et al. 1997).

Hewlett-Packard - Radical Cost Reduction through Postponement
One terrific example is Hewlett-Packard (HP) and their postponement strategy used for the power supply of their printers. The power supplies were country-specific, as were the manuals, and so the addition of those elements were done in the regional distribution centres instead of in the factories. That enabled the factories to produce a standard product, and for lateral transshipment of products in case of discrepancies in regional demand. HP cut total manufacturing, shipping and inventory costs by 25% that way (Lee et al. 1997).

Smart Automobile's Cluster for Reduced Cycle Times
Smart car created a production cluster in Germany, called *Smartville*, where all their suppliers are located within the same area. Each supplier produce partly pre-fabricated

modules straight to the assembly line. In some cases, the suppliers assemble the modules to the line themselves in other cases it is made by Daimler. By having this structure with the production cluster it minimizes the transport and logistic cost. In addition to the proximity to suppliers, there is a high focus on just-in-time, flexibility and minimum delivery time. Extraordinary short lead times are generated and the smart cars can be assembled in only a few hours (Daimler 2008).

Benetton's Postponement of Dying
Benetton used an innovative postponement strategy to increase their responsiveness. In Benetton's product portfolio there are various designs and each design is offered in a great range of colors. The demand for each color is unpredictable and fluctuate due to trends, seasonality and customer preferences. Before Benetton introduced the postponement strategy, there were always too many garments in colours customers did not want, whereas popular colours were always sold out. Traditionally in the textile industry, the yarn is first dyed and than knitted into garments. To improve forecasts and better respond to customer preferences, a postponement strategy was adopted. In this case, Benetton first knitted garments using bleached yarn and postponed dying until later in the value chain. This strategy allowed Benetton to be extremely responsive and adapt to changes in customer demand for different colours fast (Waller et al. 2000).

Leverage the Sharing Economy
The sharing economy has gained a lot of interest the last few years and created a lot of buzz. However, the concept is highly interesting from a responsiveness perspective; the core of sharing economy is about access. When entities (people or companies) share the same resources in a form mediated by the market, it should be viewed as an economic exchange more than sharing. Customers are after service and cost benefits, more than the concept of sharing with each other. Two factors should be noted about the sharing economy. First, convenience at a lower price are the keys to competitive advantage in the sharing economy. Second, customers will not form a brand identity in the sharing economy as they would otherwise, branding and community building efforts may prove futile (Eckhardt et al. 2015). Seeing how service and price are fundamental for customers, how does responsiveness come into the picture? The sharing economy provides excellent scalability, illustrated by Amazon Flex's radical move into the shared delivery.

Amazon Flex's Shared Deliveries
Amazon launched its Flex service in 2015, recruiting private persons for deliveries in urban areas starting in Seattle. The concept enables fast deliveries (one or two hours are options) and provides excellent responsiveness through scalability upwards and downwards; when demand is high, more drivers can be recruited with only variable costs, the opposite is true for low demand (Yerak 2015). As Amazon spokeswoman Kelly Cheeseman expressed it (Yerak 2015):

> *"Amazon Flex will allow us to ramp quickly to meet customer demand, which*

is super helpful in a business like Prime Now where we see interesting peaks in volume (...) It could also be helpful during the holiday season, or during sales like Prime Day, where we experience sharp peaks in delivery volumes."

Information Use

Information use as a tool for responsiveness refers to an enhanced use of the data that can be collected in the SC and should be separated from information technology (a tool for efficiency described in section 2.2.5). The concept is sometimes described as *big data*.

Big data and advanced analysis tools for leveraging the information have the potential to bring a great many benefits other than responsiveness, such as reduced inventory or lower costs. However, responsiveness and agility are areas of high potential. Data processing and analysis may allow for companies to improve demand forecasts, discover new demand patterns, and enable new services. Responsiveness to machinery service may also be enhanced by more accurate, even real-time, forecasts of service needs. Using information on for example weather forecasts, competitive behaviour or pricing positions will enable companies to determine what influences demand and quickly adapt to contextual factors. In order to work with big data, companies need to (1) connect the SC from end to end, (2) reward data consistency, (3) build cross-functional data transparency, and (4) invest in the right capabilities. Connecting the SC from end to end provides the data to analyse, investments in technology, such as RFID, may be necessary. Rewarding data consistency is a prerequisite that needs to be raised on managers' agenda. Through conveying the impact of consistency and rewarding it, big data analysis can be done. Cross-functional transparency is required to respond to changes rapidly. Functional silos and protection of sensitive data must be fought. Collect personnel from silos to discuss for example production reliability, adherence to schedules, and breakdowns (Kotlik et al. 2015). Information use between entities in the value chain, such as use of point-of-sales data and key customer data, is an effective way to reduce demand uncertainty and provide efficient flows (Lambert et al. 2000). Investing in the right capabilities means to build an internal and external competence base towards the strategic goals for data handling (Kotlik et al. 2015).

Zara utilizing Sales Data

A commonly used example for a responsive SC strategy is Zara, for which responsiveness to the market is more important than costs. It is known for delivering new products to the market fast and in small batches. A key to getting new garments, fitting customer demands, into the store as fast as possible is the use of sales data; the store managers feed data of what customers like and dislike directly to the designers, which gives Zara very quick feedback on current trends. If a popular style or garment sells out, Zara can get new garments into the store while the trend is still peaking. To support decreased lead-times, a significant amount of Zara's production (including sourcing, cutting and sewing) is kept in-house and is located near the design headquarters in Spain. The near-shoring results in higher labour costs but drastically shorter turnaround time (Lu 2014).

2.2.2 SC Service Tools

Sawhney et al. (2004) identified two axes along which to classify service innovation: (1) type of growth, and (2) focus of growth. The type of growth can be either (a) adding new activities or (b) reconfiguring existing activities. Adding new activities refers to an offering extension with activities that support the customer in satisfying their needs (more on needs in section 2.4.1). Reconfiguring the offering is about customer convenience, in other words to shift activities that the customer would otherwise do to the company. The focus of growth can either be (a) on the primary activity chain for the customer or (b) on an adjacent activity chain. An example illustrating the difference: visiting a car dealership would be a primary activity of a car ownership chain, whereas finding an insurance is on an adjacent chain (Sawhney et al. 2004).

For the purpose of describing RSCI, the authors make the division along type of growth: customer convenience and offering extension, with the addition of selling uptime - a special case of one or both of the others resulting in a very different business model.

Customer Convenience
One motivation to make the customer journey more convenient, or reduce the customers' burdens, is the simple fact that the company can perform the business processes more effectively or efficiently than customers. Another that the aggregated customer demand for those processes creates economies of scale that can be passed on to customers. A third that knowledge and best practices can be applied from the industry. An example is Gadue's Dry Cleaning of Burlington, which stores customers' clothes during the off-season, making it convenient for customers with economies of scale for the company (Sawhney et al. 2004).

Offering Extension
Before extending the offer, managers need to map customer activities throughout the product interaction until the basic need is fulfilled. By focusing on the customer needs, problems and activities, value adding services may be found. Extending the offer before or after the sale, or augmenting the offer with a network or updates are suggestions. Managers should also consider what other activities or customer journeys are intertwined with the use of the primary product. Possibly, synergies can be gained through venturing into neighbouring businesses (Sawhney et al. 2004).

Amazon Prime Now's One-Hour Delivery
Amazon's core product could arguably be the products they sell in their e-retailing business. However, with their loyalty programme Amazon Prime, they add extra services in order to strengthen the value offering and increase retention. One service they add is free two hour delivery in certain larger cities, and even a one hour delivery option for a fee. The one hour delivery option is powered by the Amazon Flex business, using private persons

for delivery (Yerak 2015). A competitor could deliver the same core product, but Amazon has strengthened the offering with a very speedy service for urgent shopping.

Selling Uptime
The concept of selling uptime is elaborated through the following examples.

GE Aviation's Supply Chain Driven Service Innovation
GE Aviation enhanced its core products, aircraft engines, by including risk sharing, predictive analysis, product bundling, and guarantees in their offering called *OnPoint*. Instead of selling the product alone, GE Aviation started selling uptime, which captures the need for reliability and low risk for the customer. From the customers point of view, there is no need to worry about maintenance or unexpected costs, GE Aviation measures and models the performance of its engines in order to forecast service needs. In the same integrated way, technology upgrades are bundled into the service, making it even easier for the customer. In order to back their business model of selling uptime, response service teams are available at all times (Keeley et al. 2013).

Rolls-Royce's TotalCare Program
Much like GE Aviation, Rolls-Royce has a programme for selling uptime on their aircraft engines, *TotalCare*, in which the customers pay a fee per flight hour instead of per engine. Aligning customers interests with ones own has proven successful for Rolls-Royce, who managed to reach a very high level of penetration for the programme. With the *TotalCare* programme, it proved very hard for independent service providers to gain any business in serving Rolls-Royce motors (Derber 2013).

2.2.3 Collaboration Tools

Montoya-Torres et al. (2014) studied the literature on SC collaboration and mapped the previous literature after what it covered. The focus was dyadic collaborations, which differs somewhat from the approach of this study but the classification applies; collaborations can be divided according to decision level. Three decision levels are identified: strategic, tactical and operational, each one differing on the decision time frame. The goals of the types of collaborations are mapped in Table 4.

Strategic
With strategic collaboration, a collaboration with the longest time horizon is considered. Stevens (1989) defined strategic activities such that feed directly into the companies' value propositions, affect facilities and their locations, or affects organisational structure and alignment. The following examples illustrate the definition.

Table 4: Classification of collaborations according to the decision-making level. Adapted from Montoya-Torres et al. (2014) and Stevens (1989).

Strategic	**Tactical**	**Operational**
Value proposition shaping	Goal setting	Shipment and delivery integration
Facility location	Choosing tools for goal realisation	Controlling and measuring
Organisation structuring and alignment	Outsourcing	Order replenishment
	Joint planning	

Incentive Alignment
One effective way to improve supply chain performance is by aligning incentives between entities in the SC. Aligned incentives help reveal hidden actions and develops trust between organisations. One way to align incentives is to re-write contracts to bring hidden actions to the surface. The performance can be improved by creating contracts that rewards and penalizes based on outcome (Narayanan et al. 2004). Companies often underestimate the power of redesigning contracts, according to Narayanan et al. (2004), small changes in incentives can transform supply chains, fast and effectively.

Blockbuster's Incentive Alignment through New Contracts
In the 1990s, movie studios in the US found that frequent stock-outs in movie rental stores, such as Blockbuster, was a huge problem. The stock-outs resulted in reduced sales for movie studios, lost income for video rentals and dissatisfaction for consumers. The root-cause of the problem was a badly designed contract with misaligned incentives for the studios and retailers. The studio's price of each videotape was high and the income that the retailer received from each rental was low. The studios wanted to sell more tapes, but the retailers wanted to keep low inventory levels to make it possible with many rentals of each tape. To solve the problem, a contact with shared revenues of rentals was developed. This entailed that the retailers bought the tapes for a lowers price, and in addition, the retailers gave a share of the revenue from each rental to the movie studios. The new contracts reduced the stock-outs and resulted in profit growth for both the retailers and studios (Narayanan et al. 2004).

Smart's Cluster Facility Location
Ever since the start in 1998, Smart (a Daimler subsidiary) used a strategy for co-location with suppliers. Suppliers were rather few, with 10 suppliers making up 85% of cost of goods and 23 in total. At the single site factory complex, a main production line was placed in the centre, with seven first-tier suppliers' productions feeding directly into it. Those contractors were often involved in development right from concept stages of cars, and received larger modules to deliver than traditional in the automotive industry (for example entire doors, cockpits, power trains, or electronics). Apart from the fact that the setup helped beat the previous record in assembly time of cars, it also blurred the lines between companies (for examples in terms of employees) (Christopher 2013).

Tactical
The tactical perspective is a way of achieving the strategy set. Breaking the overall goals into sub-parts and providing them to the organisation's parts are tactical components (Stevens 1989).

Joint Investment in tools for Goal Realisation
In order to reach the goals that the strategy has been broken down into, shared tools for reaching that goal can be helpful. Soosay et al. (2008) found that supplies and customers rather often make joint investments in for example technology or capital investment. Through joint investment in technology, improved communication and coordination of processes may be achieved. Examples of possible technology investment to improve supply chain collaboration are Electronic Data Interface (EDI) for more efficient communication or implementation of an Enterprise Resource Planning (ERP) system that can be used by several partners in the network.

Joint Planning
Suppliers and customers may perform joint planning which is beneficiary for improved handling of marketing and inventory management. Collaboration can be regarding sales forecast, planning of new product launch and to determine appropriate inventory levels. Joint planning with suppliers may be performed through collaborative Material Requirement Planning (MRP) (Soosay et al. 2008). Partners in a SC should identify collective Key Performance Indicators (KPIs) that can be used to evaluate the performance and identify improvement opportunities (Soosay et al. 2008).

The outcome of joint planning may be more efficient sales forecast due to higher accuracy of data, effective product development and launch, increased efficiency of inventory management and better performance measurement. Collaborative planning also leads to improved ability to match supply and demand (Soosay et al. 2008).

Whirlpool's Joint Forecasting
The case of Whirlpool's turnaround project through Collaborative Planning, Forecasting and Replenishment (CPFR) makes up an interesting example of executing a major innovation project involving several parties in the supply chain. Through the eyes of the project leader, who also keeps the steps on a generic level, a multi-step model is presented involving (1) understanding customer needs, (2) identifying trade partners' priorities, (3) benchmarking the competition and (4) building for the future (Slone 2004). Similar to classic innovation models, Slone (2004) starts with identifying the needs of the customers. In this case, the need identification was done by a consulting firm. From the resulting report, the project leader could identify the real needs of the customers, which was more about reliability than speed. In the second step, a segmentation according to needs was done, with 27 different parameters measuring performance. The third step, benchmarking, entailed measuring what it would take to beat the competition on each of the 27 measures, resulting in an expected cost for being world class. The factors where the most effect could be gotten out of the least money were identified and targeted. The fourth step was a robustness analysis, making sure that proposed solutions would work with probable future

scenarios.

Operational
The operational perspective concerns the efficient operation of the SC, in terms of detailed systems and procedures. Typically, measuring the SC performance happens here (Stevens 1989) and collaboration are of a more shallow kind such as joint shipments and delivery, or order replenishment.

Controlling and Measuring
To assure the success of collaborative efforts, the performance must be properly monitored and measured (Min et al. 2005). The SCOR reference model, developed by the Supply Chain Council, is a cross-functional framework that enables users to measure, improve and communicate supply chain management practices. The SCOR model is a management tool, spanning from the supplier's supplier to the customer's customer. One of the strengths of the SCOR model is that it provide a standard format for communication (Huan et al. 2004).

Barilla's Vendor Managed Inventory
Barilla implemented Vendor Managed Inventory (VMI), starting in Italy, but not without facing the difficulties of collaboration. In the fragmented retail industry of Italy, Barilla tried to replace the traditional replenishment orders from customers with the sharing of sales data. From the sales data, Barilla could themselves provide the right replenishment quantities. Despite the leading market position and strong brand, Barilla met resistance since distributors feared disintermediation in the SC. Another problem was the intrusion into the distributors' business, even offending them. Producing a proof of concept and quantifying potential gains through pilots at their own depot turned the initiative around. Showing the pilot results with inventory cuts of up to 50% and simultaneously raising fill rates got the distributors on board (Yücesan 2007).

Whirlpool's Joint Shipping
Transplace, Dal-Tile, Whirlpool, Convermex and Werner Co. collectively won the 2012 Supply Chain Innovation Award and Arlbjørn et al. (2011) found it radical. Transportation resources on applicable lanes were cut by 60% by collectively optimising vehicle use. Dal-tile, with its high density products, had very low cubic utilisation of transportation, whereas low density goods Whirlpool had low weight utilisation. By co-loading their goods on the same vehicles for cross-boarder shipping, all involved parties were able to cut costs. Transplace was involved as a third party logistics (3PL) (Transplace 2012).

PACIV's Information Sharing for Controlling Transparency
An example of operational collaboration in terms of controlling and measuring is PACIV, a Puerto Rican outsourcing solution provider in the areas of process automation and computerized system validation. As a new actor in the pharmaceutical industry were compliance and transparency are essential, PACIV used extensive information sharing to create trust and reduce the organisational boundaries between supplier and customer. The founder,

Jorge Rodriguez-Gonzalez, disrupted suppliers to the pharmaceutical business as he opened up the information flow completely. Jorge set new standards for information sharing and gained the first customer Eli Lilly by sharing all data on labor and material costs, profits, and even personal income tax returns. In a business where compliance is paramount, it earned PACIV the trust of Eli Lily's purchasing executives. This forced the competition of PACIV to follow, as the reputation of transparency spread (Isenberg et al. 2015).

2.2.4 Reconfiguration Tools

There are several approaches to how a SC network may be reconfigured to achieve competitive advantage, both value adding and cost benefits. The reconfiguration tools are divided into insourcing, outsourcing, node reconfiguration and channel innovation.

Insourcing and Outsourcing
Outsourcing is traditionally seen as a mechanism to transform non core activities and free resources to advance the core competences of an organisation. Outstanding examples of successful outsourcing are Nike and Reebook which focused on design and marketing of footwear, their core competence, while the manufacturing was outsourced (Pratap 2014).

Nike
Nike moves over 900 million items through their supply chain in one year, using a network consisting of over 700 factories in 42 countries, yet Nike owns no factories for manufacturing their footwear and apparel. Instead, the manufacturing is done by contractors to cut cost and enable Nike to focus on their core competence: design and marketing of footwear. Nike was one of the pioneers of the industry with their high degree of outsourcing and took outsourcing to an entirely new level (Soni 2014).

Node Redesign
The targeted tool for node redesign may be divided into geographical transfer through near-shoring, off-shoring, centralisation and decentralisation.

Off-Shoring versus Near-Shoring
According to Slepniov et al. (2013), there are three alternatives of where companies can locate their activities from the point of view of location and distance from headquarters (1) domestically: in close proximity, (2) near-shoring: at medium distance, and (3) off-shoring: at a great distance.

Centralisation versus Decentralisation
For this tool, centralisation versus decentralisation of all tiers in the supply chain is considered. What advantages are there of using single source or dual source? Should there be one manufacturing site or several? A central warehouse or several regional/local? Is there one single interaction point with customers or several? Centralized activities can

result in significant cost benefits, however, it leads to higher supply chain risk compared to decentralised activities. By increasing the degree of centralisation of warehouses in a SC network it can create competitive advantage such as reduced inventory levels, economies of scale, reduce demand and lead-time uncertainty and improve customer service (Pedersen et al. 2012).

Channel Innovation

Another approach to node redesign is to deliver the product through a new innovative channel. This could for example be to remove a brick and mortar store and sell online. According to Jackson (2010), some of the most dramatic successes in recent business history have come through channel innovation. One example of this is Itunes, which made it easier for people to accessess their favorite music while mitigating the theft of intellectual property. Another example is eBay, making neighborhood garage sale available to the entire universe (Jackson 2010).

Dell: Penetrating the new PC Market by a Direct Sales Model

Dell was an early player in the PC market, starting in USA and beat Japanese competition for a long time. Dell did not manufacture the components themselves, which set it apart, interestingly Dell also cut out the distributors. Applying this direct sales model provided several key advantages: (1) channel costs were dramatically cut by eliminating intermediaries; (2) customer options were wide since all computers were made to order; (3) the direct contact with customers shortened the feedback loop and enabled service modification according to demands; (4) fast throughput of material and low inventories shortened the time to market for new technologies (Mendelson 2000).

2.2.5 Efficiency Tools

Going for the purely efficiency innovation track, three radical ways can be identified. Through process redesign, complexity reduction, or information technology innovations, the SC can cut business costs in a radical way.

Process Redesign

Redesign of processes can lead to dramatic improvements in performance, increased effectiveness in delivering value to customers and higher shareholder profit (Hammer 2007). According to Hammer (2007), there are several examples of companies achieving radical improvements in profitability, cost, speed and quality by focusing on their internal and customer processes.

Davenport et al. (1994, p. 122) discuss process reengineering and five primary concepts that make up reengineering:

1. A clean slate approach to organisational design and change
2. An orientation to broad, cross-functional busness processes, or how work is done
3. The need for, and possibility of, radical change in process performance
4. Information technology as an enabler of change in how work is done.
5. Changes in organisational and human arrangements that accompany change in technology.

Hammer (2007) discusses the importance of introducing new measurement system and incentives when redesigning processes. Moreover, to be able to successfully redesign and create high-performing processes, companies need to provide supportive environments. Hammer (2007) presents a framework, the Process and Enterprise Maturity Model (PEMM), describing how to successfully implement and sustain business processes. The model consist of five process enablers; *Design, Performers, Owner, Infrastructure* and *Metrics;* and four enterprise capabilities; *Leadership, Culture, Expertise* and *Governance.*

Complexity Reduction Analysis

Complexity in a supply chain network can lead to inefficiencies, long lead-times, issues in reliability, difficulty to integrate supply chains and reduced delivery performance. In addition, supply chain complexity results in a system that is hard to understand, describe, predict and control (Leeuw et al. 2013). A supply chain network, consisting of all members with whom the focal company interacts directly or indirectly through its customers or suppliers, in many cases make up a very complex network which is hard to understand and predict. To make it more manageable, one way is to distinguish between primary (carrying out value adding activities in the business process) and supporting members (providing resources, knowledge, utilities, or assets for the primary members of the supply chain). To increase the understanding of a complex supply chain one approach is to use supply chain mapping. When mapping a very complex supply chain, it is preferred to only include primary actors and select key actors in order enhance its usage for strategic decisions (Lambert et al. 2000).

Simplification

Hoole (2005) identifies a few factors that Dell, Zara, and Wal-Mart have in common and enables them to transform their industries: the ability to reduce complexity in their supply chain architecture. He further identifies a number of drivers of complexity in the SC. Firstly, it is due to competitive forces that drive businesses to expand their capabilities. Secondly, the fact that as functions in large organisations become separated and place demands on each other in a sub-optimal way. Thirdly, as business needs evolve over time, old decisions leave organisational artifacts behind that may not fill a purpose. Along the very same lines, Srai et al. (2008) found that advanced SC performance often did not correlate with advanced business processes, and stated that simpler processes may often be more effective.

Information Technology
The use of information technology is a common way to increase efficiency in a SC. One way is the use information systems to enable more efficiency in distribution by optimising routes, not only geographically but potentially taking traffic patterns into account (Kotlik et al. 2015). Information technology is considered a targeted tool where hardware or software is used in a novel way to boost efficiency, as opposed to *information use* (a targeted tool for responsiveness described in section 2.2.1) where the use of information is key.

Cemex's Unique Transportation Efficiency
Cemex, a Monterrey based concrete company doing business in Mexico, faced the traffic chaos of Mexico. Combined with frequent last-minute changes from customers and the risk of the concrete spoiling, the pressure put Cemex in a difficult situation. Drawing inspiration from other industries through benchmarking FedEx and the 911 dispatch centre in Houston, Cemex realised that instead of fighting uncertainty they could embrace it. In 1994, they lauched a project called *Sincronización Dinámica de Operaciones* (the dynamic synchronization of operations). They tore down the zone system for allocating trucks and tracked them through GPS instead. They used an IT system for analysis of traffic patterns and truck positions. In order to boost customer service they started education programmes for truck drivers. The result for the customers were same-day service and free, unlimited order changes and discounts if the load was more than 20 minutes late. For Cemex, the vehicle efficiency was increased by more than 30%, which with a delivery reliability of 98% proved a massive competitive advantage (Jr. 1999). Keeley et al. (2013) described it as a *Radical* optimisation.

2.3 Antecedents to Radical Supply Chain Innovation

Antecedents, in contrast to the targeted tools described in section 2.2, concern more general inputs to RSCI. At the same time, the antecedents are more RSCI-specific than the innovation methods in section 2.4. In short, the antecedents described here have been shown to have a direct connection to SCI, but boost chances of innovation success towards all types of RSCI.

Antecedents to logistics- and SC innovation have been researched to some extent previously, and can be divided into two groups: organisational and environmental (i.a. Grawe (2009)). In accordance with the limitations set in section 1.4, environmental antecedents are excluded from analysis since they are considered given for a company and without actionability. However, for the sake of creating a holistic view, the main findings are summarised in Table 5.

Although the findings on environmental antecedents are highly interesting and applicable when explaining SCI, the purpose of this study is to develop an actionable model. Environmental factors are considered to be tied to a geographic location, and thus less practical to influence. Of course, companies may choose to strategically place development team, and

Table 5: External antecedents to SCI, excluded from analysis. Positive correlation with SCI is symbolised by (+) and negative with (-).

Article	Competition	Capital scarcity	Organisation of labor	Federal regulations
Grawe (2009)	(+)	(+)	(-)	
Zinn (1996)	(+)	(+)		
Gellman (1986)			(-)	(-)

is likely to affect innovation (Sachwald 2008; Liu et al. 2013) but the causal relationship with a specific innovation is considered too weak to go into the generic model. Therefore, only organisational antecedents to innovation will be considered in the following sections (where inter-organisational antecedents are included).

The literature on organisational antecedents to SCI is summarised in table 6.

Table 6: Organisational antecedents to SCI, subject of analysis.

	Antecedent Category			
Article	Knowledge and learning	Technology	Network structure and relations	Market orientation
Grawe (2009)	X	X	X	
Chapman et al. (2003)	X	X	X	
Ulusoy (2003)		X		
Flint et al. (2005)	X			X
Gellman (1986)			X	
Håkansson et al. (2004)			X	
Panayides et al. (2005)	X			
Soosay et al. (2008)			X	
Y. Lin et al. (2010)				X

2.3.1 Knowledge and Learning

Zack (1999, p. 135) argued that a knowledge strategy *"describes the overall approach an organisation intends to take to align its knowledge resources and capabilities to the intellectual requirements of its strategy"*.

Grawe (2009) states that knowledge, and its manifestations technology and capabilities, is an essential resource for achieving logistics innovation. Chapman et al. (2003) supports this view and identifies knowledge as an imperative in the pursuit of logistics innovation, where the management of knowledge internally and in the SC is key in the innovation process. Here follow some views on knowledge management.

Flint et al. (2005) summarise literature on organisational learning and the topic's effect on innovation capabilities. The subject covers many disciplines including psychology and or-

ganisational development, management science, sociology and organisational theory, strategy, production management, and cultural anthropology. Thus it can be hard or even undesirable to produce a unified framework describing the entirety of it (Easterby-Smith 1997). Furthermore, there are different levels of learning, ranging from low to high. Low being responding to customer requests, medium being contemplating behaviors, and high being reflecting over the very process of learning (Argyris et al. 1978; Bateson 1973). Low levels of organisational learning are unlikely to produce radical innovation, thus companies aspiring to do so must reach for a high level of organisational learning (Flint et al. 2005).

All in all, a working knowledge sharing system regarding changes in the customer behavior and the environment is essential in the process of developing meaningful logistics innovation that require interaction from several parts of the logistics organisation (Flint et al. 2005).

2.3.2 Technology

Recent years the use of technology has developed exponentially and today there is a vast amount of data available that can be used for increased understanding of markets, customers and products. Unstructured sources such as tweets, videos or click streams contains information about customer preferences, however, the data is hard to extract, analyse and present in a structured way (K. Tan et al. 2015). Grawe (2009) proposed a positive correlation between technology and logistics innovation and reasoned that technology serves as an enabler for knowledge sharing, which in turn is an important antecedent to logistics innovation.

The technology strategy needs to be in managerial focus, and is an important antecedent to innovation (Ulusoy 2003). Ford (1988) defined technology strategy as what a company knows and what it can do. This entails policies, plans and procedures for (1) acquiring knowledge and ability, (2) managing it and (3) exploiting it for profit. In order to develop the technology strategy of a company, Ford (1988) recommends doing a technology audit, and from that audit develop the strategy for acquiring, managing and exploiting technology. Campbell-Hunt et al. (2003) further developed the technology strategy framework by analysing in what ways a company can acquire, manage and exploit technology. They found that acquisition can happen through networks and alliances, mergers and acquisitions, in-house Research and Development (R&D), lead users, technology licensing, contract R&D consultants (Campbell-Hunt et al. 2003).

In order to manage technology and make use of it, absorptive capacity is needed, which builds on an existing level of experience and knowledge within the firm. That level must be actively built, which is done through working with knowledge and learning. Other technology management parts are inherently a part of the firms overall management of resources, and does not need to be specifically dealt with for technology strategy (Campbell-Hunt et al. 2003).

Exploitation is highlighted in three ways: Intellectual Property (IP), technological lock-in

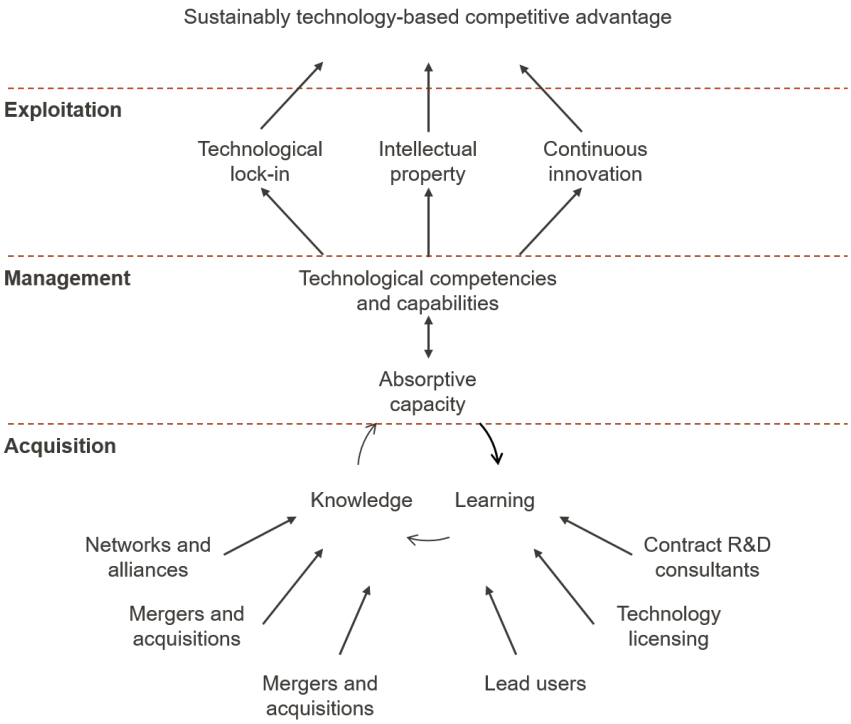

Figure 5: Technology strategy as adapted by Campbell-Hunt et al. (2003) from Solomon (2001)

and continuous innovation. IP is a protection decision that must depend on the market, if for example speed to market is important or legal capabilities unequal, then IP protection might not be an optimal strategy to pursue. Instead a technological lock-in may be beneficial, making the product the de facto standard on the market. The technological lock-in can often be paired with the last exploitation way, continuous innovation, where first-mover advantages are exploited. If the latter two are used in combination, the continuous innovation may support the technological lock-in (Campbell-Hunt et al. 2003). The technology strategy framework of Campbell-Hunt et al. (2003) is displayed in Figure 5.

2.3.3 Network Structure and Relations

Innovation at the network level in a SC is highly dependent on the network structure, which also strongly impact the prerequisites for collaboration. High density in a network, close relations with supply chain partners and vertical integration have positive correlation with SCI (Carnovale et al. 2015). Flint et al. (2005) found that logistics innovation is often produced in collaboration with customers, something they choose to call inter-organisational learning and relate to the construct of Robert F. Lusch (2004) - co-service production. Håkansson et al. (2004) found that collaboration can lead to innovation.

In a supply chain network, information has historically been a source of power and therefore

it has traditionally been protected and guarded. Consequently, a high level of trust is required to enhance information sharing in a SC relation. According to Soosay et al. (2008) many firms are protective about their information and knowledge and share only to limited extent. One strategy presented by Soosay et al. (2008) is to share information with selected key suppliers. One example of information sharing is to share information on customer order to suppliers to increase their time horizon and their ability to forecast. In addition, innovation capabilities are improved through sharing of information and knowledge and it will also increase the capacity of firms to learn from each other (Soosay et al. 2008).

2.3.4 Market Orientation

Y. Lin et al. (2010) emphasise the importance of market orientation for SC performance, and quantifies the relation in their paper. Market orientation has been defined by Narver et al. (1990) as the implementation of marketing concepts, through a culture of the organisation to produce most effectively and efficiently the essential behavior for creating superior value for the customers and organisation performance in the firms. This means that the organisation must progressively and systematically collect information about the customers and the competition, share information over organisational walls, coordinate activities, and rapidly respond to competitor moves and customer needs (Narver et al. 1990; Martin et al. 1990). Green et al. (1990) follow the same lines in asserting that (1) Market Orientation (MO) improves financial performance, (2) SCM strategy mediates the impact of MO on marketing performance and (3) MO is an important antecedent to a successful SCM strategy. Narver et al. (1990) summarised the concept of MO in the three focuses on (1) customer orientation, (2) competitor orientation and (3) cross-functional orientation, in which a deep-dive follows.

Customer Orientation

Customer orientation is the sufficient understanding of ones target buyers to be able to create superior value for them continuously, which demands that one understands the customer's whole value chain (Narver et al. 1990). Flint et al. (2005) suggest a model for SCI by collecting clues about what the customers want in the future and refer to the concept as customer-focused innovation, which the authors consider to be a part of market orientation under the point of customer orientation.

Before starting the data gathering and analysis process, the organisation needs to lay the foundation of being customer focused. These activities include training managers in designing interviews, conducting surveys and analysing the results. Physical resources might be imperative to acquire in this phase as well, such as IT-systems or facilities in which to interact with customers (Flint et al. 2005). Furthermore, the notion of actively enhancing the customer-orientation within the organisation was reoccurring in their study of logistics organisations, as well as top managements involvement therein. Training of

staff (or hiring of new) next to culture building are central in the quest of making the organisation customer-oriented.

The actual gathering of customer clues, done after setting the stage as described above, can be done in many different ways including managing customer groups, single customer in-depth interviews, extended customer retreats, joint strategic planning, and ordering customer research from third parties (Flint et al. 2005). Customer groups where established out of strategically important customers, that were invited to participate in workshops with logistics managers of the organisation and sometimes with other non-competing customers. The purpose of the workshop would be to enhance knowledge of the market situation and identify the customers' visions, goals, pains, and ideas of improving the business.

Competitor Orientation
A competitor orientation includes understanding both current and potential competitors. An understanding of the capabilities and strategies in the long run, as well as strengths and weaknesses in the short run is key (Porter 1985; Narver et al. 1990). Inseparable from customer orientation, competitor orientation requires an insight into all the technologies able to satisfy the basic customer need (Narver et al. 1990).

Cross-Functional Orientation
In the pursuit of superior customer value creation, coordinated utilisation of the company's resources is considered cross-functional orientation (Porter 1985). Value creation should be the goal of the entire organisation, not just the sub-components, and is most effectively done through collaboration. In order to succeed with cross-functional orientation, incentives for departments to collaborate must be in place (Narver et al. 1990). Flint et al. (2005) describe the process orientation as defined by Ljungberg et al. (2001) and Davenport (1992). Ljungberg et al. (2001) states that the functional organisation leads to ad hoc processes and informal decision making, and describe the roles in a process oriented organisation. Ljungberg et al. (2001) found that firms that do not transition into the process oriented organisation have difficulty in:

- Thinking holistically
- Keeping customer focus
- Involving employees in the learning process
- Taking care of employee skills and motivation
- Implementing strategy
- Remaining flexible
- Being efficient
- Living up to increasing demands on their time and product/service quality

2.4 Generic Innovation Tools

The last type of input considered in the RSCI process is the generic innovation tools. In the following section generic innovation tools for *Finding the Problem, Solving the Problem* and *Organising for Innovation* are presented.

2.4.1 Finding the Problem

The very front end of innovation is deciding where to focus the attention, or finding the problem. In doing so, the areas of strategy for innovation, customer segmentation, needfinding, and design thinking may prove helpful.

Strategy for Innovation
When setting a strategy for innovation, a more general strategy towards radical innovation helps set the direction. Here the strategy of *Blue Oceans* exemplify that. To further boil down how to shape the SC, it should be broken down into SC goals with regards to the type of product delivered.

Blue Ocean Strategy
In blue ocean strategy, the difference between competing on the existing market terms and creating new market space is emphasised, and new market space is preferred. Blue oceans represent the industries not in existence today, whereas red oceans the known market space or industries in existence. In red oceans, classic competitive rules apply, and industry boundaries remain firm. As red oceans fill up with competitors, the total profit pool shrinks and products become commodities. Red oceans can be expanded into blue oceans, where competition is irrelevant because the competitive rules are still undefined. Notable examples are for example Cirque de Soleil, catering premium circus to adults and corporate clients instead of children; snowboards, expanding alpine sports from skiing; discount retail and many more. A key concept of blue ocean strategy is the reduction of costs associated with classic competitive factors and creating customer value new to the industry (Kim et al. 2005). The concept is called value innovation, which is visualised in Figure 6.

Blue oceans strategy, in contrast to red ocean strategy, relies on the notion that industry structures and market boundaries can be shaped and remoulded by the actors within (Kim et al. 2005). The distinctions between red ocean strategy and blue ocean strategy are summarised in Table 7.

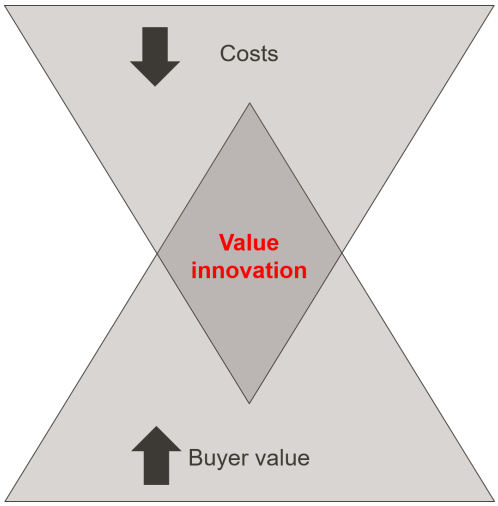

Figure 6: Value innovation is the core of blue ocean strategy. It entails both lowering the costs induced by current factors for competition, and raising value through offerings new to the industry. The simultaneous pursuit of differentiation and low cost produce value innovation. Adapted from Kim et al. (2005).

Table 7: The distinguishing factors of red ocean strategy and blue ocean strategy.

Red Ocean Strategy	**Blue Ocean Strategy**
Compete in existing market space	Create uncontested market space
Beat the competition	Make the competition irrelevant
Exploit existing demand	Create and capture new demand
Make the value-cost trade-off	Break the value-cost trade-off
Align the whole system of a firm's activities with its strategic choice of differentiation *or* low cost	Align the whole system of a firm's activities in pursuit of differentiation *and* low cost

Setting Supply Chain Goals

The SC strategy must be fitted to overall business goals and adapted to the products that a company sells. Fisher (1997) presented a model to evaluate what kind of SC strategy a company should aim for, and related it to the products. Different products of a company may require different strategies and end up in a segmented SC.

Evaluating the products, a company needs to decide whether the product is functional or innovative. A functional product fits with an efficient SC, whereas an innovative product fits with a responsive SC (Fisher 1997). The aspects differentiating the two types of products are displayed in Table 8, and their relation to SC strategies in Figure 7.

Table 8: The distinguishing factors of functional versus innovtive products, as defined by Fisher (1997).

	Functional products	**Innovative products**
Demand type	Predictable	Unpredictable
Product life cycle	More than two years	Three months to one year
Contribution margin	5% to 20%	20% to 60%
Product variety	Low (10 to 20 variants per category)	High (Often millions of variants per category)
Average margin of error in the forecast at the time production is committed	10%	40% to 100%
Average stockout rate	1% to 2%	10% to 40%
Average forced end-of-season markdown as percentage of full price	0%	10% to 25%
Lead-time required for made-to-order products	Six months to one year	One day to two weeks

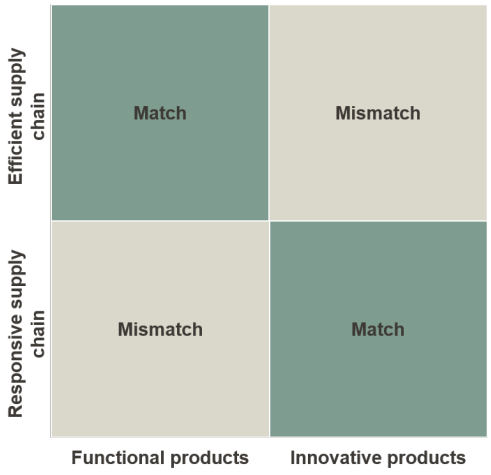

Figure 7: The matrix describes the preferable relationship between product type and SC type (Fisher 1997).

Customer Segmentation

Osterwalder et al. (2010) define customer segments as customer groups with distinct preferences in terms of offers, channels, relationships, or with different profitabilities. Gavett (2014) has a more narrow definition: the separation of a group of customers with different needs into subgroups of customer with similar needs and preferences. In essence, segmentation should group customer with the same reasons behind a purchase together, and should

not be confused with a demographic division if the two do not coincide. Slone (2004) and Rigby et al. (2006) highlight how thorough segmentation has proven vital for transformation success. When approaching customer segmentation, a top-down approach is helpful. That is, decide what actions to take depending on the segmentation before you perform it. The segmentation can be done according to needs or behaviors; segment according to needs if the target is to match offerings to customer; segment according to behaviors if the offering is under control but market efforts need direction. Either way, the approach should entail six characteristics (Gavett 2014):

1. **Identifiable.** Measurable characteristics must be present in the grouping
2. **Substantial.** The segment must be large enough to make it worth the effort
3. **Accessible.** The company must possess a way of reaching the customers. For young people, social media presence is an example
4. **Stable.** The segment must be stable for a sufficient period of time. A dynamic measure like lifestyle is therefore risky
5. **Differentiable.** The entities in the segment should be similar and distinguishable from other segments
6. **Actionable.** The segment should be defined in such a way that the company actually can form an offer to the segment

Needfinding

In developing a technical solution to a problem, the most common problem is not the development, but rather solving the right problem. Of course, the problem is usually that of the customer, and so customer contact is often used for identification. However, when probing the customers, asking what features or functionality they want will provide only obvious answers based on previous experience. To dig deeper, one must focus on finding the real needs, for example through asking *"What is bugging you?"* or *"What is your problem?"* (Patnaik et al. 2008; Cooper et al. 2002).

Customer Observation

Another way of identifying the problem to solve is to put oneself in the customers' shoes by using ethnographic research, or to spend time with the customers. By observing them use and abuse the products and experience their frustrations, the real problems can be identified. A technique used by, for example, Hewlett Packard (Cooper et al. 2002; Brown 2008). It is similar to the lean concept of *Gemba walks* (i.a. (Womack 2011)), performed at the customer site rather than internally. The type of qualitative research from observing and spending time with customers is also more convincing to stakeholders and useful for segmentation (Gavett 2014).

Lead User

A more selective way to gain customer inspiration is to work with lead-customers, a concept first developed by Hippel (1986). It is a way of forecasting needs in the market place by targeting and incorporating lead users in the organisation. Lead users are defined as

those whose needs will become more general to the market place in the coming months or years. Apart from being ahead of the market curve, lead users often attempt to solve their problems themselves and are thus already doing the job the innovator is trying to perform. The lead user approach was suggested in a four stage approach: (1) identify an important market or technical trend, (2) identify users who lead that trend in terms of (a) experience and (b) intensity of need, (3) analyse lead user need data (4) project lead user data onto general market of interest (Hippel 1986).

Customer Journey Mapping
The needs may not only cover the use of the product or service, but may be connected to any touchpoint with the customer. In order to catch all potential needs, pains and gains, the entirety of customer interactions may be mapped in a customer journey map. It may be from cradle to grave or only for a part of the journey (Richardson 2010). Many companies excel at satisfying customer needs connected to one or a few of the interaction points, but in order to really delight the customer, a journey perspective is vital (Richardson et al. 2013). An example journey template is displayed in Figure 8.

Figure 8: A customer journey template, as applied by ICG (Sonnenberg et al. 2015).

Design Thinking
Design thinking is a model for innovation that consists of three parts that one should move through iteratively: (1) inspiration, (2) ideation, and (3) implementation. The inspiration part is about finding a need to address, and is recommended to do through observation. By observing for example customers, one can find behavioural patterns that indicate a need or wish that is not fulfilled and of which the customer can be unaware of. The ideation part is for design, and recommends describing the customer journey, work integrated between functions, and prototype frequently. The implementation phase moves the project to marketing, with designer still feeding input into it. When done with one project, the team moves on to the next (Brown 2008).

2.4.2 Solving the Problem

When candidate areas for innovation has been identified, the problem must be solved, often iteratively with refining the problem definition. Hammer (2004) describes how to accelerate the innovation process: (1) get top management committed to the innovation

process, without their support the innovators will not succeed, (2) focus the innovation on activities with the most impact on strategic goals, (3) set stretch goals. With goals in ranges that appear achievable, only incremental innovation will be achieved, and (4) apply helpful models for the innovation process. A selection of helpful models are described below.

The Stage-Gate Process

The Stage-Gate® process developed by Robert G. Cooper (Cooper 1990; Cooper et al. 2002; Cooper 2008) has gained large penetration among innovators (Oorschot et al. 2010). The process is a conceptual and operational roadmap with the purpose of taking projects from an early idea to launch and further, effectively and efficiently. More precisely, it consists of five stages and five gates, in addition to an initial discovery (ideation) phase and post-launch evaluation. The stages are where work is performed, data gathered and analysed, whereas the gates are decision points where the project is either advanced in the process or killed. Each stage is designed in order to reduce project risk and more resources are committed along the way as the risk decreases. The stages are by nature cross-functional, so no single function owns a certain stage. To each gate, the project team must bring deliverables, outputs of the former gate, as a result of performing the activities in the stage. The deliverables are measured against criteria of two types, must-meet and should-meet, where the first is for discarding projects and the second for prioritisation. The output of a gate is a decision of go/kill/hold/recycle, including an action plan and deliverables for the next stage (Cooper 2008). The Stage-Gate® is visualised in Figure 9.

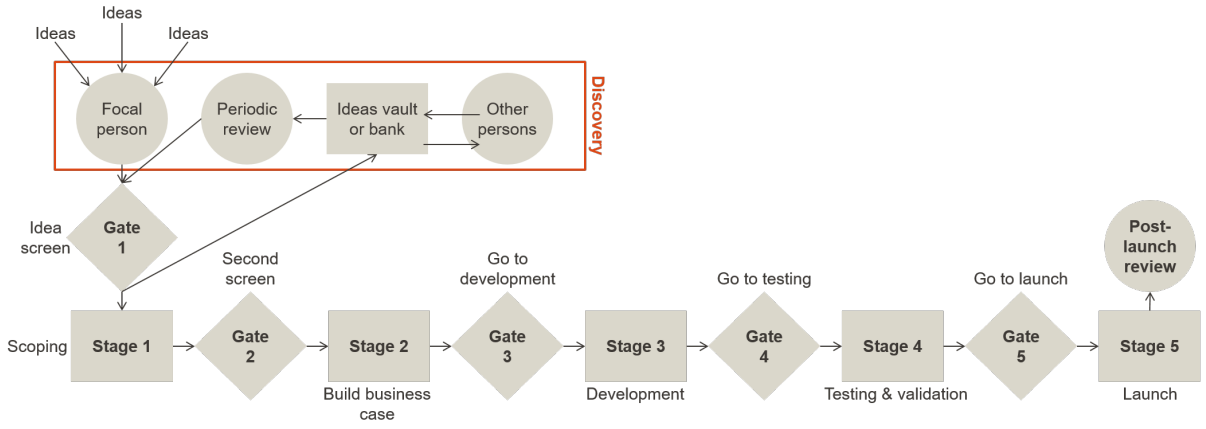

Figure 9: The Stage-Gate® process, adapted from Cooper et al. (2002).

Scrum

Scrum is an agile approach to project management derived from software development methods. It is based on an iterative, incremental process with updates each day. Each day an iteration of progress is done, which is inspected by peers in order to adapt the

work streams. A list of requirements (product backlog) ranked according to importance drives the iterations, which are performed as long as the project is funded. At the start of an iteration, the team reviews what must be done, and establish deliverables. The team is then left alone to work towards the deliverables to be presented at the end of the iteration leading to an adaptation of the project. The iterations allows for the team to adapt to difficulties they encounter along the way, collectively deciding how to solve problems (Schwaber 2004). An overview of the Scrum process is visualised in Figure 10.

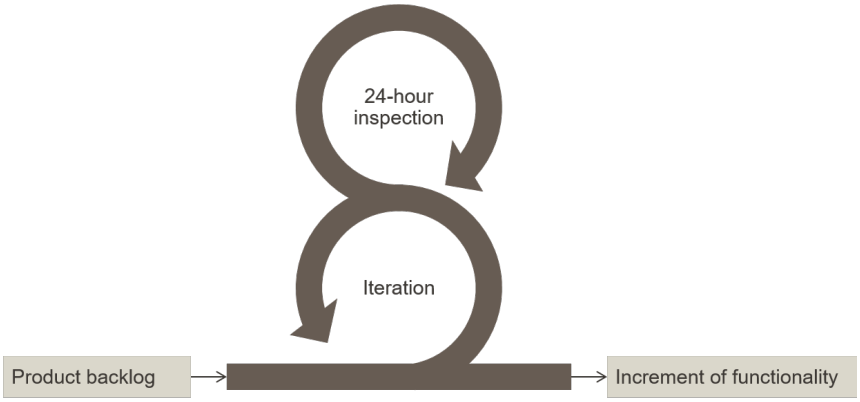

Figure 10: The Scrum process, as adapted from Schwaber (2004)

Finding Role Models in Other Industries

Hammer (2004) suggests that radical innovation in operations is unlikely to happen if comparing to your own industry. On the other hand, by benchmarking players in seemingly very different industries it may result in radical innovation. For example, Taco Bell transformed its operations by benchmarking manufacturing plants, instead of other restaurants. By outsourcing food preparation to suppliers and centralising production of key components, the restaurants could be an assembly point more than production, which lowered costs and increased consistency. When a strategic target for innovation has been chosen and inspiration gained (possibly through benchmarking other industries) Hammer (2004) recommends setting stretch targets *clearly* unattainable through current approaches, otherwise only incremental innovation is achieved. Furthermore, the key constraining assumption keeping the company from reaching the goal should be identified and defied. For example, in traditional warehousing the key assumption is that goods need to be *stored* in there, which the concept of cross-docking defies.

The Lean Start-Up and Business Model Canvas

The stereotypical innovation process in both large corporation and start-ups has long been a high-risk venture; after producing a business plan, pitching it to investors, assemble a team, introduce and roll out a product, failure is often imminent. As many as 75% of all start-ups fail in this manner. The lean start-up is a way of working to reduce the risk

through focusing on customer feedback and experimentation more than elaborate planning (Blank 2013).

Experience of start-ups shows that (1) static business plans rarely survive the first customer contact, (2) long-term plans are a waste of time, (3) successful start-ups adapt quickly after failures. The key is that start-ups are still designing their business model. The Lean Start-up is supported by the *Business Model Canvas* and *Minimum Viable Products* (MVP) and has three main points:

1. Entrepreneurs should accept that all they have is a series of untested hypotheses about their business plan. Dynamically, and subject to constant change, they can be displayed in a *Business Model Canvas*.
2. Lean start-ups test their hypotheses towards customers as early as possible using MVPs, then revise the hypotheses
3. Lean start-ups practice agile development. Iteratively and incrementally, concepts of MVPs are developed not assuming knowledge of the customer'

The display of prototypes towards customers may be uncomfortable, but the underlying thought is that feedback matters more than secrecy. Lately, large companies like General Electric, Qualcomm and Intuit have adopted the lean start-up model for internal ventures (Blank 2013).

The *Business Model Canvas* was developed by Osterwalder et al. (2010), as an attempt to describe a business model in a comprehensive way. The business model *"describes the rationale of how an organisation creates, delivers and captures value"* Osterwalder et al. (2010, p. 14). The conclusion is that a business model can be described by nine sub-components:

1. Customer segments: customer groups with distinct preferences in terms of offers, channels, relationships, or with different profitabilities.
2. Value propositions: the bundle of products and services that create value for a specific customer segment.
3. Channels: how the company communicates with and reaches the customer segments do deliver the corresponding value proposition.
4. Customer relationships: the types of relationships established with customer segments.
5. Revenue streams: the way in which the value propositions generate revenues. Can be either one-time or ongoing payments.
6. Key resources: required to create and offer a value proposition, enable channels and relationships, and earn revenues. Can be physical, financial, intellectual, or human.
7. Key activities: the most important things a company must do to make its business model work. Analogical to key resources, with activities.
8. Key partnerships: the network of suppliers and partners that makes the business model work. Partnerships can be (a) strategic alliances between non-competitors, (b) strategic partnerships between competitors (coopetition), (c) joint ventures to

develop new businesses, and (d) buyer-supplier relationships to assure reliable supplies.

9. Cost structures: the cost incurred to operate the business model. Different models can have different cost-focus.

The relationships between the ingoing nine parts are visualised in Figure 11.

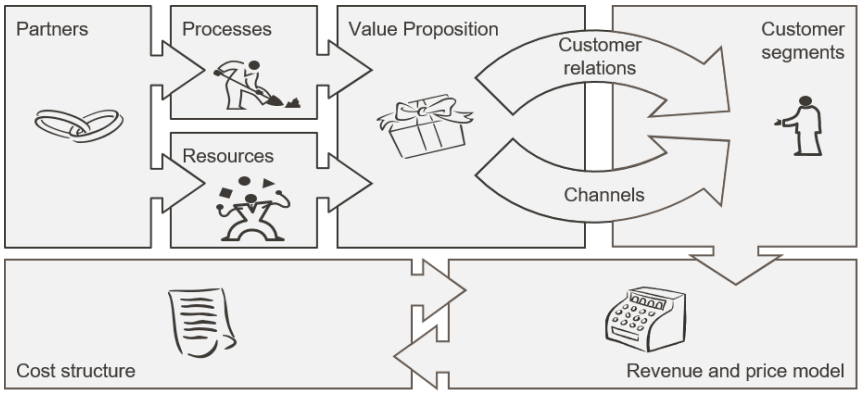

Figure 11: The *Business Model Canvas*, adapted by Sjögren et al. (2015) from Osterwalder et al. (2010).

The MVP is a concept that targets early adopters for feedback on a prototype. Based on customer needs, the features that meet those needs and *no more* are included in the prototype. Ries (2009) described the concept of MVP as follows:

> *The idea of minimum viable product is useful because you can basically say: our vision is to build a product that solves this core problem for customers and we think that for the people who are early adopters for this kind of solution, they will be the most forgiving. And they will fill in their minds the features that are not quite there if we give them the core, tent-pole features that point the direction of where we're trying to go.*

Finding the early adopters is key for the MVP approach, and involving them in the development. One way to do it is to make them feel included in something that is going to be big. An experiment used to test early prototypes would be a landing page, selling a product not yet developed. Measuring the traffic, the company gets information on how attractive the features described are. Using MVPs, failures are frequent but cheap and will produce a product that the customers actually want (Ries 2009).

2.4.3 Organising for Innovation

The final part of generic innovation tools is concentrated on how to organise the company to achieve RSCI. Two parts are considered. First, open versus closed innovation is elaborated on. Second, the choices of organisational form and its indications come into the picture.

Closed or Open Innovation
The classic view of innovation is that it requires control, which is the underlying assumption of closed innovation. Closed innovation has a strong internal focus, with the view that innovation should be kept in-house. It is assumed that first mover advantage is important, that it requires secrecy and using Intellectual Property management. The result is that many promising business ideas and technologies will remain non-exploited (Herzog 2011).

In contrast, open innovation acknowledges that such control is not imperative any more; development and exploitation of innovations does not have to be done through a firms internal activities. Ideas can enter or exit the company boundaries at any stage in the innovation process: ideation, idea development, and commercialisation (Herzog 2011). West et al. (2006, p. 320) defined the open innovation approach as *"systematically encouraging and exploring a wide range of internal and external sources for innovation opportunities, consciously integrating that exploration with firm capabilities and resources, and broadly exploiting those opportunities through multiple channels"*.

Choosing Organisational Structure
Managers of companies face two different challenges: make money off the current business, and develop the next business to make money from. This has been called exploitation versus exploration and is the difference between running the business and radically changing it. It has been shown that a separate organisation that aims only for radical innovation is an effective way to organise for radical innovation. Four organisational forms for radical innovation are (1) separate organisation (ambidextrous organisation), (2) integration in regular functions, (3) cross-functional teams, and (4) unsupported teams. Unsupported teams are separate units but not tied to senior management in the way ambidextrous organisations are. In ambidextrous organisations, teams are independent to focus on radical efforts, but are closely knit to the main organisation on senior management level. Ambidextrous organisations have been found to be more effective in achieving its goals (90% satisfaction rate) than other organisational forms, apart from a special case where innovations were replacements of existing products and integration in regular functions performed as well (O'Reilly et al. 2013). Francis et al. (2015) and Roos et al. (2015) identified four similar types of organisation, and fitted the choice of type to the type of innovation and degree of newness of the innovation wanted. They concluded that a separate unit for radical innovation is most fitting when technology intensiveness and investments are high and product cycles are long. The benefit from separation from the main organisation was found to increase with how new the innovation is to the company and to the world.

2.5 Output of Radical Supply Chain Innovation

Porter (1985) introduced the concept of competitive advantage, which can be defined as the asymmetry or differential in any firm attribute or factor allowing one firm to better serve the customers than others and hence create better customer value and achieve superior

performance (Ma 1999). According to Porter (1985), competitive advantage can be in form of either differentiation or lower costs. Specifically for customers, a seller can create value for customers in two ways: to increase the buyer's benefits in relation to costs or to decrease the buyer's costs in relation to benefits (Narver et al. 1990). Along the same lines, Björnland et al. (2003) point out that the strategic importance of the supply chain is determined based on two factors; (1) logistics as a unique driver delivering added value, or (2) logistics as a cost driver. To facilitate an innovative culture logistics should be considered as both a unique value driver and a cost driver (Björnland et al. 2003). The authors adhere to this view, but extend the concept of cost leadership into cost benefits, meaning that cost cutting can be taken out as higher profit margin and can also mean lower cost variance. Lower cost variance would carry with it lower risk, even though costs over time are higher. One can argue that competitive advantage is an automatic outcome of RSCI (compare to the definition in chapter 1 by Arlbjørn et al. (2011)), but the outcomes of RSCI have nonetheless been studied. The findings are summarised in Table 9. The findings are more or less specific, but all can be collected under the two types of competitive advantage: value adding (differentiation), and cost benefits.

Table 9: Outcomes of SCI

	Competitive Advantage	
Article	Cost benefits	Value adding
Porter (1985)	X	X
Narver et al. (1990)	X	X
Woodruff (1997)		X
Björnland et al. (2003)	X	X
Corsten et al. (2003)	X	
Slone (2004)	X	X

2.5.1 Value Adding

Supply chain cooperation and information sharing can result in added value through higher service levels and more accurate forecasting methods (Slone 2004). The notion of customer value is widely spread but rarely specified beyond the meeting of customer needs. One definition that the authors promote is that of Woodruff (1997): *"a customer's perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations"*. Because the customers' perceived preferences and evaluations are subjective, internally different, and multifaceted, the optimisation function would be very complex. Because the SC can impact almost part of every value proposition, understanding the customers' perceived values is as essential in the SC strategy as in the business strategy.

2.5.2 Cost Benefits

Supply chain collaboration has been shown to reduce costs for the parties involved, even if the relationships can be strained between them (Corsten et al. 2003). A vivid example of how the collaboration can cut costs, for example through lower inventory costs, is provided by the case of Whirlpool, where the forecast errors were cut in half through CPFR (Slone 2004).

Nike network strategy, relying on outsourced manufacturing, is another terrific example resulting in cost benefits. The manufacturing is performed in off-shore, low cost countries where the labour cost is kept to a minimum while design and research are kept in-house, and the R&D department ensure continuous improvements of quality and design. The outsourced production enables Nike to be flexible and shift production successively to lower wage countries to avoid rising wages (Ma 1999).

2.6 Compiling the Theory into a Conceptual Model

After studying previous research on RSCI and related subjects, the rudimentary model described in the beginning of the literature chapter (Figure 4 on page 7) can be developed into a more descriptive one in Figure 12. The types of RSCIs are hypothesised to have three targeted tools each. The form in which antecedents to RSCI are needed has a close connection to which targeted tool one uses. Generic innovation tools seem to be useful all the way from needfinding to implementation and organisation, which is visualised in Figure 12 by an arrow stretching from the other inputs to RSCIs. Relating to the research questions:

1. Five types of RSCIs are identifiable from literature
2. RSCIs seem to affect competitive advantage in either value adding or cost benefits, although specific causal relationships are not distinguished
3. The constellation of inputs required for RSCI needs investigation, but three categories are identified
4. General guidelines for choosing the right inputs could be identified from literature, but need more investigation

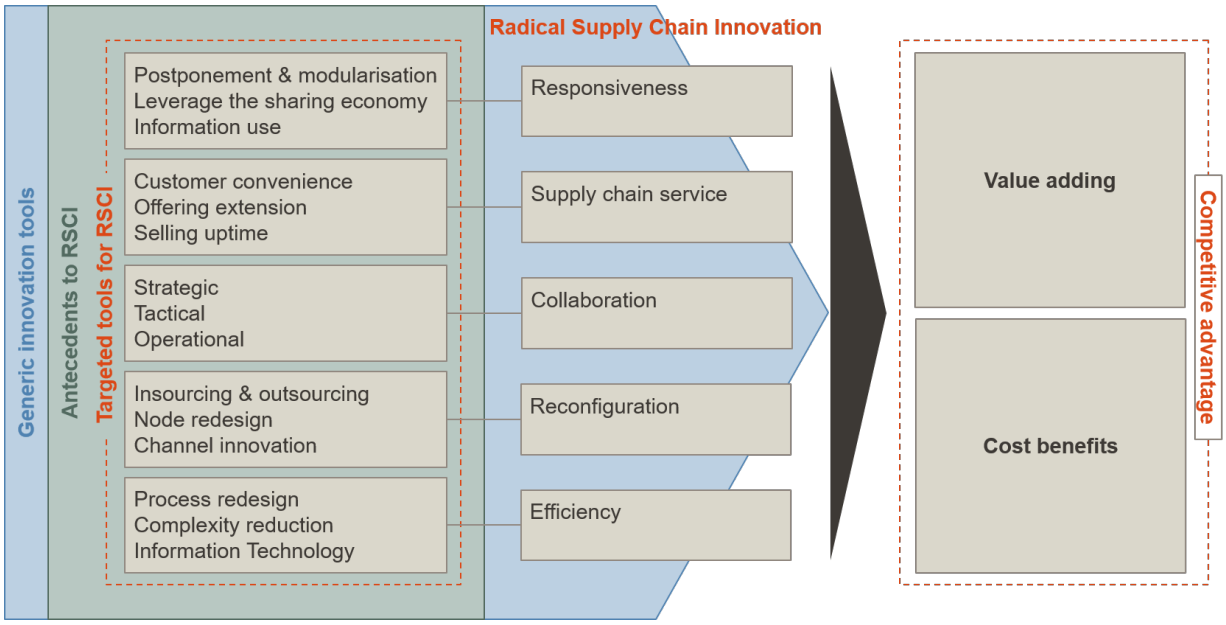

Figure 12: A conceptual model of RSCI as it can be derived from literature, forming the base for empirical research.

3 Methodology

In the following section the approach to research methodology, approach to literature review, chosen methods and quality of the research design are presented. The chosen method consists of a multiple case study embedded in a constructive approach.

3.1 Approach to Research Methodology

According to Arbnor et al. (1997), the choice of research method should not only be determined based on the nature of the research problem, but also on how the researcher views reality. The view of the reality to some extent determines the problems to be solved and the questions to ask. This section outlines the background to research methodology approaches, the choice for this study, and how the approach becomes a high-level plan.

3.1.1 Three Approaches to Research Methodology

Gammelgaard (2004) describes a methodological framework with three alternative approaches; analytic approach, systems approach and actors approach which are presented in the following section.

The Analytic Approach and the Positivist View
In the analytic approach, building on positivism, the view on reality is objective, and both causal relations and patterns may be investigated and disclosed by using research. This approach relies on the basic assumption that the world can be decomposed and that each unit can stand alone and be conceptualised (Gammelgaard 2004). With the positivistic view of the world, research methods tend to be quantitative more than qualitative, with surveys being the dominant quantitative method (Mentzer et al. 1995). A researcher who chooses the analytical approach should also refrain from interacting with the object of study, because no influence should be exerted on the object.

The Systems Approach and the Systems Theory
Arbnor et al. (1997) classify the systems approach as being in line with positivism. However, in contrast to the analytic approach, the system perspective makes it meaningless to decompose reality into its smallest parts, because the components making up the system are mutually dependent. The components together form a system with goals, feedback mechanisms and parts containing links and dependencies. The system approach is pragmatic in nature, and to derive knowledge cases should be compared and analysed instead of searching for universal cause effect relations. An appropriate method in system analysis is case studies (Gammelgaard 2004). To further elaborate on the view of the researcher using the system approach, Gammelgaard (2004, p. 481) explains:

"The researcher's task is to create an understanding of a given part of the world, to identify the system parts, links, goals and feedback mechanisms in order to improve the systems. Therefore, the theory in the systems approach is contextual rather than universal. To derive knowledge, it is necessary to analyze and compare cases instead of seeking universal cause-effect-relations. The systems approach is pragmatic in nature, and the search for an absolute truth is replaced by the search for a problem solution that works in practice."

The Actors Approach and Sociological Meta-Theories
According to the actors approach, reality is not objective but rather the result of several social constructions. Knowledge is perceived as socially constructed, which entails that the creation of knowledge depends on the interpretation of the researcher. Moreover, to understand reality an investigation of intentions is required and in the actors approach qualitative studies are foremost used (Gammelgaard 2004).

3.1.2 Why the Systems Approach Fits the Purpose of the Study

The systems approach was chosen to conduct this study, as opposed to the analytic or actors approaches. Given the nature of the purpose and the following research questions, the authors' view is that a model providing recommendations must be constructed.

The reason for not choosing the analytic approach is that in the authors' opinion, supply chain innovation consist of mutually dependent parts and can not entirely be broken down into components independent from context, time and people. Furthermore, the authors believe that innovation is a phenomenon which must be studied intimately as opposed to observing from the outside.

On the other hand, the actors approach makes such a model impossible by definition, which disqualifies the actors approach as a choice.

Bearing this in mind, the systems approach is the best fit for the research questions and the purpose. And even though the systems view does not recognise discovery of universal causality, the authors hope to conceptualise the findings into a model that can be used to navigate SCI, keeping the context in mind. A visualization of the defined system of this study is presented in Figure 13. In order to widen the applicability of the findings, multiple cases should be chosen over a single case.

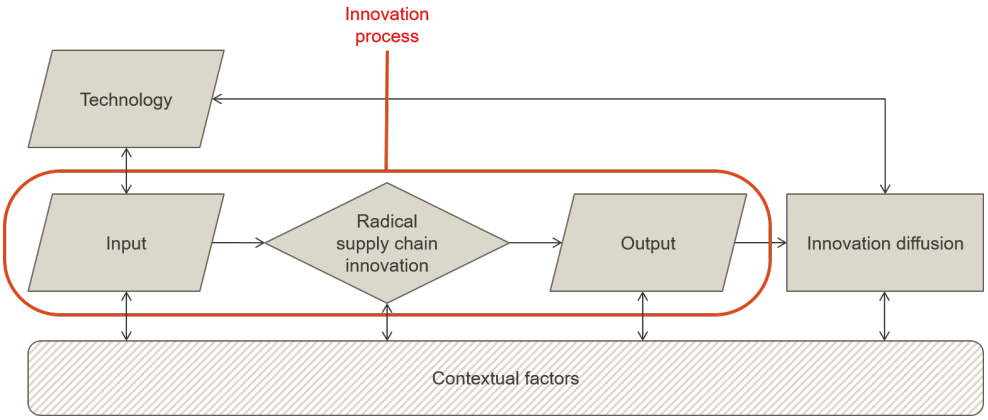

Figure 13: The figure visualizes the authors definition of the system, including the main components and their links, with ICG's focus encircled

3.1.3 Approach to Methods and High-Level Plan

The purpose of the study is to create a generic model of SCI, focusing on managerial actionability, which makes a constructive approach appropriate. The concept of RSCI, or at least the differentiation between RSCI and incremental SCI, is not thoroughly explored (Munksgaard et al. 2014). Therefore companies at the front line of the field will be used as examples of how to achieve it. In order to gain a deep understanding of the concept, multiple case studies will be used for data collection and analysis.

In summary, a multiple case study will be embedded in a constructive approach in order to build the foundation of the model. The empirics will be compared to literature (which often is based on cases) in order to arrive at a compiled model. In order to validate the model, a market test will be conducted with potential clients of ICG. The high level process is described in Figure 14.

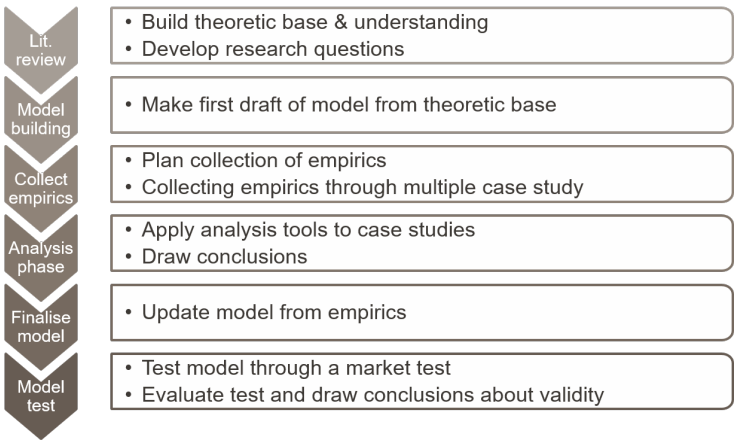

Figure 14: A high level plan of the methods used

3.2 Literature Review

In order to cover academic work on SCI as fully as possible, two different databases (Web of Knowledge and Emerald Insight) were used for a *building blocks approach* (Rowley et al. 2004) starting with the phrases *"supply chain innovation"* and *"logistics innovation"*. According to Rowley et al. (2004), a good source is not only relevant to the subject but also up-to-date. That spurred adding the search criterion for the hits to be published in 2010 or later. *"supply chain innovation"* and *"logistics innovation"* yielded in total 25 and 16 results for Web of Knowledge and Emerald Insight respectively, with one result overlapping. All results were screened for relevance (i.e. type of innovation, relevance to SCM and generality), similar to the *successive fractions* approach (Rowley et al. 2004) and rated on a scale of one to ten. The results were then read more in detail from highest relevance to the lowest relevance deemed applicable. Remaining were 11 relevant sources in total, making up the base of the literature review.

According to the *building blocks* method, additional searches were made for terms such as *"network innovation"*, *"value chain innovation"* and *"relations innovation"*. The terms were chosen from the screenings of the initial hits, but did not yield satisfying results.

In order to complement the base formed by academic journals and books retrieved through the search described above, Harvard Business Review was used in order to identify recent developments within the field according to the view of Rowley et al. (2004). It was scanned for articles containing key words *"supply chain innovation"*, which yielded 18 results. The results were scanned for relevancy which resulted in seven articles that were read more thoroughly.

The journals containing relevant hits are compiled in Table 10.

In order to find important publications from before 2010 and from adjacent fields of study, *citation pearl growing* (Rowley et al. 2004) was used, meaning that from reading the initial hits the authors could identify relevant cited literature. A short summary with the key content for each relevant article was conducted in order to structure the literature review according to topics touched upon by different researchers.

Table 10: Table of relevant results from the *building blocks approach* in the literature review. From the initial hits, a selection has been made.

Journal	Search database		
	Emerald	Web of Science	hbr.org
European Business Review	1		
European Journal of Operational Research		1	
Harvard Business Review			7
International Journal of Physical Distribution & Logistics Management	1		
International Journal of Production Economics		1	
International Journal of Retail & Distribution Management	1		
International Journal of Technology Management		2	
Journal of Supply Chain Management		1	
Operations Management Research		1	
Supply Chain Management	1		
The International Journal of Logistics Management	1		

3.3 Developing a Model using the Constructive Approach

The constructive method is really one of several methods available for a case researcher, thus not disjointed from the case study method. The approach has been developed for the use in business administration research, but is also used in the fields of engineering, information systems, medicine and education but has an applicability that is far wider (Lukka 2003).

3.3.1 Fitting the Constructive Approach to the Study

The goal of the constructive approach is to create a novel construction in order to solve a tangible problem faced in the real world, while contributing to theory in the relevant field. The novel construction focus fitted well with the authors' intentions to draw up an actionable model for RSCI, and the pragmatic approach is well suited to the problem presented by Implement Consulting Group. Lukka (2003) listed requirements of the constructive approach, it must:

1. Focus on real-world problems felt relevant to be solved in practice
2. Produce an innovative construction meant to solve the initial real-world problem
3. Include an attempt for implementing the developed construction and thereby a test for its practical applicability

4. Include a close cooperation between researcher and practitioners an a team-like manner, in which experiential learning is to take place
5. Be explicitly linked to prior knowledge
6. Pay particular attention to reflecting the empirical findings back to theory

This project was initiated by Implement Consulting Group, explicitly requesting a model to describe RSCI, so the problems are relevant to be solved in practice, fulfilling the first criterion. A literature review showed that no holistic framework had been proposed for RSCI, so given that the research produced a construction, the second requirement was fulfilled; a model (construction) for RSCI was created. The testing was done in two parts: (1) towards Implement Consulting Group, to align and verify that the consulting world approved and recognised working concepts, and (2) in a workshop setting with companies interested in exploring RSCI, in order to see that actionable results could be produced from applying the model. The fourth requirement fits well with the systems approach described in section 3.1.1. During the course of the project, ongoing interaction with the consultants of Implement Consulting Group took place, as well as deep data gathering and industry application with case study targets and workshop participants. Regarding the fifth requirement, the empirics were collected after a thorough literature study that was integrated in the construct. The results were interpreted holistically and not industry specifically, adding to the current theory and fulfilling the last requirement (more in-depth descriptions of analyses performed can be found in section 3.4.4).

3.3.2 Applying the Constructive Approach

Following the recommendations of Lukka (2003), the application of the constructive approach went as follows:

1. A relevant problem was found, in this case the knowledge gap in the topic of RSCI
2. The cooperation with ICG was set up
3. The topic of RSCI was researched through a literature review and discussions with ICG, followed by collecting empirics through a multiple case study
4. A model was constructed, describing RSCI and how to approach it
5. The model was tested in a workshop setting with potential clients to ICG
6. From workshops and analyses, conclusions about the theoretic contributions were drawn

The truly interesting part in this application of the constructive approach is the testing in workshops. The goal was to involve persons from several functions, a feature that was commonly mentioned in the literature as an imperative part of the innovation process. Therefore, persons from SC, marketing, business intelligence (BI), Business Development (BD) and sales were involved. The workshops are presented in Table 11. Erik Kayser, partner at ICG, and Peter Abdon, consultant at ICG, participated at all workshops.

Kasanen et al. (1993) elaborated on the market tests used in the constructive approach,

Table 11: Validation workshops performed

Company	Date	Participant	Role
Lindab	25 April 2016	Björn Andersson	SC Developer
		Dag Jarlson	SC Manager
		Erik A. Elming	BI & Integration Manager
		Martin Nilsson	SC Developer
		Paul Olsson	Purchase & Sales Manager
PostNord Fulfilment	28 April 2016	Björn Johansson	SC Manager
		Mats Sjöberg	BD Manager

which range from weak, to semi-strong, to strong. The weak market test is about willingness to adopt the model, and is the one that suited the scope of this research best. The weak market test is fulfilled if any manager agrees to use the model in his or her decision making. For this research it was measured if workshop companies, but primarily ICG, were willing to adopt the model developed. The semi-strong test is fulfilled if the model has been widely adopted by companies, something that is likely to take time for a management model (especially one produced in the scope of a master's thesis) and was not measured. The strong market test is fulfilled if business units using the model systematically produce better financial results than those that are not, the strong market test was not considered for the same reasons the semi-strong was not.

In order to evaluate the quality of the model in the workshops, loose feedback was gathered from participants, as well as formalised feedback measuring the fulfillment of the purpose. The purpose is, as stated in section 1.2, to generate a generic and actionable model of how to achieve RSCI. In order to measure how generic and actionable the model was, the statements in Table 12 were posed to the participants (target companies) of the workshops, were they could score how much they agree on a scale of one to five (five being the highest).

Table 12: Validation statements to target companies of workshops

Purpose sub-part	Statement
Generic	**Q1.** The WS covered SCI relevant to our business
	Q2. The workshop was unbiased towards a specific solution
	Q3. The workshop was well structured
Actionable	**Q4.** The workshop produced concrete ideas
	Q5. The workshop produced new ideas
	Q6. The workshop produced ideas worth follow-up

For the statements in Table 12, the following analyses was made for Q1 through Q6:

1. Mean ratings for companies were evaluated. A high mean and low difference between companies indicate a generic model

2. Mean ratings and range of ratings for companies were evaluated. A high mean indicates a generic model. A high range indicates that the model may be biased towards a function or company
3. Mean ratings for companies were evaluated. A high mean indicates a structured model
4. Mean ratings and range of ratings for companies were evaluated. A high mean indicates actionability through concreteness. A high range indicates dissatisfaction in a role or function, indicates insufficient idea enrichment
5. Mean ratings for companies were evaluated. A high mean indicates actionability in producing novel ideas
6. Mean ratings for companies were evaluated. A high mean indicates a large potential for competitive advantage. A special regard were given to high ranking participants, with the assumption that they have less silo thinking

Similarly, ICG participants were asked to rank the statements in Table 13.

Table 13: Validation statements to ICG

Purpose sub-part	Statement
Generic	**Q7.** The parts of the model are collectively exhaustive **Q8.** The connections between RSCI and types of competitive advantage are clear in the RSCI model **Q9.** The connections between RSCI and inputs to achieve it is clear in the RSCI model
Actionable	**Q10.** The parts of the RSCI model are *sufficiently* mutually exclusive **Q11.** The model worked well in a workshop setting **Q12.** The model helped identifying activities to achieve RSCI

For the statements in Table 13, the following analyses was made for Q7 through Q12:

7. Ratings will be evaluated, a high score indicates that the professional consultants consider the model generic
8. Ratings will be evaluated, a high score indicates generality through clear connections between RSCI and output
9. Ratings will be evaluated, a high score indicates generality through clear connections between input and RSCI
10. Ratings will be evaluated, a high score indicates actionability through usefulness
11. Ratings will be evaluated, a high score indicates actionability through fit with consulting work format
12. Ratings will be evaluated, a high score indicates actionability through clear identification of how to work practically

3.4 Collecting Data for the Constructive Approach through Case Studies

As described above in section 3.3, case studies were used embedded in the constructive approach, as the means of collecting empirics and develop a construction. Case studies can be used to describe, explain or explore a phenomenon. In exploratory research, case studies are appropriate to describe how or why something is done. Case studies are used to provide thorough understanding of a little known phenomenon, but also to build theories that can be tested through surveys or further case studies. Moreover, case studies can be used to describe a phenomenon or predict outcomes based on past occurrences or similar cases (Ellram 1996). Since the goal is to construct an actionable model, the possibility to predict future outcomes from case studies suits the purpose well. Similarly, the thorough understanding is needed to build a generic and actionable model.

Case studies can be used to gather both qualitative and quantitative data, however, qualitative studies are generally emphasized. Ellram (1996) suggests a combination of qualitative and quantitative studies to collect empirical data; qualitative studies create understanding of complex interactions and relationships, while quantitative studies provide numerical data and quantifiable terms.

The case study method presented by Yin (2003) is illustrated in Figure 15, which also outlines the structure for this section. Taking off from theory development, an essential part of case studies according to Yin (2003), the case studies could be performed. First, the case studies were designed; second, cases were conducted; third, cases were reported; last, cases were analysed. The four parts are described in this section.

3.4.1 Designing the Multiple Case Study

The first step in a case study research is to develop the design of the study. The case study design is the logic that links the data to be collected to the initial questions of study and this must be done before the collection of empirics is initiated. In case studies, the development of the research design is a critical and difficult part (Yin 2003).

Key Components of Research Design
Yin (2003) presents four components of a research design that are especially important for case studies: (1) research questions, (2) unit of analysis, (3) the logic linking the data to the research questions, and (4) criteria for interpreting the findings. It should be noted that Yin (2003) also mentions theoretical propositions, which are rendered redundant by a clear purpose and criteria for evaluating success. The four topics are described in detail below.

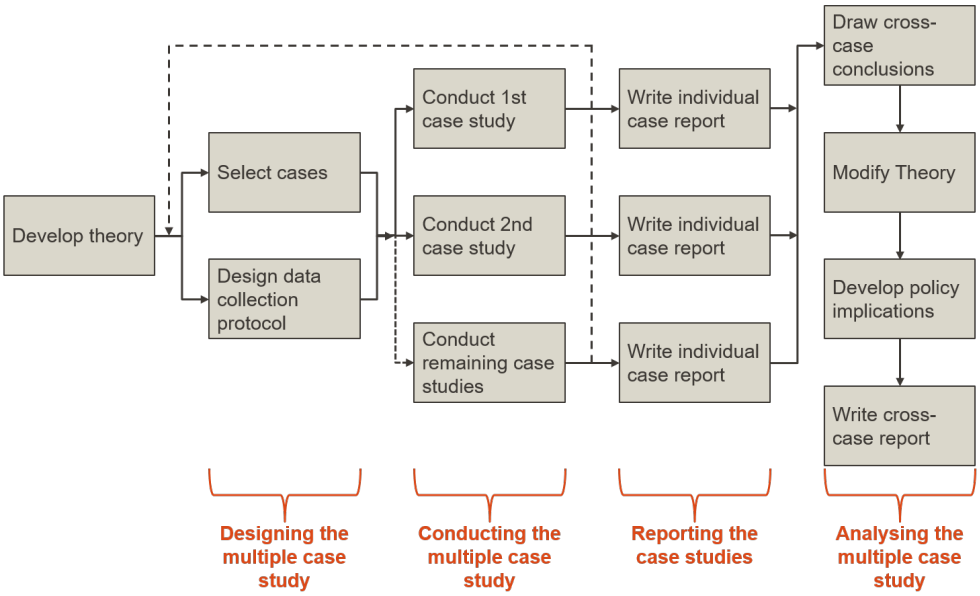

Figure 15: The case study method, applied from Yin (2003, p. 50) and largely followed in this study. After theory was developed from the literature study, case studies were designed, conducted, reported and analysed.

Research Questions

Yin (2003) recommends to form the research questions in terms who, what, where, how and why. The latter two are likely to be most appropriate for case studies. The authors have identified the following research questions:

RQ_1 What different types of RSCIs can be identified?
RQ_2 How does RSCI affect competitive advantage?
RQ_3 How are different inputs used to produce RSCI?
RQ_4 What analyses should be made in order to choose the right inputs?

Unit of Analysis

The unit of analysis defines what the case *is*. It may be an individual, some event or entity that is less well defined than a single individual such as decisions, programs, an implementation process or an organisational change. Specific time boundaries should be used to define the beginning and the end of the case (Yin 2003). The purpose of the case studies were to provide best practice examples of how RSCI has been achieved. The unit of analysis was the innovation process for RSCI, illustrated in Figure 16. The unit of analysis consists of input, RSCI, and output and how they are influenced by contextual factors. Input may consist of actions or analyses and the output may be competitive advantage.

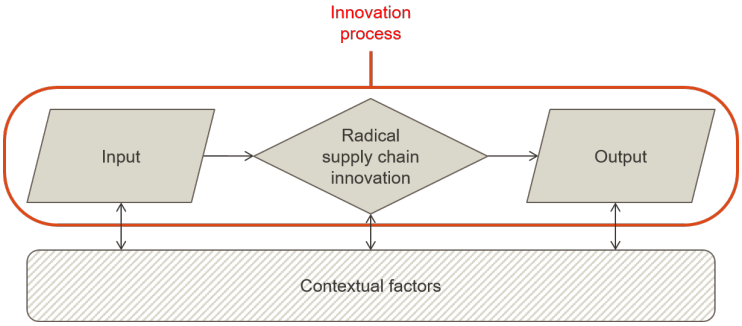

Figure 16: Unit of analysis for the case study research.

The Logic Linking the Data to the Research Questions
The data gathering must be targeted to catch answers to the research questions posed. A categorisation, or pattern matching, was used already in the literature study, tabulating the types of RSCI that can be identified from literature, relating to the first research question. Outcomes of the RSCIs in literature were categorised and their relation to RSCI, to lay the foundation of answering the second research question. The same tabulation and pattern matching was done for inputs and analyses, connecting to the third and fourth research questions. With the initial categorisations from literature, empirical data could be matched towards theory and further connections established. More on the analysis method can be found in section 3.4.4, where the data coding process is elaborated on.

Criteria for Interpreting the Findings
The last step examines how well the findings match the patterns found. With the goal of building an actionable model, predictions must be made on the basis of the cases. Having multiple cases to compare helped in drawing more general conclusions, as did the in-depth and targeted study that is hard to gather from literature. Apparent connections could feed into changing the model (e.g. company A performed RSCI type B with the outcome C. The connection between type B and outcome C can be established). Interpreting the tabulated results as well as the qualitative data, any apparent common pattern between cases was analysed and, though not provable, formed the base of hypotheses (e.g. companies X and Y are both organised according to form Z and succeeded with RSCI type B. A connection between organisational form Z and success in B is hypothesised).

Selecting Cases
According to Ellram (1996), the number of cases needed must be determined before data collection. The use of multiple case studies enable identification of cross-case patterns and development of a theoretical framework. For this project, a target of five to six cases was set up.

The sample was selected with the unit of analysis in mind. The case candidates were chosen based on a number of criteria, presented in the list below. First, a specific event or

action that lead to radical innovation was required, in order to be able to study the specific process. The innovation needed to demonstrate the radical part through novelty and lead to a clear, risky departure from existing practice. Creation of a competitive advantage, such as superior value or reduced cost, was a criterion in order to qualify as a potential case. The objective was to cover different type of innovations and cases were selected from different industries to increase generalizability. Furthermore, the cases must be accessible and willing to share information. The contact may be through telephone or video link but at least two cases must be accessed at the company site to improve construct validity. To be able to access key personnel the change must be contemporary. In Table 14 the potential case candidates and how well they qualify to the criteria for selection is presented.

Criteria for Selection

- The cases should demonstrate radical innovation
- The sample should represent different types of RSCI
- The sample should represent different industries
- The companies must be accessible

Table 14: Potential candidates contacted to participate in the study, representing cases of RSCI.

Company	Type of RSCI	Industry	Accessible
Amazon Flex	Responsiveness, Service	E-commerce	No
Amazon Fulfilment	Efficiency	E-commerce	No
Convini	Efficiency	Retail	No
Daimler, car2go	SC Service	Automotive	Video link
Dell	Reconfiguration, Efficiency	Electronics	No
Ericsson	Responsiveness	Telecom	Company site & video link
IKEA	Efficiency	Retail	No
Glossybox	Efficiency	Retail	No
Hilti	SC Service	Construction	No
LCBO	Efficiency	Retail	No
Maersk	Efficiency	Shipping	Company site
Mathem	Reconfiguration	Retail	No
Metro	Reconfiguration	Media	Physical, non-company site
Min Doktor	SC Service	Health care	Company site
Mölnycke Healthcare	SC Service	Health care	No
Packsize	Efficiency	Packaging	No
Smart car	Collaboration	Automotive	No
Whirlpool	Collaboration	Electronics	No
Zara	Responsiveness	Retail	No

Companies representing all the types of RSCI identified so far could be found, as well as a variety of industries. The constricting factor, or bottleneck, was accessibility both in terms of finding key personnel and for the companies to agree to participate. Three companies were accessible at the company site, whereas one agreed to meeting in person off site. One was accessible over video link. Five companies fulfilled all requirements.

Designing Data Collection Protocol
A research protocol should be created before conducting the cases. The research protocol may include: key research issues, the design of the research, the proposed methodology and the interview guide (Yin 2003). To increase the trustworthiness of the study different techniques can be used to study the phenomenon - this is called triangulation. The primary qualitative data collection techniques used in case study research are; direct observation, recordings and interviews (Ellram 1996). The authors developed a data collection protocol containing the key research issues, the design of the research and an semi-structured interview guide, which is attached in appendix A.

3.4.2 Conducting the Multiple Case Study

Conducting the case study consisted of two parallel activities: contacting the potential candidates presented in Table 14 and to perform the actual data collection. The two activities are descibed below.

Contacting Candidates
After potential cases were identified based on the criteria of selection, the cases best qualifying for the study were contacted first. Contact details to access key personnel were obtained through searching on-line, through use of the authors personal network and through the network of Implement Consulting Group. The initial contact were mainly through e-mail and telephone, thereby appointments for interviews were booked.

Collecting Data
To increase reliability of a case study several sources of evidence should be used during data collection (Yin 2003). In Table 15, six sources of evidence are presented; documentation, archival records, interviews, direct observations, participants observations and physical artifacts, together with their strengths and weaknesses. In this study interviews together with documentation and archival records were used for data collection. No observations were used since it was considered to be too time consuming to fit in the time frame of this study.

Table 15: Six sources of evidence and corresponding strengths and weaknesses adopted from Yin (2003, p. 86)

Source	**Strengths**	**Weaknesses**
Documentation	Stable: can be viewed repeatedly Unobtrusive: not created within the study Exact: contains exact names, references Broad coverage: long span of time, many settings and events	Retrievable, can be difficult to find Biased selectivity, if collection is incomplete Reporting bias: reflects (unknown) bias of author Accessible: may be deliberate
Archival records	Same as those for documentation Precise and usually quantitative	Same as those for documentation Low accessibility due to privacy reasons
Interviews	Targeted: focuses directly on case study topics Insightful: provides perceived causal inferences and explanations	Bias due to poorly articulated questions Response bias Inaccurate due to poor recall Reflexivity: interviewee gives what interviewer wants to hear
Direct observations	Reality: covers events in real time Contextual: covers context of the case	Time-consuming Selectivity: hard to cover whole context Reflexivity: observing an event may affect it Cost: many man hours may be needed
Participant observations	Same as those for direct observations Insightful into interpersonal behaviour and motives	Same as those for direct observations Bias due to participant-observer's manipulation of events
Physical artifacts	Insightful into cultural features Insightful into technical operations	Selectivity Availability

The interviews were performed individually with one to three staff members at the case company. It was a criterion that the participants work, or had previously worked, at a relevant position to have sufficient information regarding the unit of analysis. The interviews were semi-structured and had a duration of 30 min to 90 min, depending on accessibility. In all case studies at least one interview was conducted. Relevant data regarding the case were collected from internal and external sources. Interviews were recorded and notes were taken to be able to reflect deeply on the topics discussed. The companies participating in the case study and information regarding the data collection are presented in Table 16.

Table 16: Interviews conducted in the study

Company	Interviewee	Position	Date of Interview	Length	Media
Daimler	Wolgang Gruel	Head of Autonomous Mobility Systems, car2go	30 March 2016	30 min	Video link
Ericsson	Sten Wandel	Professor Emeritus, LU	1 April 2016	90 min	In person
Ericsson	Lars-Göran Hansson	Head of Radio Base Station Supply	6 April 2016	75 min	Video link
Ericsson	Lars Magnusson	Cross Process Driver	19 April 2016	90 min	In person
Maersk	Lars-Henrik Jensen	Operations Manager, RCM	11 April 2016	90 min	In person
Metro	Pelle Andersson	Founder	29 March 2016	75 min	In person
Min Doktor	Daniel Persson	Business Developer	23 March 2016	90 min	In person

3.4.3 Reporting the Case Studies

In his book, Yin (2003) point out the importance of starting to compose the reporting early in the analytic process, which was done in the categorising of RSCI, input and output in this case. In that way, the outline of the case study report could be drafted after the literature review was complete. The reporting follows a multiple case version of the classic single case, inspired by a question and answer format. The cases were reported separately in the empirics and in the analysis, with a cross-case analysis in the analysis phase. The internal structure were, however, drawn from the categories aimed at answering the research questions. The reporting of individual cases is therefore structured according to RSCI, input and output. An example of the question and answer format would be if the reader wishes to dive deeper in the first research question *"What different types of RSCIs can be identified?"*, then focus should be places on *"Radical Supply Chain Innovation"* sections.

In this research the authors have used the real names of companies and interviewees for all cases where it was approved. An outline of the case study report is presented in appendix A.

3.4.4 Analysing the Multiple Case Study

In order to conceptualise the result from the case studies the result needed to be analysed. First the findings within each case were analysed, thereafter analyses were conducted between cases and cross-case patterns identified. The analysis of the case study evidence is the most difficult part of doing case studies and lacks well developed frameworks (Yin 2003).

The analytical tools were chosen and used targeting the research questions, purpose and success criteria set up, which provided direction in the same way theoretical propositions would.

In his book Yin (2003) presents five techniques of how to analyse case studies: pattern matching, explanation building, time-series analysis, logic models, and cross-case synthesis. However, none of these techniques are simple to use or can be used mechanically following a strict procedure. Moreover, Ellram (1996) presents data coding processes, containing different analysis techniques, performed in three mutually dependent, iterative processes: open coding, axial coding, and selective coding. In this study a method inspired by data coding were used to analyse the results. Both in the individual cases and cross-case synthesis, tabulation was an important tool to code and interpret.

Analysing Individual Cases

The coding of data begun with the literature review, in order to categorise RSCI, input and output. Open coding was an essential tool in the work, providing a method of break the data down and present in tables. Open coding was used to present data *as is* in a descriptive and comprehensive way. Practically, this entailed pinpointing what was essential parts of input, output and RSCI in each case.

Thereafter, connections had to be made in the data based on the categories identified in the open coding. Ellram (1996) pinpoints that many researchers do not distinguish between open and axial coding, and all the coding methods are iterative in nature. However, studying interactions and conditions in order to provide greater insight into the data is considered axial coding here. Ellram (1996) highlights that axial coding may also be called pattern coding, since patterns and dependencies are investigated. In practice, the patterns would be finding common factors in the RSCI types, aligning them and identifying sub-components.

Cross-Case Synthesis

In a cross-case synthesis each individual case study is treated as a separate study. A challenge when using synthesising is to develop strong and reasonable arguments that are supported by the data (Yin 2003). The analysis was based on the tables created in the open and axial coding processes. Additional word tables were also created in order to examine other processes and outcomes of interest, after which the collection of tables was analysed and cross-case conclusions drawn. The conclusions were on a higher level, like hypothesising causal relationships between RSCI and outputs, something that could not be done purely from literature.

The cross-case synthesis contained elements of selective coding, which can be used to connect the theory and make it coherent (Ellram 1996). Selective coding, was used to select central categories of the analysis, relate them to other categories, to validate them and to further develop categories. Selective coding is an integrative process, as axial

coding, however it is performed at a much higher, holistic level of analysis. In selective coding alternative patterns are sought out and analysed in order to find new perspectives to describe the phenomenon. Selective coding relies heavily on pattern matching, which is considered one of the best techniques in case study analysis (Yin 2003). Patterns was developed based on the empiric and thereafter compared with previous research and the predicted pattern.

3.5 The Quality of the Research Design

In this section, the quality of the research is evaluated in two parts: first, the general approach of the constructive approach with the nested case study is evaluated, followed by an in-depth evaluation of the case study method. The first part is more holistic in nature, whereas the second more specific.

3.5.1 Judging the Quality of the Constructive Approach

The process of synthesising the conclusions is creative by nature and is bound to few academic guidelines (Lukka 2003). The validation part aimed to answer the question of whether the purpose is fulfilled by the model:

- Is the produced model generic (collectively exhaustive)?
- Is the model actionable in pursuing RSCI?

In order to test these questions, validation workshops were carried out with potential clients to ICG, interested in exploring RSCI. The workshops were three hours in length, several participants from both ICG and the client organisations participated. The purpose was to apply the model and see if interesting ideas could be produced. The full method is described in section 3.3. Here follows a discussion in terms of validity, reliability and objectivity.

Validity
The study aims to map how to approach RSCI, and the validity question is whether or not what is measured in this research actually captures that. The evaluation workshops are used as a way to measure that and should provide some indications. However, the workshops are limited in length and do not go into refinement of ideas or implementation, for obvious reasons like time constraints. The questionnaires used for evaluation were handed out in presence of the consultants and researchers hosting the workshop, which may cause participants to score higher than otherwise.

Reliability
Are the measuring instruments reliable? The validation workshops were few in number,

but the respondents were fairly numerous (seven). The combination of the content in the model is inseparable from the facilitation of workshops as such, and one might affect the other. However, the purpose is to create an actionable and generic model for RSCI and the only thing that matters are the results. That is, if a well executed workshop can boost the content to a level were participants are happy with the outcome, the purpose is all the same fulfilled.

Objectivity
Only two industries and companies were covered in the workshops, but one of the companies (a 3PL) work across industries and that coverage should transfer into extended objectivity. Generalising from case studies is elaborated on below.

3.5.2 Judging the Quality of the Case Study Method

For both qualitative and quantitative case studies, the following dimensions are important to consider to evaluate the quality of the study (Yin 2003). An overview of tactics available and used are presented in Table 17, and elaborated on in this section.

- **Construct validity:** establishing correct operational measures for the concepts being studied.
- **Internal validity:** establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships.
- **External validity:** establishing the domain to which a study's findings can be generalised.
- **Reliability:** demonstrating that the operations of a study, such as the data collection procedures, can be repeated with the same results

Table 17: Case study tactics for four design tests (Yin 2003, p. 34), with applied tactics marked by *

Tests	**Case study tactic**	**Phase of research in which tactic occurs**
Construct validity	Use multiple sources of evidence*	Data collection
	Establish chain of evidence*	Data collection
	Have key informants review draft case study report*	Composition
Internal validity	Do pattern-matching	Data analysis
	Do explanation-building*	Data analysis
	Address rival explanations	Data analysis
	Use logic models	Data Analysis
External validity	Use theory in single-case studies	Research design
	Use replication logic in multiple-case studies	Research design
Reliability	Use case study protocol*	Data collection
	Develop case study database	Data collection

Construct Validity
In this research multiple sources of evidence were used, and a chain of evidence was established in an effort to reduce the subjectivity of the data collected. The case study outline was reviewed and critiqued by the academic supervisor before the data collection was initiated, and case reports were sent to interviewees for validation before the final edition was published.

Yin (2003) stated that a researcher has to (1) define what type of changes are to be studied and relate them to the study objective as well as (2) demonstrate that the selected measures of these changes do indeed reflect the definitions set up. In other words, break the purpose down into sub-components and find good proxies to measure those sub-components. The purpose is the construct a generic and actionable model to achieve RSCI. The concept of RSCI has been broken down into competitive advantage and newness of the change, the degree of which are subjective measures that are discussed in sections 5 and 6.

Multiple sources were used, as described in the description of conducting cases (section 3.4.2). A chain of evidence is established if a reader can follow the conclusions in backwards chronology through case study database, specific sources of evidence, case study protocol and case study questions (Yin 2003). Hopefully, the curious reader can successfully venture on such a journey in this research. The informants of the research were given the opportunity to provide feedback on the (nearly) finished reports before publication, providing an opportunity to straighten out mistakes.

Internal Validity
The second factor, internal validity, is only a concern in explanatory case studies (Ellram 1996). Internal validity concerns making correct inferences from the data, the use of convergent data and the consideration of alternative explanations. Drawing conclusions on causal links is admittedly hard to do from the data gathered, and definitive conclusions cannot be made. Hypotheses were set up that merits further academic investigations.

External Validity
In the initial phase of the study, during the design of the research, the external validity was addressed. The external validity refer to how accurately the study represent the phenomenon and evaluate the generalisability of the result. This has been a major criticism of case studies and it is best addressed through replicating case studies and verifying patterns (Ellram 1996).

Replication logic is an important part of external validity, which is hard to do in a case study format. It was implemented in the reconsideration of the case study protocol after each case empirics was collected. The cases were selected based on *having achieved* RSCI, thus predicting similar results between them. Relating to Yin (2003), who deemed 6-10 cases enough to support an initial hypothesis if turned out as predicted, five cases may not be sufficient to draw definite conclusions. The sampling was, however done in line with

the logic presented as replication logic by Yin (2003). A thorough literature framework was developed, which Yin (2003) emphasises as important. Furthermore, in order to catch differences between industries, a selection of industries were covered, as with types of RSCI, to boost generalizability.

Reliability

Another major issue of a research is the reliability and whether the same result will be achieved through replication. The design and use of a case protocol is of great importance for the reliability of a study, which was done for this research (presented in appendix A). According to Ellram (1996), reliability is even more important in multiple case studies. To increase reliability, the authors began the collection of empirics with a pilot case study, after which it was used to further refine the research regarding both content and procedure for the following case studies.

An attempt to build a case study database was done, as presented in the empirics section (section 4). Those who agreed to participate in the study were sent information in advance. This information included a copy of the interview guide and overview of the research to prepare the participants on what type of questions to expect and what information will be requested. The case study method included using multiple data sources, which increases reliability (Ellram 1996).

4 Empirical Data

In this section the empirics from the case studies are presented. For each case a description of the company background and its business model is presented, followed by the process of RSCI. The process of RSCI concist of the RSCI achieved, the inputs identified, and the outputs of the RSCI.

4.1 Daimler - Providing Cars as a Service through car2go

The empirics of car2go is presented in this section. First the company and its business model are presented, thereafter a description of the innovation is presented followed by its input and output.

4.1.1 The Company and its Business Model

In this section the company background of Daimler, followed by a description of the business model of car2go. The business model consists of value proposition; customers, channels and revenue streams; key activities, resources and cost structure; and key partnerships.

Company Background
Daimler AG is a German multinational automotive corporation, which runs several businesses including Mercedes-Benz, Daimler Trucks, Daimler Buses, Mercedes-Benz Vans and Daimler Financial Services. In 2015 Daimler sold 2.9 million vehicles, an increase compared to 2014 by 12%. By unit sales, Daimler comes in as the thirteenth largest car manufacturer in the world and the second-largest truck manufacturer (Daimler 2016).

Through its Business Innovation branch, Daimler started car2go in 2008. car2go provides rental cars available at multiple convenient locations around cities, as opposed to one fixed rental spot. To utilize the service, users need to register for it. Using a smartphone application, users may search for, book, unlock and pay for vehicles. car2go started in Ulm in Germany 2008 and the first pilot was internal to the company with a fleet of 50 cars, thereafter it expanded outside the company with 200 cars. Because of positive customer feedback the expansion kept on going (Gruel 30 March 2016).

Daimler describes Business Innovation as a think tank, a lab for new business models, with large focus on decentralisation and case-by-case management (Mercedes-Benz 2016a). Business Innovation has produced several more new businesses since its inception in 2007, of which a selection is the launch of the *moovel* application in 2012, *Mercedes me* in 2014, and *Mercedes-Benz energy storage*. *moovel* aims to integrate the interface between people and and urban transportation, by car, public transportation or any other means. *Mercedes me* is a customer platform that covers all services Mercedes-Benz provides to its customers,

as a complement to the brick-and-mortar stores around the world. *Mercedes-Benz energy storage* was spawned as a storage unit for both home and business use (Mercedes-Benz 2016b). A timeline displaying a few of Business Innovation's initiatives is displayed in Figure 17.

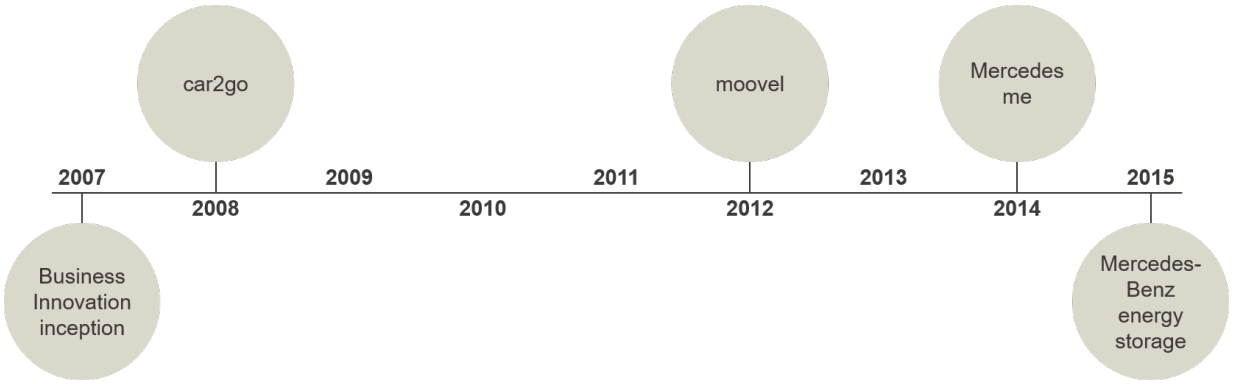

Figure 17: A selection of the outputs of Daimler's Business Innovation. Adapted from Mercedes-Benz (2016b).

Value Proposition of car2go

car2go provides access to a car without owning one. The pricing is simple and there is no hassle of owning a car, such as insurance, maintenance or parking (Gruel 30 March 2016).

Customers, Channels and Revenue Streams

car2go is focused on the consumer market. In order to use the service, one has to create an account with car2go. The cars can either be booked in advanced or used right away, controlled through the smartphone application (app). Whenever a customer wants to use a car, availability is checked via the app and a car is reserved. The car is also unlocked via the app and is then ready to use. car2go supports one-way trips, meaning that a user only needs to leave it in accordance with the city's parking rules as opposed to in the same place as where it was picked up. Both minutely, hourly and daily rates are available, and a one-time sign up fee adds on. The fees are all-inclusive and cover rental, gas, insurance, parking in authorised areas, and maintenance (car2go 2016a).

Key Activities, Resources and Cost Structure

car2go almost exclusively uses *Smart Fortwo* vehicles by Smart Automotive, another subsidiary of Daimler. Of course there is a convenience in using internal supply, but the size of the Smart car is aligned with the strategy of car2go in the focus on intra-city travel. However, pilots have been set up with four-door Mercedes vehicles as well, for example car2go Black, which is more targeted towards inter-city travel (car2go 2016b).

The IT development of car2go is done by a dedicated team. While the development of the service is done by one team for all locations, operations is dependant on other factors like

cities, fleet size, and number of customers. The core team developing car2go consisted of about five people that were supported by other resources from within and outside Daimler (Gruel 30 March 2016).

Key Partnerships
car2go mainly uses Smart cars today due to their convenience of usage in urban area. Smart is another Daimler subsidiary (Gruel 30 March 2016).

Parking, on streets and certain garages, is usually included in the rental fees. In some markets, car2go collaborates with municipalities regarding parking space for the car fleet. That way, on-street parking can be included in the price for car2go cars wherever there is space, instead of having to find a special car2go parking (which is the case in other markets). (car2go 2016a; Gruel 30 March 2016). These arrangements require car2go to cooperate with local authorities, but is not the only area of collaboration. As Gruel (30 March 2016) put it: *"car2go collaborates with local authorities in order to provide the best customer experience possible an to help to solve mobility issues in cities."*

4.1.2 Radical Supply Chain Innovation

car2go has had some considerable impact on the carsharing market, being the largest player as of May 2015 (Dryden 2015). Looking at the automotive industry as a whole and not just the carsharing component, the move from producing cars to delivering them as a service (specifically categorised by Rutqvist (2015) as *product as a service*), was something new at the time. However, other manufacturers, such as Volkswagen, BMW and Peugeot, followed in the subsequent time (TheIndependent 2011).

4.1.3 Input

The input to RSCI consists of targeted RSCI tools, antecedents and generic innovation tools.

Targeted Radical Supply Chain Innovation Tools
Gruel (30 March 2016) described how the carsharing services before car2go were very community-based, and a bit more rigid. Zipcar, an early and fairly successful example, let its users book the vehicle for a specific period of time and return at the same spot. A new feature of car2go was thus the increased customer convenience due to one-way travels and renting for a dynamic period of time, meaning you do not have to plan where to go or for how long specifically (Gruel 30 March 2016).

Antecedents
Antecedents to the RSCI could be identified within the fields of knowledge and learning, technology, network structure and relations, and market orientation.

Knowledge and Learning
The core team was recruited into Business Innovation from multiple functions. They were hand-picked by the founder Robert Henrich in order to create a strong core team. An important factor for people working in innovation projects is passion, driving the innovation forward. Though business cases can be set up in early stages of the innovation process, insights will be very limited as they are based on many assumptions. Instead of going into detail on business cases, key assumptions need to be proven as early as possible (Gruel 30 March 2016).

Technology
In technology acquisition, car2go used both internal and external developers, depending on what suited the task best (Gruel 30 March 2016).

Network Structure and Relations
The contacts between Business Innovation and Daimler were intimate, with employees connecting frequently. Firm guidance was not inflicted from Daimler on Business Innovation, but rather a dialogue where both parties could provide suggestions and improve ideas (Gruel 30 March 2016).

Market Orientation
According to Mercedes-Benz (2016a), Business Innovation works extensively with being market oriented:

> *"This "breeding ground for innovative ideas" takes a very unique position within the company. It's not simply enough to "think outside of the box" — there is a need to develop a supportive structure to encourage the international team's way of thinking and working."*

The essential task is described as recognising trends early enough in order to turn them into new business models. In order to accomplish it, a large focus is placed on closely monitoring different markets. Proximity is key, the sites Business Innovation has are displayed in Figure 18. In the words of Business Innovation itself (Mercedes-Benz 2016a):

> *"This not only requires strokes of insight and inspiration but also the integration of a broadly skilled team in order to pull the most pertinent knowledge from various areas of specialization. It's therefore hard to place employees of Business Innovation into a specific niche, as roles may change according to the topics being addressed — thus ensuring that their knowledge is used in the most effective way. Of course, it is also important to keep one ear to the ground in order to stay on the cutting edge of technological trends worldwide. A total of five offices in Germany, the USA, China, Brazil and Argentina work closely together to make for a consistently global approach."*

Figure 18: The sites of Daimler's Business Innovation. Adapted from Gruel (30 March 2016).

Generic Innovation Tools

The Business Innovation unit uses several models to achieve their innovation, which they describe as business innovation.

Finding the Problem

The rapid prototyping of car2go was enabled by using scrum-like methods with agile iterations of ideas to identify and solve issues as they pop up. The main idea was set up early by the founder and consecutive CEO of car2go Robert Henrich who was looking for a new idea (Gruel 30 March 2016).

Solving the Problem

When it comes to new businesses there is a limit to how detailed the business cases can get. Sometimes you just need to test it in order to move forward, which demands a clear value proposition. The value proposition needed to be supported by investigating three key questions. First, the need had to be proven. Second, willingness to pay for satisfying the need. Third, the feasibility of scaling the business from small pilot to international business needed proving. These proofs of concept were done through pilots, where the project went from idea to internal pilot in less than a year. The 50 cars for the internal pilot soon became 200 cars for external pilot in Ulm when people responded well (Gruel 30 March 2016). The general process on Business Innovation, which fits well with how car2go was developed, is displayed in Figure 19

The innovation process was inspired by the stage gate model by Cooper et al. (2002), which describes an approach to innovation. Important decision points were determined whenever it came to resource allocation, for example buying the first cars for prototyping, buying more cars to run a pilot and so on towards launch (Gruel 30 March 2016).

Organising for Innovation

The very organisation of Business Innovation within Daimler is an essential part of the

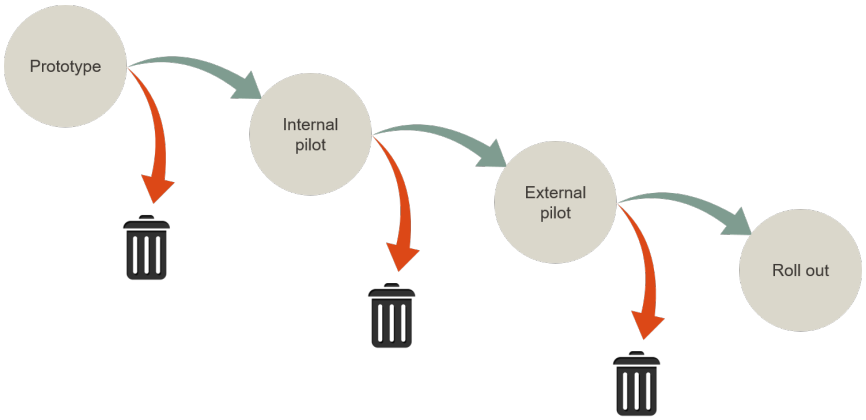

Figure 19: Daimler's Business Innovation process. A large focus is put on speed, where ideas are taken to the next step or discarded fast. Adapted from (Gruel 30 March 2016).

innovation production. All employees there were allocated for creating new businesses. Running the business and developing the business at the same time by the same people is a very difficult task. Especially for radical innovations, a separation of the two is helpful, according to Gruel (30 March 2016).

The Business Innovation team also acts as facilitators of innovation, in order to pick up ideas from within the organisation itself, with initiatives such as *Digital Life Day*. It is, as the name suggests, focused on digital developments within the company. Current hot-topic innovations such as autonomous driving and digital services are covered in detail. Not only are the workshops focused on developing interesting new ideas and projects, participants are also trained to pitch their ideas, inspire others and evangelise the product to potential partners. All focused on going all the way to implementation. The ideas are screened according to certain criteria, on a high level described as whether or not the idea fits with the core mission of Business Innovation (creating new businesses), and whether it meets the best interests of its customers (Mercedes-Benz 2016b).

Business Innovation seeks to connect with other innovation-driven organisations through knowledge exchange networks. For example *Startupbootcamp*, an inter-organisational, -national, and -industrial network which connects start-ups with important players relevant to their business (Mercedes-Benz 2016c).

4.1.4 Output

The features distinguishing car2go from their carsharing foregoers are one-way travel support and not having to book in advance (Gruel 30 March 2016). These are value adding services for the customers that would justify a higher price compared to alternatives without such options.

4.2 Ericsson - Responsiveness through Merge-in-Transit

The empirics of Ericsson is presented in this section. First the company and its business model are presented, thereafter a description of the innovation is presented followed by its input and output.

4.2.1 The Company and its Business Model

In this section the company background of Ericsson is presented, followed by a description of the business model with focus on Merge-in-Transit (MIT). The business model consists of value proposition; customers, channels and revenue streams; key activities, resources and cost structure; and key partnerships.

Company Background
Ericsson is a multinational provider of communication technology and services, headquartered in Stockholm, Sweden. Ericsson's products can be divided into (1) networks, (2) services and (3) support solutions, which are mostly provided to network operators. The largest part of revenues (55%) comes from networks, where products include infrastructure for mobile networks, core networks, internet protocol networks, and fixed-access solutions for copper and fiber. 40% of revenues come from services like operations management, equipment- and systems integration, multi-technology change programs, customer support, consulting, network rollout etc.. Finally, support solutions include software for operations and business support systems (OSS/BSS), as well as TV, media and m-commerce solutions. As of 2015, Ericsson had 116,000 employees, the turnover was SEK 246.9 billion, and operating income SEK 21.8 billion (Ericsson 2016).

As a part of the network business unit, Ericsson sells base stations to support the network infrastructure. A base station, for example in mobile communication networks, communicates with mobile devices using radio waves. Base station antennas are usually placed on rooftops, masts or on building walls. Additional antennas are usually placed in crowded areas such as offices or malls. The base station antennas can be placed both outside and inside (Ericsson 2010). A simple conceptual model of the interaction between phone users and base stations for the GSM network is displayed in Figure 20.

Hansson (6 April 2016) described how Ericsson in the mid 90s was a major player in the base station business, with a market share of roughly 30-40%. The base station business was subject of a large transformation project aiming at increasing the flexibility towards customers, that started in 1996 and stretched to 2006. Two main parts of the project could be identified, the first being consolidation of sourcing, which was forced by the large volumes of GSM base stations demanded by a thriving market. The second part was how to deliver more flexibly to customers, something that was becoming more and more vital. The flexibility part entailed the MIT project, which is the topic of this case.

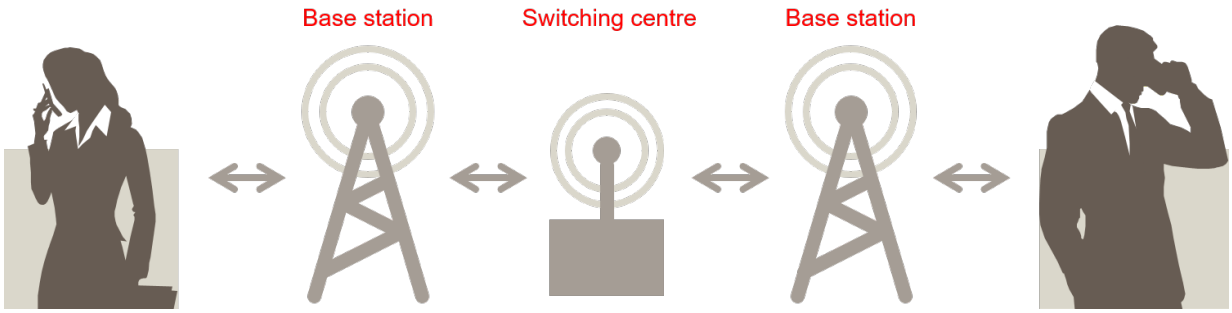

Figure 20: A simple model of the role of GSM base stations. The switching centres, routing calls between caller and receiver, are nowadays replaced by servers. At the time of the MIT introduction, one switching centre could serve around 1000 base stations (Hansson 6 April 2016).

MIT is a concept that includes postponement of assembly and cross-docking in delivery. When MIT was rolled out, the entire operations was performed by a 3PL. A Bill of Quantity (BOQ) with different items was ordered to a specific place at a specific time. Thereafter the 3PL was responsible of coordinating the deliveries from different suppliers, both international and local, at different merge points in the value chain. The goods arrived on time, in full, with very high precision. The accuracy of the delivery time was not allowed to deviate more than 30 minutes (Magnusson 19 April 2016). When the components arrived from different locations, the base stations were assembled in transit, or merged in transit, at certain configuration points (Hansson 6 April 2016). A conceptual model of MIT is visualised in Figure 21.

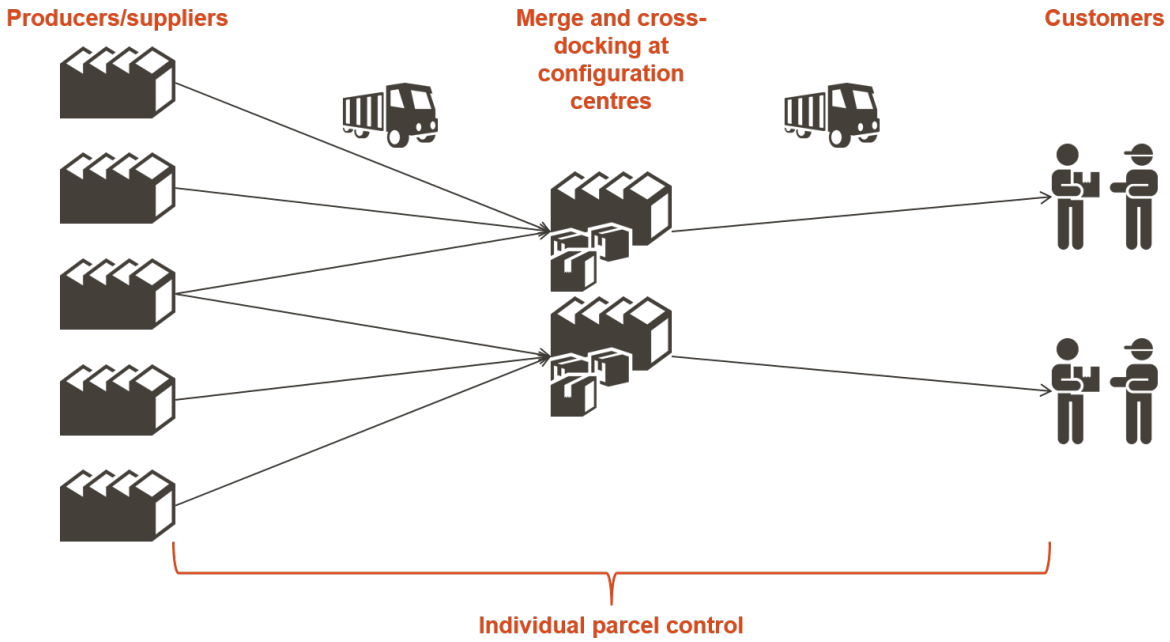

Figure 21: A model of the MIT concept, adapted from Wandel (1 April 2016).

Value Proposition
Ericsson's MIT concept provided customers with base stations at great flexibility. Instead of the previous 3 months from order to delivery of base stations, the delivery was made within two to three weeks. Short lead-times and high availability was key (Hansson 6 April 2016).

Customers, Channels and Revenue Streams
The customers, mainly network operators, buy infrastructure, including base stations, from Ericsson. The base stations are placed on rooftops, building or on the ground, which the operators must not necessarily own themselves. The sales channels to customers are direct, with (after the MIT project) a high level of systems integration. Customers demanded a lead time from order to delivery of about three weeks, with real delivery time (before the MIT project) being about three months (Hansson 6 April 2016).

Key Activities, Resources and Cost Structure
The first part of the project towards flexibility was the consolidation of sourcing, which led to considerable increase in efficiency. Ericsson went from around 75 suppliers for base stations to around 20 module suppliers. A key resource for MIT was the extensive network of configuration centres that was set up to support the assembly of base stations. The postponement of assembly (to configuration centres) was primarily focused on heavy and expensive equipment, such as antennas or diesel generators, that would tie up a lot of resources if assembled early on (Hansson 6 April 2016).

Ericsson used to have their own SC departments, but successively outsourced such activities to 3PLs (Wandel 1 April 2016). In Merge-in-Transit, the main part of the operation was run by 3PLs and the material flows were managed through control towers (Magnusson 19 April 2016). The logistics partners used for distribution were chosen partly after where they could provide configuration centres. The goal was to match the centre placements strategically to fit the customers' geographic distribution (Hansson 6 April 2016).

Monolithic IT systems such as SAP were the standard to use, and the MIT change demanded integration between parties in the SC. The systems integration between companies placed a large demand on capital investment, mostly due to consultancy fees for implementing the integration; a large investment compared to the licence fees for software (Hansson 6 April 2016).

Key Partnerships
The MIT concept was set up in collaboration with universities, Lund and Stanford, as well as 3PLs. Ericsson funded research that was carried out jointly with both researchers and Ericsson staff. 3PLs handled all execution of transport and warehousing (Wandel 1 April 2016).

4.2.2 Radical Supply Chain Innovation

The central part of the MIT concept, was the postponement of customer decoupling point forward in the supply chain. That is, the final assembly of components into products was made closer to the customer in a cross-docking like manner. The cross-docking was done at certain points (called configuration centra), until which the material was not tied to a specific customer order. The setup built on a weekly forecasting system and postponed assembly all the way to the delivery phase; an approach that was new to the group of peers providing telecommunications infrastructure (Hansson 6 April 2016; Wandel 1 April 2016).

Before the projects of Ericsson, the separation of companies in the value chain was distinct. That state was changed with Ericsson's MIT project and competitors consecutive similar projects; the industry moved towards supply chain integration (Hansson 6 April 2016).

What separated Ericsson from the business was the effectiveness in handling the increasing volumes and the satisfaction of customer needs. The flexibility was better than the competition for several years after the projects, which led to the maintainance of market share in an exploding market, where customers generally opposed suppliers growing too large (Hansson 6 April 2016).

4.2.3 Input

The input to RSCI consist of targeted RSCI tools, antecedents and generic innovation tools.

Targeted Radical Supply Chain Innovation Tools
In order to approach MIT, Ericsson had to design the SC and decide where to place the customer order decoupling point. The decision was based on geographic analysis, capital intensity of modules and components of base stations. Furthermore, the outsouring of logistics execution was key to keep a lean organisation running and based on an analysis of what Ericsson succeeded in doing and what it did not (Hansson 6 April 2016).

Magnusson (19 April 2016) emphasised the use of strategic KPIs, and their importance in the development of MIT. The strategy for KPIs used in MIT was similar to early versions of SCOR, which Ericsson later implemented (Magnusson 19 April 2016).

A holistic approach to SCM improvement is crucial in order to avoid sub-optimisation; one needs to work cross-functionally and address the five key areas simultaneously: (1) perfect order fulfilment (quality of products and delivery), (2) cost, (3) SC cost, (4) flexibility, and (5) lead times (Hansson 6 April 2016). Hansson also highlighted the functionally integrated work of SCM and key account managers.

Antecedents
Antecedents to the RSCI could be identified within the fields of knowledge and learning, technology, network structure and relations, and market orientation.

Knowledge and Learning
The IT competences demanded for integration of business systems between companies were mainly sourced from management consultants (Hansson 6 April 2016).

Technology
IT systems were too heavy back in the day in order to provide the visibility that the MIT concept demanded. The development in the times before and during the MIT development at Ericsson was characterised by a movement towards variations of IT systems and add-ons for SC monitoring. The visibility of the supply chain was dramatically improved by the new technology, which enabled the individual parcel control of MIT (Hansson 6 April 2016).

A factor interfering with the development of MIT, was the use of different ERP-systems by different actors in the value chain. When Ericsson implemented SAP, it was also forced to be used by collaborative partners to improve transparency and integration (Magnusson 19 April 2016).

EDI was another enabler of MIT, necessary in the process of order booking at the 3PL and allowing for the planning to be done by the 3PL. EDI enabled the transmission of orders, delivery notifications, invoices, and planning info for the mergers of MIT; merger data entailed what, where, when mergers were to happen. The technology of EDI was made possible by standardisation of data formats. Such standardisations were in turn made possible by deregularisations engineerined by Margaret Thatcher (Hansson 6 April 2016).

Network Structure and Relations
Universities and 3PLs were the most important partners in the prelude and development of MIT. The 3PLs grew with the tasks assigned to them as activities were outsourced. It was discovered that the 3PLs could do value-adding services at reloading points as well; the modularisation of products, and the following simplification of assembly, enabled 3PLs to do those tasks. The main 3PL that Ericsson used in the development was Geologistics, another was the German Kuehne + Nagel. The latter developed from a pure haulier into a 3PL, and Ericsson realised that 3PLs were better at keeping their logistics organisation slim. Thus, the outsourcing helped keep the costs down, since Ericsson tended to build large organisations for each activity they engaged in (Hansson 6 April 2016).

Ericsson played an important part in driving the standardisations of data formats forward, but, for natural reasons, needed other players to agree in order to succeed. Vodafone was one of the largest customers of Ericsson at the time, and so Ericsson convinced them to go along with the standardisations. The competition also went along, including Nokia, Alcatel, and Cisco (Hansson 6 April 2016).

Sten Wandel, at the time active at Linköping University, acted as a catalyst of the change by taking Ericsson staff on a field trip to USA to study the supply chains of other companies, among them Lucent and Dell. At the time (end of 1990s) Lucent was not yet a competitor, but had come a long way in using information hubs to increase transparency of the SC and had already set up MIT for their distribution of telephone systems for companies (Wandel 1 April 2016). Lars-Göran was then active with the consolidation of sourcing with the focus on increasing flexibility towards customers, and was inspired by the visit; the MIT concept fit in very well with the other initiatives to increase flexibility (Hansson 6 April 2016).

Lars-Göran met Wandel at the Stanford Supply Chain Forum and European Supply Chain Forum. Ericsson Supply Chain Academy (ESCA) was started jointly with Stanford and Lund University and research projects were initiated. The basis of the university collaboration was 60 SC issues across Ericsson's business, that neither Ericsson nor their consultants had solved. 15 of these were deemed approachable from an academic perspective; hence the involvement of universities instead of consultants (Wandel 1 April 2016).

Market Orientation
Hansson (6 April 2016) emphasised the need of customer value focus and specifically referred to the thoughts of Porter. In fact, the change in demand forecasting that included MIT was spurred by a realisation about Ericsson's customers. Ericsson previously considered its customers as bound to a plan with high precision. However, it turned out that its customers had a hard time planning exactly when they needed the base stations. In total, the number of base stations was fairly predictable, but there was a high variability in when the individual base station sites were ready for setup; the dealings with land owners and building permits could be extensive. It led to a demand for very short lead-times and high availability.

Cisco was a forerunner in product configuration and planning/info handling. Information hubs were used for business intelligence, which enabled them some of the visibility of the business intelligence systems. The SC department grew very skilled and finally developed a software for SCM, which is now available on the market. Both Cisco and Nokia were early adopters of the MIT concept but lost to Ericsson in time (Hansson 6 April 2016).

Generic Innovation Tools
In order to produce a successful transformation, extensive benchmarking was made both of other industries (such as Lucent and Dell, where visits were made) and internally to promote diffusion of best practices. Dell was one of the first that postponed assembly in the way that inspired MIT. One inspiration source was the very beneficial cash flow situation of Dell, that produced practically to customer orders, due to the very early payment from customers and the very late payment to suppliers. Ericsson copied this setup by the previously mentioned postponement of expensive modules like diesel generators and antennas (Hansson 6 April 2016).

4.2.4 Output

Several outputs of MIT could be identified by Hansson (6 April 2016), they are elaborated on in this section.

Value Adding for Ericsson through Capital Control
Dramatically shorter lead-times led to lower capital intensity of the business, which increased the return on investment for Ericsson and its owners (Hansson 6 April 2016).

Cost Benefits for Ericsson through increased Transparency and Consolidation of Sourcing
The IT-systems implemented led to higher SC transparency, which reduced the risk of opportunism in the relationships. The transparency, along with the consolidation of sourcing and reduced transportation (as a result of MIT) pushed SC cost below 10% of turnover, which it was not before (Hansson 6 April 2016).

Value Adding for the Customer through Flexibility
The customer satisfaction relied on flexibility, or the possibility of getting base stations with short notice and high availability. Ericsson managed to delight the customers, who wanted three weeks lead-times, with a lead-time of hours or days (Hansson 6 April 2016).

4.3 Maersk - Remote Container Management through Big Data

The empirics of Maersk is presented in this section. First the company and its business model are presented, thereafter a description of the innovation is presented followed by its input and output.

4.3.1 The Company and its Business Model

In this section the company background of Maersk is presented, followed by the business model with focus on Remote Container Management. The business model consists of value proposition; customers, channels and revenue streams; key activities, resources and cost structure; and key partnerships

Company Background
Maersk Line is the world's largest container shipping company with a fleet of 590 containers vessels. Maersk provides ocean transportation in all parts of the world and is known for reliable, flexible and eco-efficient services (Maersk 2016b). In the supply chain there

are trucks, terminals, depots and ocean carriers with no end-to-end visibility. For cargo requiring special conditions, this entail big risks. As a consequence, Maersk spends vast amount of time and money every year on inspection and monitoring of their refrigerated containers (Churchill 2016). The costs associated with refrigerated containers, also called reefers, are particularly high due to increased complexity of the containers and strict quality requirements to carry temperature sensitive cargo cargo. Maersk has introduced a system to remotely monitor their entire fleet of refrigerated containers. The system is called Remote Container Management (RCM) (Jensen 11 April 2016).

Value Proposition
The value proposition of RCM differs between the potential it brings to Maersk and to the customers.

To Maersk
RCM gives Maersk better cargo care, reduce claims, gives increased visibility superior cold chain transparency, and also enables identification of operational bottlenecks and process inefficiencies. RCM also makes it possible for Maersk to better identify faults in the SC and identify who is responsible for deviations (Jensen 11 April 2016).

To Customers
RCM enables Maersk Line's to optimize their operation and increase reliability and service level towards customers. Due to availability of data and improved information flows, customer and complaints claims can be addressed efficiently and accurately (Jensen 11 April 2016).

The future value of RCM towards customers has great potential. It is being evaluated whether to commercialize RCM and offer full transparency to customers. Moreover, is has been discussed to offer additional services such as the possibility for customers to control the temperature of containers directly depending on time of arrival or weather conditions (Jensen 11 April 2016).

Customers, Channels and Revenue Streams
Maersk Line has approximately 59,000 customers worldwide and covers ports in almost every country in the world and serve their customers through 324 offices in 115 countries (Maersk 2016b). The rates for shipments are determined based on a basic rate, mandatory surcharges and extra services (Maersk 2016a). Maersk operates about one million shipments a year with reefers. Before and during the transport, the containers are inspected and maintained by mechanics and the crew on board the vessels (Jensen 11 April 2016).

In its current state, RCM does not result in any additional revenue stream. Its main value is the saved costs through more efficient maintenance and root causing. If the data would be sold, it could result in revenue streams through process optimization and operational excellence. If RCM is commercialized, it could result in revenue streams. It is uncertain

whether a price premium could be added for the increased data availability, but customer interviews has shown that increased transparency alone may result in more cargo support (Jensen 11 April 2016).

Key Activities, Resources and Cost Structure
Maersk operates approximately 270,000 reefers. Most of the containers are purchased and owned by Maersk Line. Historically, there are high costs associated with the maintenance and technical support of the containers. If a reefer breaks down, there is a high risk that the cargo will be damaged or lost. To avoid this, the reefers are being are being monitored manually on a regular basis which requires a lot of man-hours and result in high costs.The regular monitoring, however, still leaves 12 – 24 hours in-between check and it may therefore take several hours before a malfunctioning container is attended. With RCM, the running condition of each reefer can now be remotely monitored every hour for the entire trip. Should malfunctioning occur, the system will immediately notify the local mechanic to attend the container and repair it (Jensen 11 April 2016).

In addition to the monitoring, RCM also enables Maersk Line to determine what type of service is required prior to next shipment. Before RCM, all reefers went through extensive, costs and time consuming service checks before each new trip. These are called pre-trip inspections (PTI). With RCM based on data collected throughout the journey, it can be now be establish whether the container requires a full inspection before the next trip or whether the container is performing satisfactorily. This system is called ePTI and is similar to the 'check engine' algorithm in automobiles. If the container is performing satisfactorily, ePTI shows green status and the container undergoes a visual inspection which requires less resources compared to a full inspection. With ePTI, the equipment turn time is improved, costs are reduced, resource utilization is improved and CO_2 emission is reduced. So far regular PTIs have been reduced with more than 50% (Jensen 11 April 2016).

The technology behind RCM consists of a modem, GPS, wireless SIM card and satellite link (Churchill 2016). The modem, GPS and SIM card are put in a box and mounted on all the 270,000 reefers, which enables collection of vital data regarding the running condition and power status in addition to GPS tracking (Maersk 2016b). To ensure unbroken data availability, Maersk has, in cooperation with Ericsson, installed VSAT satellite systems and GSM antennas on their vessels to create connectivity also at sea. The data is sent to a central server on an hourly basis. Through inter-link communication, all reefers onboard the vessels can report irrespective of stowage positions (Jensen 11 April 2016). An overview of RCM is presented in Figure 22.

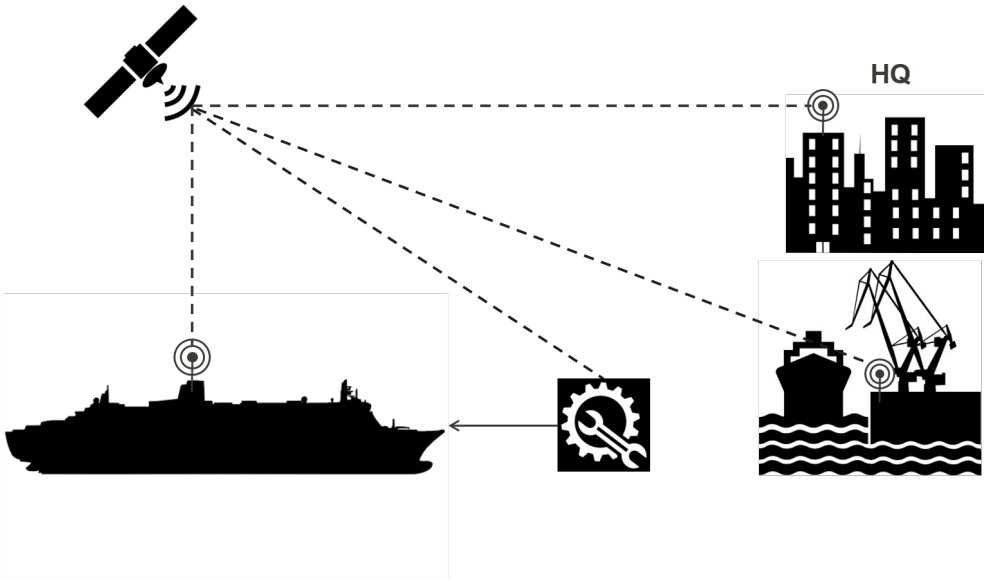

Figure 22: Overview of how RCM is constructed and what components it contains (Churchill 2016)

As of mid-2015, RCM is headed by three people at the Copenhagen headquarter. In addition to the management team, RCM has a huge global support center located in Chennai, India, with an additional 50-60 persons constantly monitoring and supporting RCM (Jensen 11 April 2016).

Key Partnerships
The infrastructure of RCM was developed jointly with Ericsson and AT&T. Ericsson's role was primarily to provide the GSM antennas while AT&T's main focus was data transmission and hardware. The IT part of RCM was developed internally (Jensen 11 April 2016).

The algorithm of ePTI was developed in cooperation with Danish Technical University (DTU) and IPU, an organisation with the goal of commercialising university knowledge, primarily working with DTU (Jensen 11 April 2016).

4.3.2 Radical Supply Chain Innovation

The effective use of big data is the most radical innovation of RCM. There are similar solutions, but Maersk is years ahead of competition concerning the effective way to use such unstructured data. The increased efficiency through superior transparency that RCM enables to Maersk's operations is unique to the shipping industry and enable Maersk to identify problems in the SC. It also drastically cuts the number of extensive unnecessary inspections and reduces running cost of reefers. If RCM was commercialized, the hourly data availability could also allow customers to make important business decision based on

the reported condition of the cargo. The connectivity spurs from the good collaboration with Ericsson and ATT (Jensen 11 April 2016).

Freight forwarders have similar solutions that mainly show the location of goods and perhaps a few reading on temperatures, nothing about the overall cargo condition and container running condition. Competitors have also tried to create solutions similar to RCM which they have tried to commercialise, however, the price for which it was sold was too high and it did not succeed (Jensen 11 April 2016).

4.3.3 Input

The input to RSCI consist of targeted RSCI tools, antecedents and generic innovation tools.

Targeted Radical Supply Chain Innovation Tools
Ericsson's development of a new IT-system to handle the big data from all the reefers was essential to reach efficiency increase. Before, it was difficult for Maersk to track deviations and identify who was responsible of damaging cargo. It resulted in Maersk spending huge amounts of resources on preventive maintenance and inspections to avoid breakdowns of reefers. In addition, Maersk would take responsibility of customer claims even though it was likely that another player in the value chain was responsible. The transparency RCM provided countered those problems (Jensen 11 April 2016)

The use of information towards responsiveness was another tool; through the algorithm and the feedback to customers, the speed of supply could be better matched to demand (Jensen 11 April 2016).

Antecedents
Antecedents to the RSCI could be identified within the fields of knowledge and learning, technology, network structure and relations, and market orientation.

Knowledge and Learning
During the development of RCM, knowledge and technical support was sourced from IPU and DTU. A lot of different people have been involved in the project of RCM, some of them full time and others only a few hours a week. In addition, many consultants have been involved the project, they were an especially important resource concerning the analysis of data. As a consequence, many of the persons involved in the early part of the development are not working with it anymore (Jensen 11 April 2016).

Technology
The technology behind RCM consist of a modem, GPS, wireless SIM card and satellite link (Churchill, 2016). The hardware Maersk install on the containers are not entirely new to the market and there are similar off the shelf products available. The algorithm (ePTI) and

data processing is what distinguish Maersk from the competition. It is very complex and has taken years to develop. The IT-department of Maersk together with consultants, DTU and IPU carried the main responsibility for developing the algorithm for ePTI (Jensen 11 April 2016).

Network Structure and Relations
Maersk has a business unit working with innovation which has partly been involved in the development of RCM. The innovation department, together with the RCM management group in Copenhagen, are looking for ways to better utilize the data now made available through RCM. The same time, the team is already now looking at the next generation of RCM hardware (Jensen 11 April 2016).

Market Orientation
During the development of RCM, some trials were made with customers about the sharing of data. It was found that the needs differ between for example banana importers and frozen fish importers. Frozen fish businesses are practically unaffected by reasonable deviations in temperature, whereas bananas are more sensitive to temperature deviations. Therefore, a more stable and transparent cold chain could be very valuable to businesses similar to banana importers. In moving forward with RCM, these insights will be important when shaping the value proposition of shared information. As RCM is shaped at the time of writing, these and other customer trials and meetings show that increased cargo care, transparency, reliability and on time delivery are of high priority for the customers. With RCM Maersk can optimize their operational processes. If RCM is commercialized, it may not generate additional revenue but it is likely that it would generate increased cargo volumes (Jensen 11 April 2016).

Generic Innovation Tools
During the development of ePTI as a part of RCM, inspiration was found through benchmarking with the automotive industry. A car is only brought to a mechanic when check engine lights are lit, and this approach was used as inspiration of how to reduce the inspection cost of refrigerated containers (Jensen 11 April 2016).

Maersk has an innovation department, working with business innovation. The main responsibility has for RCM development, however, not lied in the innovation department but in the operative department (Jensen 11 April 2016).

4.3.4 Output

The innovation of RCM resulted in significant cost benefits for Maersk. In addition, RCM has the potential of adding great value to Maersk's customers in the future.

Cost Benefit for Maersk
For Maersk, RCM results in radical cost reductions as a consequence of increased trans-

parency and decreased number of container inspections. Moreover, RCM enables detection and elimination of bottlenecks and non-value adding activities throughout the value chain. In addition, the number of claims are reduced through better transparency and increased data availability and information flow regarding cargo conditions Jensen (11 April 2016).

Future Value Adding for Maersk's Customers
Today, the data available through RCM is confidential and not shared with Maersk's customers. Commercialization is being evaluated. There are, however, both pros and cons to be duly considered. Whereas RCM is used to achieve operational excellence through full transparency and thereby will result in increased cargo care, releasing the data would also give customers direct insight. Such insight could create value to Maersk's customer through increased trust and reliability and thereby generate more cargo, but it could essentially also result in unfounded claims. All these factors will have to be carefully evaluated before deciding whether to launch RCM commercial (Jensen 11 April 2016).

4.4 Metro

The empirics of Metro is presented in this section. First the company and its business model are presented, thereafter a description of the innovation is presented followed by its input and output.

4.4.1 The Company and its Business Model

In this section the company background of Metro is presented, followed by an overview of the innovation process and a description of the business model. The business model consists of value proposition; customers, channels and revenue streams; key activities, resources and cost structure; and key partnerships

Company background
Metro is not only the biggest daily newspaper in Sweden with its 1.2 million readers, but also the biggest daily newspaper on a global basis. Every day 18 million people read Metro and the paper is available in 23 countries in 15 languages (Metro 2016).

Overview of development process
The first seed that became Metro was created in the head of Pelle Anderson in 1973, while studying to become a journalist in Stockholm. It was, however, a long way to go and it was not until 1995 when the first issue of Metro was released. The starting point for the realisation of the idea was a meeting with Pelle Anderson and his two friends Monica Lindstedt and Robert Braunerhielm in 1992 (Larsson 1996). Here follows a more detailed explanation of how the idea was developed.

During his time at the journalism school in the 1970s, Anderson was inspired by the leftist winds and quit his education to become a typographer at the maoist paper Gnistan, under the leadership of Jörgen Widsell (Larsson 1996). It was here that Anderson first met Robert Braunerhielm, one of Metro's three co-funders. Anderson later spent nine years at the large newspaper Dagens Nyheter, doing mostly editing and design. However, Pelle was not satisfied with how DN was created and described a persisting desire to produce a newspaper that the customers actually wanted (Larsson 1996).

Robert Braunerhielm also worked for Dagens Nyheter and was in 1986 appointed editor-in-chief of the 13 papers called *DN Runt stan*, papers that were transformed into ad-funded editions around the same time. CEO of *DN Runt stan* was HC Ejemyr, a man that later got involved with the Metro project. HC Ejemyr noted that as CEO he was not allowed to use the cheapest means of printing, but had to use Dagens Nyheter's own printing business. Through Anderson's consecutive occupation with his own design company BAD (Bark Anderson Design) in 1988, he got his first Kinnevik and Stenbeck contacts. His partner John Bark acted as a sparring partner, as did the co-founder-to-be Robert Braunerhielm. The three met in 1989 to discuss Andersson's idea. Braunerhielm suggested to involve Ejemyr. They included Ejemyr and his coworker Louis Davoust in the next meeting. Until this time, the idea was still concerning a weekly magazine (Pitkänen 2015).

Anderson met Lindstedt, the third co-founder, at a designing project for the company she was CEO at at the time, a company of the Bonnier group. Lindstedt had an education from Stockholm School of Economics, which helped in the initial calculations for Metro. When she quit her current job in 1992, Anderson called on her to discuss his idea of a new paper. That is how the trio of Lindstedt, Anderson, and Braunerhielm got to discussing the new papers together on 20 October 1992 (Larsson 1996).

Value proposition

The value proposition of Metro is presented from the view of the readers, advertisers and the collaborative partner SL.

Reader Value Proposition

Metro informed readers on the subway, short and briefly, through press items and short articles and one cover story per issue, a mini-reportage. All in the time span of 15-20 minutes (Larsson 1996). Metro is free to read and provides convenience to the reader through its distribution in stands in the public transport (Anderson 29 March 2016).

Advertiser Value Proposition

Metro provided cheap, easy and effective advertising to advertisers through efficient organisation, simple pricing and a high number of readers (Anderson 29 March 2016).

Partner Value Proposition

Metro secured a public transportation partnership with *Stockholms Lokaltrafik* (SL) by providing one page per paper that SL could use for communication towards workers and

travellers. In addition, Metro heightened the traveller experience at no cost (Anderson 29 March 2016).

Customers, Channels and Revenue Streams

In the traditional daily newspaper, only a third of the revenues come from subscriptions while the rest come from advertising. At the same time, the distribution cost take up roughly the same amount as the subscription revenues. By allowing the readers to pick up the paper themselves, it could be handed out for free, which is the core idea of Metro. The core of Metro's business model is to distribute the paper in connection to subways and buses and to cover the costs through advertisement (Larsson 1996). By making the paper free to the end user in this way, Metro managed to fill a need for news during a gap in the end users' day - the trip to work (Anderson 29 March 2016).

In the early 1990s, DN almost had monopoly on the market for paper advertisement. Advertising in DN was expensive and the system for how the ads were priced had a high degree of complexity. When Metro entered the marked, they charged a much lower price for their advertisements and used standardized pricing based on the size of the ad. This disrupted the market and made it much easier and cheaper to publish advertisement, which attracted new actors to the market of advertising. In the words of Pelle Anderson *"Metro created a whole knew market for advertisement, and made it even possible for a local hot-dog seller to set out ads in Metro"*. At the same time Metro could guarantee more viewers for each ad, and Anderson explain that all people who pick up a copy of Metro take an active decision that they will read the paper today, which result in more views for each ad. When the first person has read the paper it might be left on the train after which an other reader finds it, or it might be brought to a workplace or classroom where other readers pick it up. On the contrary, when a paper is sent to a families' mailbox the people living there might be on vacation or not able to read due to some other reason this specific day. Moreover, the probability that other readers will find it is lower since the paper is often read at home. Advertising in Metro was very beneficial for the advertisers and Metro had several success stories that proved it, and thereby it was not a problem to find advertisers (Anderson 29 March 2016).

Key Activities, Resources and Cost Structure

Metro was able to start its business using very limited financial means for three main reasons. First, during this time in the late 1980s, the technology for making newspaper was developed greatly, and there were many new tools and techniques at the market that reduced the resources required for creating a newspaper. For example, new software made it possible for anyone to design a newspaper themselves. Second, several actors misjudges the future need for printing and invested capital in printing houses which created a lot of overcapacity when they were finally done. Actually, the reading of newspapers was on the decline in large cities like Stockholm (whereas local newspapers in rural areas were doing well). This was the case for both SvD, DN, and Aftonbladet and in the beginning

Metro used contracts for printing in their facilities. The printing capacity was almost always owned by the papers, a trend that Metro broke. Third, Metro's strategy was to focus on their key activities distribution and objective news content. Everything that could be outsourced was outsourced, which resulted in a much leaner organisation than the competition. Metro used a lot of freelance journalists for articles and even private persons for chronicles. This got Metro closer to readers and it got more articles sent in. By following their strategy, Metro created an small, efficient and flexible organisation which enabled them to keep down their costs (Anderson 29 March 2016). In order to further minimise financial strain, Metro focused on reducing working capital, with strict customer credit of ten days, but with paying terms of 90 days or more (Pitkänen 2015). An interesting note is that even though the paper was supposed to be read in 20 minutes according to Metro itself, the cover story usually took more time than that. One reason for this approach was to make people bring it with them from the subway, reducing the cleaning expenses that Metro had to carry for SL (Anderson 29 March 2016).

Key Partnerships

The key to Metro's success was its distribution model, and this distribution model relied on the partnership with SL. From the start, the founders of Metro had high expectations to accomplish this cooperation with SL, but after several discussions they released they had a long way to go. First of all SL stated that they would not be willing to help funding Metro, neither cover any additional costs such as cleaning or fire prevention. To be able to proceed with the idea, the entrepreneurs needed to find external sponsors (Anderson 29 March 2016). At this time the market was insecure and it was impossible for Metro to obtain a loan from the bank. Furthermore, several potential investor had been contacted without success. Finally, Anderson contacted his former collegue Jörgen Widsell, who worked at Kinnevik and without much delay they were promised 50 million SEK from Jan Stenbeck and Kinnevik through the subsidiary Modern Times Group (MTG) (Larsson 1996).

With the funding set, the founders of Metro could get back to SL and proceed with the negotiation. In addition to external sponsors, SL demanded two things: (1) the paper had to be value-adding for SL's customers, and (2) all costs were to be carried by Metro. The entrepreneurs pushed for exclusive rights to the distribution, which was denied by SL. The negotiations continued without much progress and in April 1993 the entrepreneurs received a no from SL. The cooperation with SL was considered crucial to proceed with the idea and Lindstedt contacted SL once again to negotiate, after which the issue was escalated to the CEO of SL and the CEO of MTG.

When negotiations were done, the first demand from SL was secured through quality standards for the newspaper, the second through payment for any additional cleaning caused by the papers. In addition, Metro had to pay a yearly fee for the distribution. Papers were signed 5 Spetember 1994, not including exclusivity rights (Larsson 1996).

4.4.2 Radical Supply Chain Innovation

Metro was radical in many ways and changed the standards for the entire market for newspapers. Metro was the first actor in the world that succeeded to create this type of newspaper and there came many followers who tried to imitate it. When launched in Stockholm, Metro created an entire new market which included a broader scope, both readers and advertisers, that the previous papers did not reach (Anderson 29 March 2016).

There were other actors that created a similar paper and tried to compete with Metro, however, none of the competitors did really succeed. Potential reasons may be that the brand and first mover advantage that Metro had created were too big and that the competitors lacked the vital partnership with SL (Anderson 29 March 2016).

The innovation of Metro consist of two main parts which were crucial for its success; the idea for distribution and advertisment, and its implementation. Firstly, the innovation was the idea of financing a paper through advertising and place it in the public transport for the readers to come and pick it up themselves. But the idea was not sufficient, the effective implementation was vital for Metros success. The new technology enabled Metro to work efficiently and be flexible. Moreover, Metro filled a space on the market that where no other actors had been before and served as a service to the people traveling with the public transport (Anderson 29 March 2016).

Apart from the publicistic content, the leadership describes two success factors: (1) the simple and effective distribution, and (2) the modern production technology and simple and effective organisation (Larsson 1996) .

4.4.3 Input

The input to RSCI consist of targeted RSCI tools, antecedents and generic innovation tools.

Targeted Radical Supply Chain Innovation Tools

When creating an entire new organisation, Metro could acquire only the resources that were crucial for creating the paper and outsource activities beside the core business. Moreover, Metro put a lot of effort in to recruit the most talented people to their team (Anderson 29 March 2016).

The collaboration with SL was crucial for Metros success, however it took several years to convince SL and come to an agreement. The entrepreneurs had several meetings with SL were they try to convince them to cooperate, and for each meeting they brought a prototype of Metro that could had been given out that specific day (Anderson 29 March 2016).

The placement of the newspaper stands was a crucial analysis that Metro conducted. Robert Braunerhielm visited the metro stations in person and identified where the stream of people was most intense but a stands would not hinder an evacuation. These analyses went on and eventually resulted in the removal of stands from the ground level of the inner city, and eventually the addition of stands at low-cost supermarket Lidl (Anderson 29 March 2016).

Antecedents

Antecedents to the RSCI could be identified within the fields of knowledge and learning, technology, network structure and relations, and market orientation.

Knowledge and Learning

Metro recruited talented people, mostly from within their personal network, and created a team of both experienced and non-experienced co-workers with a passion to change the newspaper industry. Moreover, people were not judged based what they had previously done or who they were, but rather based on what they were capable of and what they produced. This created an ambitious environment and functioned as an incentive to work hard and efficiently (Anderson 29 March 2016).

The number of employees were kept low and most new staff were recruited from the current employee's networks. There was a great focus on keeping an efficient and reliable organisation were the employees trusted each other (Larsson 1996).

Technology

Metro used the latest technology on the market. When creating an entire new organisation they could acquire only the key resources required and avoid unnecessary cost for obsolete equipment (Anderson 29 March 2016).

Network Structure and Relations

Metro created an small and efficient organisation where they focused on the key activities. Support activities where outsourced to contractors or freelances. The relations within the organisations were close with a high degree of trust. In the words of Monica Lindstedt: *"We trusted each other. The amount of trust we had was our only asset"* (Larsson (1996) translated by the authors).

Market Orientation

During Pelle Anderson's time at DN the following became clear regarding their readers:

> *"Dagens Nyheter knew very well from their inquiries what their customers wanted. When they asked quitting subscribers why they quit they got two answers: I cannot afford it and I do not have time to read it. Still, no conclusions were drawn. The newspaper has increased both in price and thickness."* (Larsson 1996) (translated by the authors)

Metro developed a close relationship with their readers. They received heaps of letters from

the readers and took their comments and feedback into account. Consecutively, Metro learned that what the readers appreciated the most was the chronicles, representing a wide range of political opinions as opposed to the more classical editorial pages of contemporary newspapers. It was easier for regular people to publish their articles in Metro compared to their competitors, which tightened the relationship and increased the feeling of Metro being a part of the people. According to Anderson, Metro did not care about who the journalist was or how famous he or she was, but rather the content of the article. This created an whole new forum and made it possible for unknown journalist to get heard and prove their writing skills. The founder of Metro also looked for inspiration outside of Sweden. Content- and format-wise USA Today proved to be a role model (Anderson 29 March 2016).

Generic Innovation Tools
Metro succeeded in finding uncontested market space, and thus did not have competition when they started the business. They did so by differentiating from others with a novel distribution and revenue model. At the same time, the newspaper was the first daily newspaper that was free of charge. Another important working method was the focus on simplicity in organisation as well as pricing structures (Anderson 29 March 2016).

The entrepreneurs who developed Metro all had different backgrounds from the newspaper industry. Each of them had identified several aspects that could be improved and made more efficient, which they had in mind while creating Metro (Larsson 1996).

To asses the number of potential readers, analyses of the total number of people using the public transport and the potential share that could be interested in reading the paper were made (Pitkänen 2015).

The outcome of advertisement were analysed in several ways, both by Metro and by external actors, to be able to determine the diffusion and potential (Anderson 29 March 2016).

4.4.4 Output

The output of the innovation and how it created cost benefits and added value for Metro, readers, advertisers and Stockholms Lokaltrafik is elaborated in this section.

Metro
Metro became a success and the paper was profitable already in 1996. Shortly after the release of the first issue of Metro, it was the second most read daily newspaper in Stockholm (Larsson 1996). By 1997, the penetration in Stockholm was 40% and in Gothenburg, the consecutive expansion, 30% (Wadbring 2003). A reason enabling Metro's great impact was the profitability of the newspaper business in 1995. The newspaper business was highly lucrative, despite the entrance of Metro, which may have kept the competition from acting.

According to Piet Bakker, long time scholar of the ad-funded paper busiess at Utrech University, what was true in the 70's is not true anymore. The expansion of Internet and other ad-funded newspapers explosively increased the supply of ads in relation to demand. This has forced newspapers to move towards charging customers, and now up to 80% of revenues may come from customers, not one third as described by Pelle Anderson during his university days (Pitkänen 2015).

Readers
When metro was launched, it covered a market where no competitors existed. This was a blue ocean. Metro enabled readers to receive the latest news in a informative and convenient way.

Advertisers
The main value for advertisers was access to cheap, easy and effective advertising. It could be cheap because of Metro's lean organisation. The pricing was simplified compared to competition, cutting out the middle step of consultants helping ad buyers to do so. It could be effective due to the high ratio of readers per paper, an effect of the papers passing from one person to the next and the active decisions of readers to pick it up and read it (as opposed to having it handed to them by a worker).

Stockholms Lokaltrafik
Metro contributed to value to SL through allowing their own column in each issue of Metro assigned to SL to dispose as they desire. Moreover, Metro contributed to increased satisfaction among their customers which is great value for SL.

4.5 Min Doktor

The empirics of Min Doktor is presented in this section. First the company and its business model are presented. Thereafter a description of the innovation is presented followed by its input and output.

4.5.1 The Company and its Business Model

In this section the company background of Min Doktor is presented, followed by a description of the business model. The business model consists of value proposition; customers, channels and revenue streams; key activities, resources and cost structure; and key partnerships.

Company Background
The digital health care company Min Doktor was founded by Doctor Magnus Nyhlén in Lund 2013. The service is used to give reliable treatment to patients in an efficient way

through digital contact with a doctor. In 2015 Min Doktor had approximately 10,000 patients (Billing 2016) and a turnover of 6.5 million SEK (Billing 2016).

Min Doktor's customers can be divided in two groups, business to business (B2B) customers such as insurance companies or primary health care centers, or business to consumer (B2C) customers consisting of individuals without a private insurance. In Figure 23 the customer path for B2B and B2C customers is presented. B2B customers are either referred to a specialist practitioner or treated by Min Doktor, whereas most B2C customers go through the public health care providers if Min Doktor cannot fulfil the treatment (Persson 23 March 2016). The first step for patients using Min Doktor is to enter the website, after which the user needs to provide identification and answer questions regarding health status (traditionally called an anamnesis in patient-doctor interactions) and the service wanted. Thereafter the user pays and and the request is sent to a doctor. Usually within an hour, but at tops four hours, a doctor gets back to the patient with consultation of how to proceed. If the answered questions are not enough to give proper care, the doctor may contact the patient through secure text messaging, a call or a video link. Based on the information provided by the patient a diagnosis is given and, if needed, the doctor gives out prescriptions. In case the treatment requires lab examination, Min Doktor's collaborative partners are used. If the issue can not be served digitally, a referral to a public health care centre or a to a specialist is sent (*Om oss* 2016).

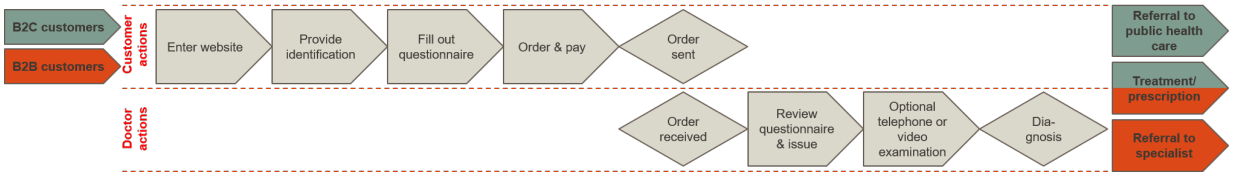

Figure 23: The customers' path through Min Doktors' organisation as drawn up by Persson (23 March 2016).

Value Proposition

The value proposition of Min Doktor differs between B2C and B2B, which is further elaborated in this section.

B2C Value Proposition

Persson (23 March 2016) described the core offering of Min Doktor as delivering accessible health care with drastically shorter lead times than alternatives at the terms of the patient. The emphasis is on "the terms of the patient", which Persson (23 March 2016) thought appeals the most to the customers.

B2B Value Proposition

Towards insurance companies, Persson (23 March 2016) described three main selling points: Min Doktor would (1) lower the costs of care for the insurance provider, (2) project an image of modernity on the insurance provider in a traditional business, and (3) provides value based care in an effective way through establishing the right level of treatment.

Towards traditional primary health care providers, Min Doktor serves as extra capacity, a service offered when patient meetings are fully booked.

Customers, Channels and Revenue Streams
Within the B2B business, Min Doktor has both insurance companies and other primary health care providers as customers. The majority of Min Doktor's patients arrive through the B2B segment and rely on the cooperation with insurance companies. Min Doktor cooperates with several insurance companies, such as Euro Accident, Skandia and Länsförsäkringar (Billing 2016). The insurance companies send their customers to Min Doktor to utilize their service, and the insurance companies are charged based on a pay-per-use model (Persson 23 March 2016). The website is the first contact for the B2C customers and the patients pay a fixed price of 295 SEK to get in contact with a doctor and 150 SEK to renew a prescription (*Min Doktor* 2016).

Key Activities, Resources and Cost Structure
The purpose of the service is not to replace traditional health care - but to serve as a complement and free up resources from the hospitals for where it is needed the most. In case of minor illnesses or cases that are not urgent, Min Doktor serves as the first contact with a doctor and provide reliable consultation of how to proceed (*Om oss* 2016).

The organisation of Min Doktor consist of roughly 50 employees, of which about 30 work with IT and system development and the rest work with management/business development, responsibility for medical services, sales and administration/support. The doctors working for Min Doktor are not situated in the facilities of Min Doktor, but work from any geographical location that fits them best. The doctors working for Min Doktor can be either employed directly by Min Doktor or work as consultants through their own companies. The doctors are compensated based on the type of service provided. Min Doktor believes it is important for doctors to continue to meet patients physically and do not encourage any doctors to work only for Min Doktor. Therefore, most of the doctors do not work full-time for Min Doktor, but rather work in their spare time beside their regular occupation. The connected doctors receive a message when a new inquiry arrive and if they are available and qualify for the request they serve the patient. With this structure of the service a high level of flexibility for the doctors is achieved (Persson 23 March 2016).

Key Partnerships
In Januari 2016, Min Doktor signed an agreement with the Swedish insurance company Länsförsäkringar. This was a big step for Min Doktor and enabled it to reach out and serve more patients (Billing 2016). It also reached agreements with another insurance company, Skandia, following an exponential growth the last years. During the early development of Min Doktor, an agreement with the insurance company Euro Accident was signed, which was crucial for the development of th (Persson 23 March 2016).

In March 2016, Min Doktor initiated a cooperation with the pharmacy chain Apoteket. The primary purpose of the cooperation is to provide medical care to women, and to offer free measurement of blood pressure to clients (Hedlin 2016). Persson (23 March 2016) explained that the purpose with the cooperation in the long run is to enable more convenient access to prescribed drugs and supporting services for the patients of Min Doktor, but the cooperation is still very new and the service is not yet fully developed.

panyThe com is currently developing partnerships with primary health care centers, who will redirect patients to Min Doktor when their own capacity is not sufficient to serve their patients (Persson 23 March 2016).

4.5.2 Radical Supply Chain Innovation

Min Doktor was the first digital health care provider on the Swedish market that remodelled the process of providing primary health care. The radical innovation is primarily the efficient use of time, both for the doctor and the patient, which has its core in the questionnaire (anamnesis) filled out by the patient during the initial contact with Min Doktor (Persson 23 March 2016).

Persson (23 March 2016) described that the purpose of Min Doktor is to make the health care more efficient through providing the service at the terms of the customers and simplifying for the patients. By using Min Doktor, the patient can receive reliable and secure consultation from a doctor independently of geographical location (Persson 23 March 2016). Persson (23 March 2016) explained that traditional public health care has the target of the patient meeting a doctor one week from initial contact, whereas Min Doktor has the goal of one hour from contact to assessment, with the current mean of less than 30 minutes.

For B2B customers, the change is towards efficiency. Min Doktor acts as an intermediator and serve up to 80% of the patients that would otherwise be served by specialist to a higher cost. In cases where Min Doktor's resources are insufficient to help the patient, he or she is sent to a specialist. The B2B patient journey, and how it is changed by Min Doktor is displayed in Figure 24.

There are competitors for digital health care in the European market, but their business model and value proposition differ greatly from Min Doktor. Another actor on the Swedish market, Kry, provides a video platform that allows for primary health care providers to book patient meetings online, but the process for treatment is the same as in the traditional health care. There are companies with business models similar to Min Doktor's based in the USA, which can be considered the pioneer country of digital health care (Persson 23 March 2016).

Persson (23 March 2016) differentiated between the platform service of their Swedish competitors Kry and the more vertically integrated service of Min Doktor. He emphasised that by recruiting medical doctors instead of just selling them the platform, Min Doktor can

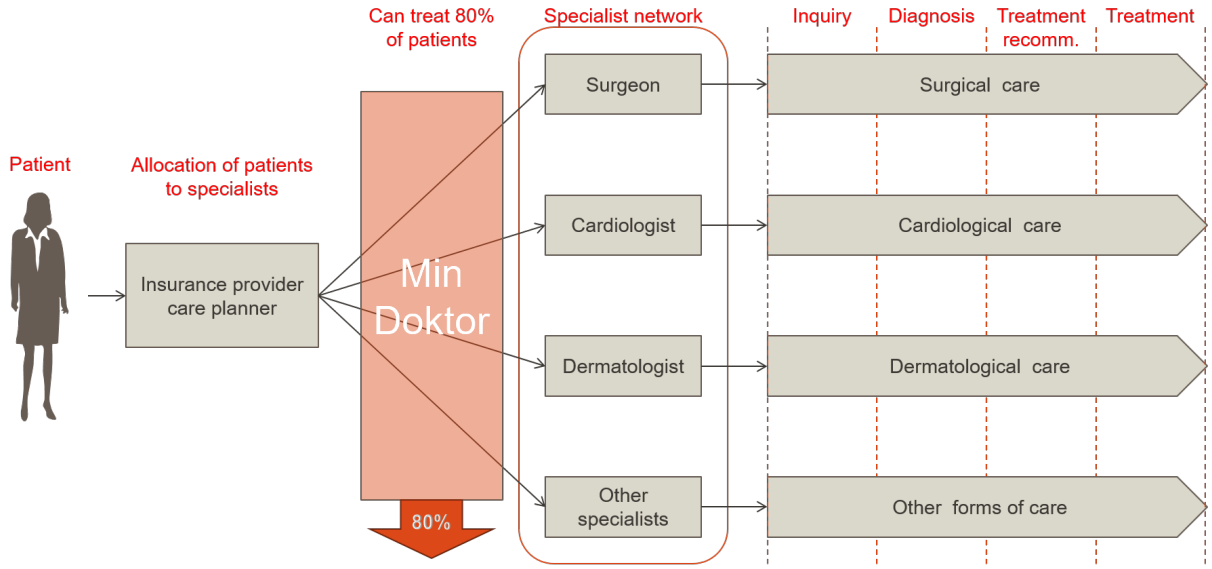

Figure 24: The customer journey for a patient with insurance coverage as drawn up by Persson (23 March 2016). Without Min Doktor, the patient is early locked into one specialist path by the insurance provider care planner. The specialists thereafter tend to keep the patient within the path

effectively optimise the flexibility and speed of patient-doctor interaction. Furthermore Persson (23 March 2016) points out that Min Doktor takes full responsibility of the entire service while their competitor only provides a platform for doctors and patients to interact (Persson 23 March 2016).

4.5.3 Input

The input to RSCI consist of targeted RSCI tools, antecedents and generic innovation tools.

Targeted Radical Supply Chain Innovation Tools
Before starting Min Doktor, Nyhlén worked in the traditional health care, and thereby experienced the challenges in the Swedish health care. From his every day life and he built up a vision of how to increase the efficiency and effectiveness in the health care. During his time as a doctor, it was possible for him to build up a rigid network of doctors sharing the same vision which played a valuable role in the early development of Min Doktor. To evaluate how to improve efficiency, Nyhlén mapped the process of the customer-patient interaction and tried to identify what the customer value the most and what they dislike in the traditional health care. Moreover, prior to becoming a doctor, Nyhlén had experience from running an Internet business which was valuable in the ideation part and during development of the platform for Min Doktor (Persson 23 March 2016).

Antecedents
Antecedents to the RSCI could be identified within the fields of knowledge and learning, technology, network structure and relations, and market orientation.

Knowledge and Learning
Persson (23 March 2016) emphasised that a key resource to success was securing and continuing to secure a professional and reliable image. He identified main components of this to be the display through the website as well as through patient interaction. The website communication, Persson translated into having quality programming capabilities in-house. Some of the first programmers were recruited from Nyhlén's former e-learning business. The patient interaction quality was translated into pedagogical communication skills in the medical doctors employed. The doctors working for Min Doktor needed to posses the capability to communicate clearly and educationally even in writing. Nyhlén being a doctor himself, his professional network was used and thereafter the network of the other recruited doctors. In order to boost these communication skills, internal training sessions were held (Persson 23 March 2016).

Technology
Min Doktor applies a multi-source technology acquisition strategy. For technology considered to belong to the core business, in-house R&D is used. For supporting technology, such as payments and video conferencing, licencing is used (Persson 23 March 2016).

Network Structure and Relations
Min Doktor keeps a close relation with patients, the doctors receive feedback from the customers in each meeting assessing whether the service was satisfying and if they saved time compared to traditional health care. In the startup process, a network factor with health care insurance provider Euro Accident was vital. After an inteview on TV, Nyhlén was contacted by Euro Accident about an exclusivity deal. Euro Accident invested in the development of Min Doktor in exchange for a one-year exclusivity deal (Persson 23 March 2016).

Market Orientation
The idea was conceived by Magnus Nyhlén, a medical doctor with strong connection to the problems and inefficiencies encountered in the everyday work of practitioners. The idea was developed based on that very understanding of the challenges and the lack of resources in the Swedish health care. In the startup process, Nyhlén used the digital health care providers in USA as a source of inspiration, benchmarking their businesses. Based on this together with the observation of increased use of digital services Nyhlén saw potential for a digital health care service (Persson 23 March 2016).

Generic Innovation Tools
Many of the analyses in the initial phase of Min Doktor were made ad hoc, without using any specific innovation method. However, in the initial phase of the creation of Min Doktor, Persson (23 March 2016) point out that two analyses were made to assess what services to

be included in the product portfolio. These analyses where the assessment of addressable market and the assessment of the possibility to handle patients digitally in a way that met the regulations. The result of the analyses made Nyhlén start with treatment of urinary infection under the name of uvi.se, since 500,000 treatments are done for women each year in Sweden. Thus, it was the first focus. The focus expanded with the market analysis showing that 17.6 million visits to primary health care providers are done in Sweden each year, and according to an American study half of them can be done over the Internet. With the experience from inefficient treatment Nyhlén had himself, he could effectively draw up the interaction points as well as solutions to regulatory demands, and from that make the process improvements, a sort of process mapping and process re-engineering (Persson 23 March 2016).

4.5.4 Output

Three different outputs of RSCI can be identified; for the two different customer segments and for Min Doktor.

Value Adding for Patients
According to Persson (23 March 2016), the RSCI produced three outputs from the customer perspective: (1) fast health care (2) at their convenience and (3) the right treatment. An example by Persson is when a patient sends a request in the evening, a doctor handles it overnight, and the patient wakes up with a prescription for medication. In addition, Persson describes the lack of incentives Min Doktor has to move the patient on in the process of treatment if not necessary, and can possibly help in the allocation between specialists (the process and positioning of Min Doktor is shown in Figure 24). Thereby, the patient is more likely to get the right treatment (Persson 23 March 2016).

Cost Benefits for Corporate Customers
For primary health care providers, Min Doktor is used as extra capacity totally scalable to demand. When a patient calls and no appointment can be made, Min Doktor is provided as an alternative. In addition, the incentive structure in traditional health care can lead to that patients receive more advanced treatment than required, which result in unnecessary cost. Once a customer is sent to a specialist, the specialist is likely to solve the issue within his or her area of specialisation. But other treatments might have been more effective or efficient. Min Doktor cuts redundant costs by reducing unnecessary treatments and helping insurance provider planners to allocate patients to specialists in the cases Min Doktor cannot help (Persson 23 March 2016).

Value Adding for Min Doktor through Increased Returns
The business model of Min Doktor enables a high degree of flexibility and efficient use of

resources by utilizing doctors who also work in the traditional health care. Moreover Min Doktor does not need to have any facilities where the doctors and patients meet. Ceteris paribus, it leads to a lower level of assets employed to perform the traditional service of primary health care and consecutively higher asset turnover and return on investment for Min Doktor and its owners. However, subsidies of the competition, primary health care providers, obstructs normal competition and revenues are likely lower than otherwise (Persson 23 March 2016).

5 Case Analyses

In the following section the case analyses are presented. In the beginning of each case analysis a table summarizing the main findings is presented. Thereafter types of RSCI, identified inputs and outputs are elaborated. Lastly, in the end of each section, a figure showing the links between the main findings is presented.

5.1 Daimler - Providing Cars as a Service through car2go

The findings from the case study of Daimler are summarised in Table 18.

Table 18: Components of RSCI identified in the case study of Daimler, (*) denotes a primary factor identified.

	RSCI	Input			Output	
	Type	**Targeted tools**	**Antecedents**	**Generic tools**	**Value adding**	**Cost benefits**
Daimler	SC Service*	Customer convenience	Knowledge Technology Network structure Market orientation	Customer journey mapping Blue Ocean Stage gate process Autonomous innovation department	Better need fulfilment Company growth	

5.1.1 Radical Supply Chain Innovation

When breaking the innovation of Daimler into its components, a clear service focus emerges. The core product of both Daimler and car2go is the car, or perhaps transportation by the means of a car. How that value is delivered to the customer differs and supports the core product, which fits the definition of a service innovation.

5.1.2 Input

Analysing the inputs to Daimler's innovation, targeted tools, antecedents and generic innovation tools are considered.

Targeted Tools
The targeted tools of Daimler were one of SC service, but the intuitively close concept of the sharing economy and why it is less important is also analysed here.

Customer Convenience
The key in the service innovation is reducing customer pains in the use of a car; the customer can use a car *without* owning a car, *without* visiting a car rental, *without* having to plan ahead or return the car. In other words, the customer journey is made more enjoyable by allowing the customers to avoid the hassles of owning or renting a car. Relating to the works of Osterwalder et al. (2014), the service is a pain reliever, by providing customer convenience.

What About the Sharing Economy?
The concept of car2go does take the mind to sharing economy concepts, but as the empirics have shown, the key of the innovation was not about access and mediating market supply and demand. In fact, the car fleet size is not easily scalable. The key of the success lies in the customer convenience, and hence, the sharing economy is not a large ingoing factor.

Antecedents
All parts of antecedents are analysed below: knowledge and learning, technology, network structure and relations, and market orientation.

Knowledge and Learning
The people collected from across functions were key for the innovation process, with an emphasis on passionate innovators. Without that passion and personal involvement, gates would not be passed. When considering levels of learning (Argyris et al. 1978), Daimler definitely fulfills medium level due to the degree of customer orientation, although data is lacking to establish a high level.

Technology
Technology development was of course key in a technology driven innovation like car2go, but there seemed to be low focus on protecting the innovations through IP rights. One possibility is that instead of defending the technology and businesses through IP, or technological lock-in, Daimler put their effort and focus on continuous innovation. The formation of Business Innovation and the streak of innovation it produced point to that conclusion.

Network Structure and Relations
The freedom from control, yet access to advice from Daimler, constituted an important antecedent to the innovation of car2go. The partnerships with Smart and muncipalities were of course convenient, but are not considered to be necessary for the business model. Without Smart, other suppliers of cars could be found, and without muncipalities, land could be bought.

Market Orientation
Even though Business Innovation currently has several locations around the world to gain market orientation, it did not in 2008. Furthermore, the idea of car2go came from the CEO in the headquarter in Ulm, piloted in Ulm, and expanded from there. However, cross-functional orientation proved essential in recruiting and later driving the innovation

process.

Generic Innovation Tools
A mix of generic innovation tools could be identified at car2go, albeit not in the very form described in the literature.

Customer Journey Mapping
By taking the issue of mobility to a higher level than the need of a car, Daimler could develop the service innovation towards the desired outcome. The identification of returning rental cars as a nuisance for customers, led to the development of technical as well as infrastructural solutions to those very nuisances. The digitalisation of car keys and parking spots for one-way trips are examples of those solutions. In summary, focusing on customer needs and pains during the customer journey were imperative to find the problems to solve.

Blue Ocean Strategy
Through the Business Innovation department, Daimler are finding new market space in which different competitive rules apply than in the traditional automotive industry. Daimler did not use a specific model to find that new market space, but the question to which car2go was the answer was *"How do we provide mobility to our customers in a different way?"* is aligned with for example Blue Ocean Strategy (Kim et al. 2005). Arguably, in the pursuit of an innovation of similar magnitude, such a model could be helpful.

Stage Gate Process
The central part of car2go's development was the market testing through prototypes and pilots. The stage gate process used was essentially there to guarantee that resources were allocated to the right projects, and did not constitute the same innovative tool. In order to solve problems popping up in the development phase, the agile methods for solution and internal communication were emphasised as essential.

Autonomous Innovation Department
Daimler achieved car2go through Business Innovation, a separate department fully committed to business innovation, yet not isolated from the rest of the company; exchanges of ideas and competence are still possible. Business innovation also acts like an internal competence base for innovation and facilitates open innovation projects, but in the case of car2go the two roles were not directly related.

5.1.3 Output

The service innovation lead to a value adding innovation for customer in the form of better need fulfilment, and for Daimler it lead to company growth through the expansion into new customer segments.

5.1.4 Bridging the Concepts of Targeted Tools, RSCI, and Competitive Advantage

The key components and the connecting links identified in the analysis of car2go are summarised in Figure 25.

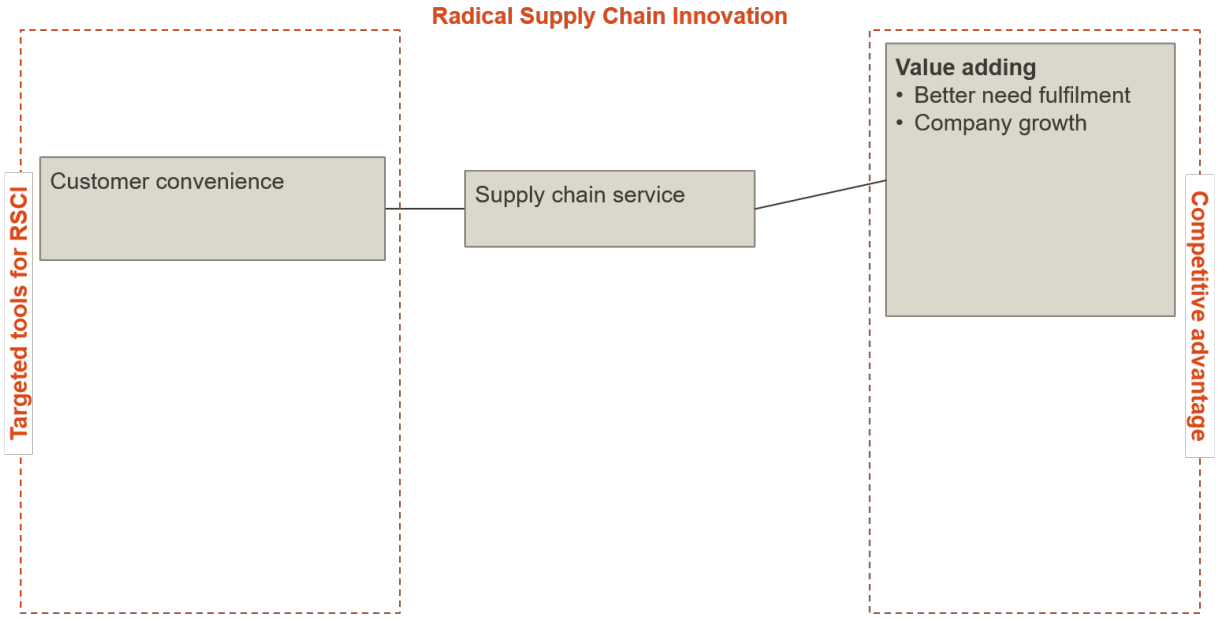

Figure 25: Components of RSCI identified in the analysis of Daimler and their interrelation

5.2 Ericsson - Responsiveness through Merge-in-transit

In this section the analysis of Ericsson is presented. The findings are summarised in Table 19.

Table 19: Components of RSCI identified in the case study of Ericsson, (*) denotes a primary factor identified.

	RSCI	Input			Output	
	Type	**Targeted tools**	**Antecedents**	**Generic tools**	**Value adding**	**Cost benefits**
Ericsson	Responsiveness* Collaboration Reconfiguration Efficiency	Postponement & Modularisation Strategic collaboration Node redesign Complexity reduction	Technology Network structure Market orientation	Other industry role modelling	Customer flexibility Reduced lead time Increased ROI	Lower operations costs

5.2.1 Radical Supply Chain Innovation

The innovation of Merge-in-Transit is primarily towards responsiveness since the implementation radically reduced the lead-times and reached an availability unique to the industry. The high degree of responsiveness was enabled trough moving customer order decoupling points downstream in the value chain and postponing assembly. The cross-docking made it possible to reduce the inventory levels and increase the flexibility.

At the same time, collaboration was a vital part of the MIT innovation. Merge-in-Transit was developed in collaboration with a 3PL and suppliers, and the entire roll-out was performed by the 3PL. To enable the design of an effective solution and enable efficient operations inter-organisational collaboration and information sharing upstream, downstream and with the 3PL was crucial. Secondary components of reconfiguration and efficiency can also be identified.

5.2.2 Input

The inputs to the RSCI of Ericsson are analysed in this section.

Targeted Tools

Several targeted tools make up the innovation of merge-in-transit. Postponement and modularisation, as well as strategic collaboration, node redesign and complexity reduction could be identified.

Postponement and Modularisation

One of the major measures that resulted in the responsiveness was the move of decoupling points downstream in the value chain. This was done through modularisation and postponement of customization which resulted in a high degree of responsiveness, similar to the

theory presented by Olhager (2010). Analyses were conducted regarding were the value chain the COPD should be placed and where in the material flow make-to-stock, make-to-order and assemble-to-order should be applied to optimize operation and reduce lead times. Module production was used for standardized components which enabled postponement of assemble downstream the value chain. This improved the ability to meet unpredictable demand and to shorten the lead time.

Strategic Collaboration
Merge-in-Transit was developed by Ericsson and strategic SC partners in collaboration. The execution was performed by a 3PL and both suppliers and customers played a vital role in designing the solution. The collaboration with the logistics partner enabled Ericsson to focus on their core business at a time of turbulence and weak economic conditions of the company, while the operations of their supply chain was executed by an organisation specialized in the area. By collaborating with suppliers and sharing forecasts, the accuracy and inventory levels in the value chain could be optimized. In addition, Magnusson (19 April 2016) stressed the importance of strategic selected KPIs used throughout the organisation but also between the organisations in the value chain. This facilitated as a great contributor to increased SC integration. As described in the frame of reference, section 2.2.3, Soosay et al. (2008) point out the importance of aligned incentives and KPIs in order to collaborate effectively. Since MIT was developed in collaboration with 3PLs and suppliers, it was important to ensure that all actors worked towards the same goals.

Node Redesign and Complexity Reduction
Ericsson performed node redesign in the near-shoring of merge centres and centralisation of sourcing departments. It goes hand in hand with the efficiency through complexity reduction, where sourcing was consolidated.

Antecedents
For MIT, technology, network structure and relations, and market orientation is considered to be the most important antecedents.

The ERP systems used when MIT was first rolled out lacked the ability to support the operations of the concept fully. Today there are several applications on the market, however, in the early 1990s the applications available were much more basic. This was one of the pitfalls of MIT, and the operations improved radically when SAP was implemented throughout the value chain. The use of the same application provider in the value chain also facilitated the integration of systems between companies and the use of EDI.

The collaboration with universities and 3PLs are considered important for the initiation of MIT. Firstly, it was Sten Wandel from Linköping who took the Ericsson staff on the field trip to USA where inspiration for MIT was born. Moreover, Ericsson had close relation with both Stanford and Linköping university and the researchers pushed the innovation. Secondly, most of the operations of MIT was executed by logistics partners who played an important role in the development. One reason for outsourcing to logistics partners was

to keep cost down. It could also serve as value adding by improving operations since both Ericsson and the logistics provider could focus on their core business.

Market orientation was an important antecedent for MIT, including customer orientation, competitor orientation and cross-functional orientation. The customer focus played a vital role since it was the customer demanding shorter lead time and improved availability. Furthermore, Ericsson had been functional orientated prior to MIT which resulted in sub-optimizing parts of the business. In the process towards increased responsiveness, cross-functional orientation was crucial align operations and work effectively. As described by Ljungberg et al. (2001), cross-functional work and process focus improve the ability to think holistically, keep customer focus and remain flexible which was critical for the success of MIT.

Generic Innovation Tools
Role models from other industries played an important role for the innovation of MIT. Dell and Lucent, among other companies, were used as a role models. By studying other companies, it could be evaluated how merge points in the supply chain could be used effectively to reduce lead times. In addition, inspiration of how to improve cash flows was taken from Dell with their short pay term to customers and long pay terms to suppliers.

5.2.3 Output

Both value adding and cost related outputs are present in MIT, described in further detail below.

Value Adding
The responsiveness achieved through MIT provided great value to customers, foremost due to the customer flexibility through availability and short lead times. The market orientation was an important factor contributing to the improved value to customers. The project of MIT was initiated due to dissatisfied customers and one of the most important objectives of the project was to better meet customer preferences. The collaboration with partners in the value chain, or SC integration, enabled the lower inventory levels, which resulted in lower working capital and thus higher return on investment (ROI).

Cost Benefits
The consolidation of sourcing resulted in great cost benefits due to economies of scale and decreased complexity. The postponement and modularisation reduced the inventory in the value chain and thereby the SC costs. The collaboration with 3PLs resulted in cost benefits and enabled Ericsson to focus on their core activities.

5.2.4 Bridging the Concepts of Targeted Tools, RSCI, and Competitive Advantage

The key components and the connecting links identified in the MIT analysis are summarised in Figure 26.

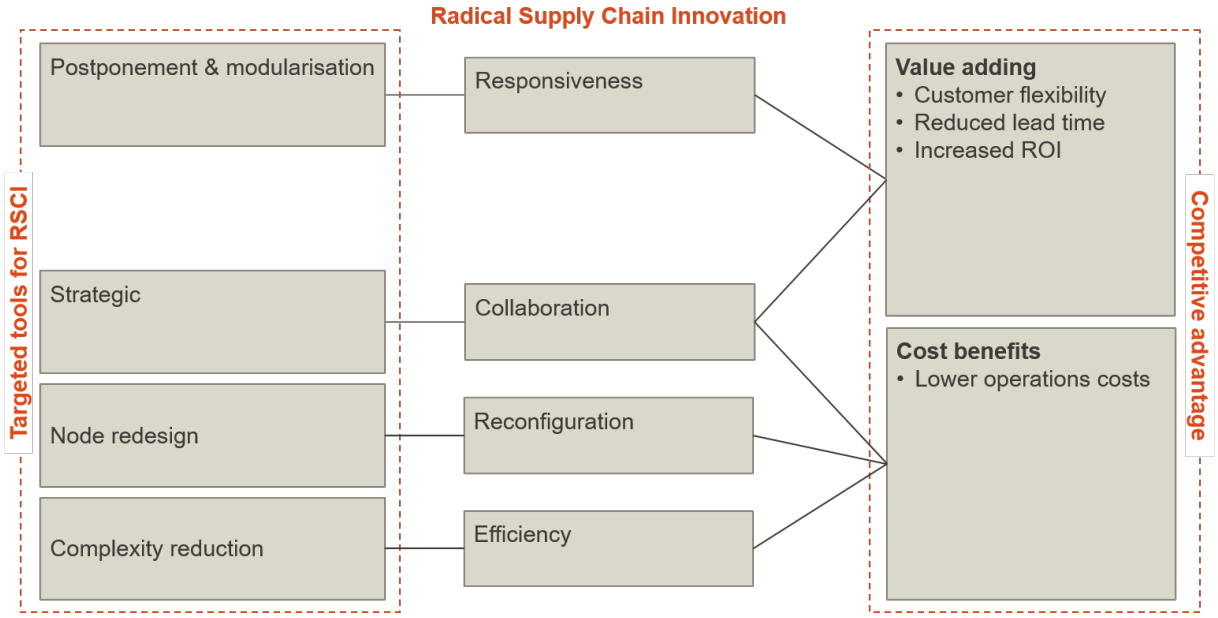

Figure 26: Components of RSCI identified in the Ericsson analysis and their interrelation

5.3 Maersk - Remote Container Management through the use of Big Data

In this section the analysis of Maersk is presented. The findings are summarised in Table 20.

Table 20: Components of RSCI identified in the case study of Maersk, (*) denotes a primary factor identified.

	RSCI	Input			Output	
	Type	Targeted tools	Antecedents	Generic tools	Value adding	Cost benefits
Maersk	Efficiency* Responsiveness	Information Technology Information Use	Knowledge and learning Technology Market orientation	Other industry role modelling Functional organisation	Faster customer information	Lower operations costs through less inspections and SC opportunism

5.3.1 Radical Supply Chain Innovation

Maersk's innovation is primarily one of efficiency, at least in its current form. The internal motivation as well as the main outcomes have been in terms of saving money on inspections and transparency. In terms of responsiveness, the potential is larger than the achieved outcome. It is worth noting that if Maersk decides to share information with its customers, it would be a means of differentiation through service innovation and offering extension since it supports the core product of shipping and value to customers has been proven.

5.3.2 Input

A selection of inputs were used at Maersk: targeted tools, antecedents and generic innovation tools are described in this section.

Targeted Tools
Technology and data were key tools for Maersk. Information technology and information use are targeted tools present in the case.

Information Technology
To achieve the efficiency innovation, the handling of vast amounts of data was key. The algorithm developed with DTU and IPU enabled the SC visibility and reduction of inspection cost which was the core of the efficiency innovation. Supporting that software, were of course the development of hardware to collect data. However, Maersk shows that in order to realise benefits from big data projects, an effective way of handling the data must be acquired.

Information Use
The use of information acquired from the big data analyses was in turn what raised responsiveness. The analysis did not stop at raising efficiency, but the customer need of reliability in the SC, embodied in a need for updates, was addressed by shortening the customer feedback loop. By providing deviation information quicker, customers could more rapidly address their demand for replacements.

Antecedents
Antecedents including knowledge and learning, technology and market orientation were important, whereas network structure and relations seemed less central.

Knowledge and Learning
How the use of external consulting resources affected the project outcome is not definite. What can be stated is that the collaborations with a university (DTU) and a company commercialising university knowledge (IPU) were indeed important to achieve the advanced algorithm that enabled the effective data handling.

Technology
Maersk's technology strategy for the RCM project was based on contract R&D, which was arguably beneficial since the competences for development was not available in-house.

Market Orientation
Customers were and still are an important feedback source, used to motivate investments and most of all ventures into data sharing with customers. Without customer and competitor insights, it is not certain that the project would have been implemented.

Generic Innovation Tools
The potential from cost-cuts through RCM stemmed from the analysis that all the checks and services of reefers were done without an actual need, simply because it was the only way to know its status. Inspections are non value adding activities and as such they should be minimised. Another way to find the problem was the issue with low SC transparency and difficulties to pinpoint root causes of deviations.

Functional Organisation
At Maersk there is a business unit working solely with innovation, however, it was not from this business unit RCM emerged. Instead, the team working with RCM was a group of selected employees, consultants and university representatives.

5.3.3 Output

The efficiency innovation led to considerable, albeit not yet disruptive, cost benefits through increased transparency and decreased inspection costs.

The potential for big data in shipping is large. There may be a new business model emerging from the transparent cold chain enabled by RCM, where the most transparent shipper providing fast information gets the most business. The future will prove how strong a competitive advantage it will be.

5.3.4 Bridging the Concepts of Targeted Tools, RSCI, and Competitive Advantage

The key components and the connecting links identified in the Maersk analysis are summarised in Figure 27.

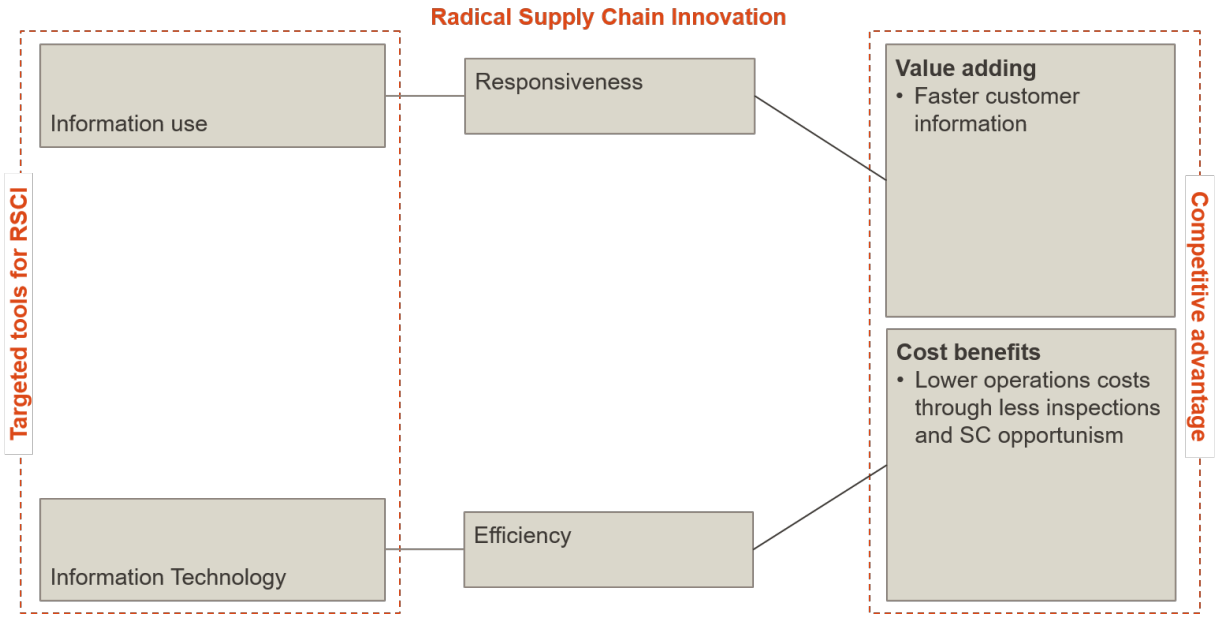

Figure 27: Components of RSCI identified in the Maersk analysis and their interrelation

5.4 Metro

In this section the analysis of Metro is presented. The findings are summarised in Table 21.

Table 21: Components of RSCI identified in the case study of Metro, (*) denotes a primary factor identified.

	RSCI	Input			Output	
	Type	Targeted tools	Antecedents	Generic tools	Value adding	Cost benefits
Metro	Reconfiguration* Efficiency	Channel innovation Outsourcing Information technology	Knowledge Market orientation	Blue Ocean Lead user	Convenience for readers	Lower customer price Lower risk and high flexibility

5.4.1 Radical Supply Chain Innovation

In the case of Metro, it can be identified that the primary type of innovation achieved is reconfiguration. The reconfiguration consists of two parts, the novel distribution channel

and the high degree of outsourcing. The innovation of Metro contains the characteristics identified by Srai et al. (2008); the tier structure including shape and location was reconfigured when using the public transport for delivery instead of delivering to private mail boxes.

One important factor contributing to the success of Metro was the effective implementation with the small, flexible and efficient organisation using the latest information technology. In addition, Arlbjørn et al. (2011) describe technology innovation that fall into the efficiency category.

5.4.2 Input

Metro's use of inputs of targeted tools, antecedents and generic innovation tools are analysed in this section.

Targeted Tools
Targeted RSCI tools for Metro were channel innovation, outsourcing and information technology, which is motivated below.

Channel Innovation
The distribution channel Metro used was entirely new to the industry and one of the main factors contributing to the great success.

Outsourcing
The effective organisation of Metro relied on a high degree of outsourcing. Metro could take advantage of the overcapacity existing at printing houses and thereby avoid the huge investments of having printing in-house. To keep a flexible and efficient organisation, analysis of what to do in-house and what to outsource were made for the entire organisation and only critical resources were kept in-house.

Information Technology
When creating an entire new organization, it was possible for Metro to acquire only the resources that were vital to keep in-house and use the latest tools and techniques available at the market. With this approach Metro avoided having a big rigid organisation with outdated technology which the competitors had. This created a high degree of efficiency in the organisation.

Antecedents
Knowledge and market orientation were imperative for Metro's success.

Knowledge
The most important antecedent for Metro was the knowledge that existed within the organisation. The small organisation with a high degree of trust created incentives for

the employees to work hard to fulfill the vision of the founders; to change the newspaper industry.

Market Orientation
Market orientation played an important role in the development of Metro, both in form of customer orientation and competitor orientation. Metro had a close relation to the readers and continuously developed the paper based on customer feedback. when designing Metro there was a strong focus to avoid weaknesses identified at competitors and to design a superior news paper.

Generic Innovation Tools
Finding new market space (blue ocean strategy) and using the knowledge of lead users are concepts that are analogous to the way Metro worked.

Blue Ocean
The innovative distribution channel of Metro was new to the market of daily newspapers. In addition, Metro was the first daily newspaper that succeeded with the business model of covering the cost through advertisement and give away the paper for free. Metro created a new market space for newspaper and many other papers have followed. it was Blue Ocean, as described by Kim et al. (2005).

Lead User
The fact that all the founders of Metro had previous experience from the newspaper industry played a vital role for the innovation. Having this experience, the founders had knowledge regarding the preferences of readers which made it possible to design a newspaper with a high degree of customer satisfaction. Moreover, the entrepreneurs previous experience from other firms had given them information regarding the weaknesses of the competitors which they could take advantage of in the development of Metro. One example is the system for payment of ads with was very complex and hard to understand at competitors. Metro created a simple system with fixed rates to make it easier for advertiser.

5.4.3 Output

Metro's RSCI resulted in both added value and cost benefits, for several stakeholder in several ways.

Value Adding
The reconfiguration with novel distribution channel in the public transport provided great value to the readers of Metro. It made it possible for readers to easily access the latest news on the way to work or school in a convenient way, at a time when no smart phones existed.

Cost Benefits
The novel distribution resulted in cost benefits compared to distribute the paper to people's houses. The outsourcing made it possible to upscale and downscale operations based on demand which enabled great cost benefits due to a high level of flexibility and low risk in the current distribution investments. The use of the latest information technology and software enabled the efficient organisation. The cost benefits could be realised in a very low reader price (equaling zero).

5.4.4 Bridging the Concepts of Targeted Tools, RSCI, and Competitive Advantage

The key components and the connecting links identified in the Metro analysis are summarised in Figure 28.

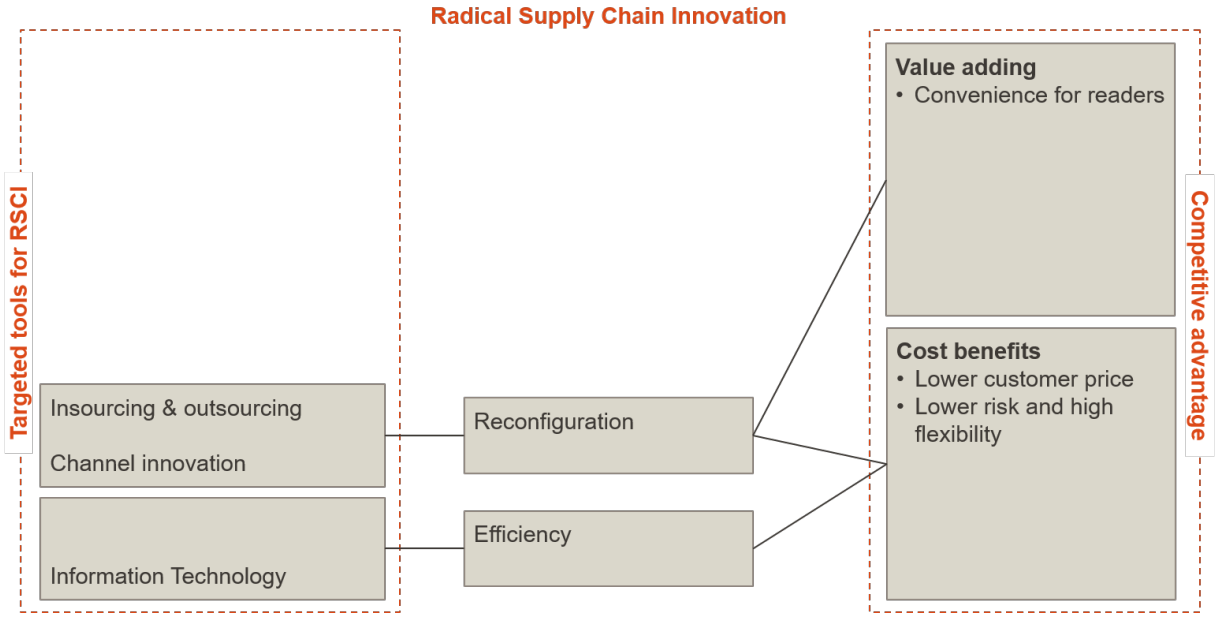

Figure 28: Components of RSCI identified in the Metro analysis and their interrelations

5.5 Min Doktor

In this section the analysis of Min Doktor is presented. The findings are summarised in Table 22.

Table 22: Components of RSCI identified in the case study of Min Doktor, (*) denotes a primary factor identified.

	RSCI	Input			Output	
	Type	**Targeted tools**	**Antecedents**	**Generic tools**	**Value adding**	**Cost benefits**
Min Doktor	Service* Reconfiguration Efficiency	Customer convenience Process redesign Outsourcing Channel Innovation	Market orientation Technology Knowledge	Segmented market estimations Customer journey mapping	Better need fulfilment Convenience	Lower operations costs Lower customer price

5.5.1 Radical Supply Chain Innovation

The innovation of Min Doktor is primarily towards supply chain service innovation. Min Doktor enables flexible and high quality treatment at great convenience for the patient. The focus of the entire business model is "at the terms of the customer" and thereby customer convenience is identified as the core innovation.

Efficiency comes into play in the process redesign of the questionnaire (anamnesis), which increases the efficiency in the patient-doctor interaction. Moreover, the digital meeting space results in reduced need of resources and more efficent operations.

Min Doktor has applied a reconfiguration strategy through the outsourcing of their medical workforce, which is kept in-house in traditional health care. It allows Min Doktor great capacity flexibility. In addition, reconfiguration innovation is achieved through the innovative channel for patient-doctor interaction.

5.5.2 Input

This section provides an analysis of the combination of targeted tools, antecedents and generic innovation tools used by Min Doktor for the innovation.

Targeted RSCI Tools

Min Doktor used a combination of four targeted tools to achieve the innovation: customer convenience, process redesign, outsourcing and channel innovation.

Customer convenience

Nyhlén being a doctor himself enabled great insight to customer needs and preferences. This was used to identify what patients value the most and what they were dissatisfied with in traditional health care. This information was used to map areas where customer

convenience could potentially be improved and thereby design the new service with customer preferences in mind. These analyses produced important input to the creation of Min Doktor and enabled the design of a service meeting customer preferences.

Process Redesign
To increase efficiency, an important tool was identifying and mapping of the current processes in the patient doctor interaction. In the process towards efficiency, it was also a vital factor that Nyhlén worked as a doctor himself and possessed good knowledge of the processes and regulations. Having this knowledge, Nyhlén could map the current processes, conduct thorough analysis and identify improvement opportunities of how to make the process more efficient.

Outsourcing
The nontraditional doctor relations of Min Doktor, arguably outsourced capacity, allows for Min Doktor provide an effective solution to the customers and focus on what it considers to be core activities.

Channel Innovation
The business model of Min Doktor enable health care distributed through an entirely new channel. Traditionally health care is provided through a physical centre but the innovation of Min Doktor makes it possible for patients and doctors to meet digitally.

Antecedents
For Min Doktor, all the areas of RSCI antecedents identified in the frame of reference are important to achieve the innovation. However, technology, knowledge and market orientation are consider to be the most important.

Market orientation, more precisely customer orientation achieved through having practitioners in the organisation, was crucial for achieving the customer convenience and to perform the process redesign, and is therefore highlighted as the most important antecedent.

Technology was and still is the core of Min Doktor's business. The in-house development of the core technology enables greater ability for Min Doktor to form the platform and to optimise its functionality. Furthermore, the trend towards increased use of digital services and similar services on other markets had great impact on Min Doktor's success.

Knowledge was a critical success factor in order to build market trust; a reliable image towards patients and collaborative partners required both high medical knowledge and to display it in a reliable way. The trust focus stemmed from digital health care being an entirely new phenomenon on the Swedish market. Learning is boosted through network relations like the close collaborations with both doctors and patiens; Min Doktor listens to feedback and takes it into account when developing the business.

Generic Innovation Tools
In the process towards creating Min Doktor, it was important to identify what type of services that were to be included in the product portfolio. Segmented market estimations were performed where the market for different types of treatments was estimated together with the ability to perform the treatment digitally. These were important measures to identify which services and what type of treatments that should be included in Min Doktor's product portfolio, and which ones to start with. Nylén and his colleagues being lead users, they had insight into how to do these analyses; how processes could be redesigned, which market to target and what services to include. Moreover, a technique similar to customer journey mapping (presented in section 2.4.1) was used to identify customer pains and gains, to finally shape a service with a high customer satisfaction - a service focusing on customer preferences.

5.5.3 Output

The outputs analysed here are both value adding and cost benefits, targeting multiple stakeholders.

Value Adding
The value by better need fulfillment that Min Doctor provides to customers rest on the foundation of supply chain service innovation through customer convenience. The inputs used were imperative for Nyhlén when creating a vision of Min Doktor, especially the enabler in Nyhlén being a doctor himself. Furthermore, the close relation with patients make it possible for Min Doktor to continuously develop based on customer preferences and continuously improve the customer convenience. The resource structure of Min Doktor, especially the structure for the doctors, enables a high degree of flexibility.

Cost Benefits
Insurance companies and primary health care providers receive strong cost benefits from Min Doktor's service. For insurance companies, the efficient use of resources resulting in a low price compared to traditional health care providers is the main influencing factor. The redesigning of the patient-doctor interaction process through the on-line anamnesis enables effective treatment of lighter issues and further contributes to the efficient use of resources, especially the time doctors spend on each patient. Primary health care providers are receiving cost benefits in avoidance of alternative costs; by outsourcing to Min Doktor, which has a lot of capacity flexibility, they can avoid the costs of having that capacity in-house to handle peaks. In this case, the flexibility of outsourced medical competence is the core.

5.5.4 Bridging the Concepts of Targeted Tools, RSCI, and Competitive Advantage

The key components and the connecting links identified in the Min Doktor analysis are summarised in Figure 29.

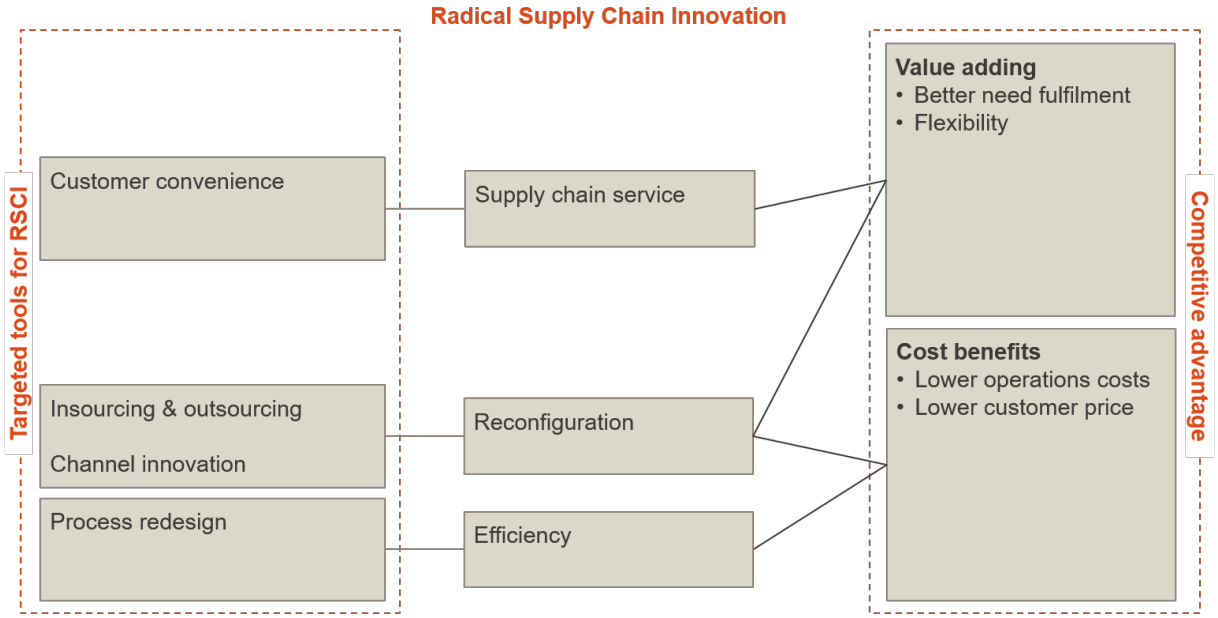

Figure 29: Components of RSCI identified in the Min Doktor analysis and their interrelations

6 Cross-Case Synthesis

In this section interrelations, similarities and differences between cases are highlighted. The section begins with analyses of the link between targeted tools, types of RSCI and their consecutive outputs after which cross-case similarities and differences are analysed. An overview of the components identified in the case studies is presented in Table 23.

Table 23: Table showing an overview of the findings from the case studies, (*) denotes a primary factor identified.

	RSCI	Input			Output	
	Type	**Targeted tools**	**Antecedents**	**Generic tools**	**Value adding**	**Cost benefits**
Daimler	SC service*	Customer convenience	Knowledge Technology Network structure Market orientation	Customer journey mapping Blue Ocean Stage gate process Autonomous innovation department	Better need fulfilment Company growth	
Ericsson	Responsiveness* Collaboration Reconfiguration Efficiency	Postponement & Modularisation Strategic collaboration Node redesign Complexity reduction	Technology Network structure Market orientation	Other industry role modelling	Customer flexibility Reduced lead time Increased ROI	Lower operations costs
Maersk	Efficiency* Responsiveness	Information Technology Information Use	Knowledge and learning Technology Market orientation	Other industry role modelling Functional organisation	Faster customer information	Lower operations costs through less inspections and SC opportunism
Metro	Reconfiguration* Efficiency	Channel innovation Outsourcing Information technology	Knowledge Market orientation	Blue Ocean Lead user	Convenience for readers	Lower customer price Lower risk and high flexibility
Min Doktor	SC service* Reconfiguration Efficiency	Customer convenience Outsourcing Channel Innovation Process redesign	Market orientation Technology Knowledge	Segmented market estimations Customer journey mapping	Better need fulfilment Convenience	Lower operations costs Lower customer price

6.1 Radical Supply Chain Innovation and Targeted Tools

In this section the types of RSCI and the targeted tools for each type are analysed and motivated. The analysis of targeted tools is based on the findings from the case studies, compiled in Figure 30, and on the cases presented in the frame of reference chapter.

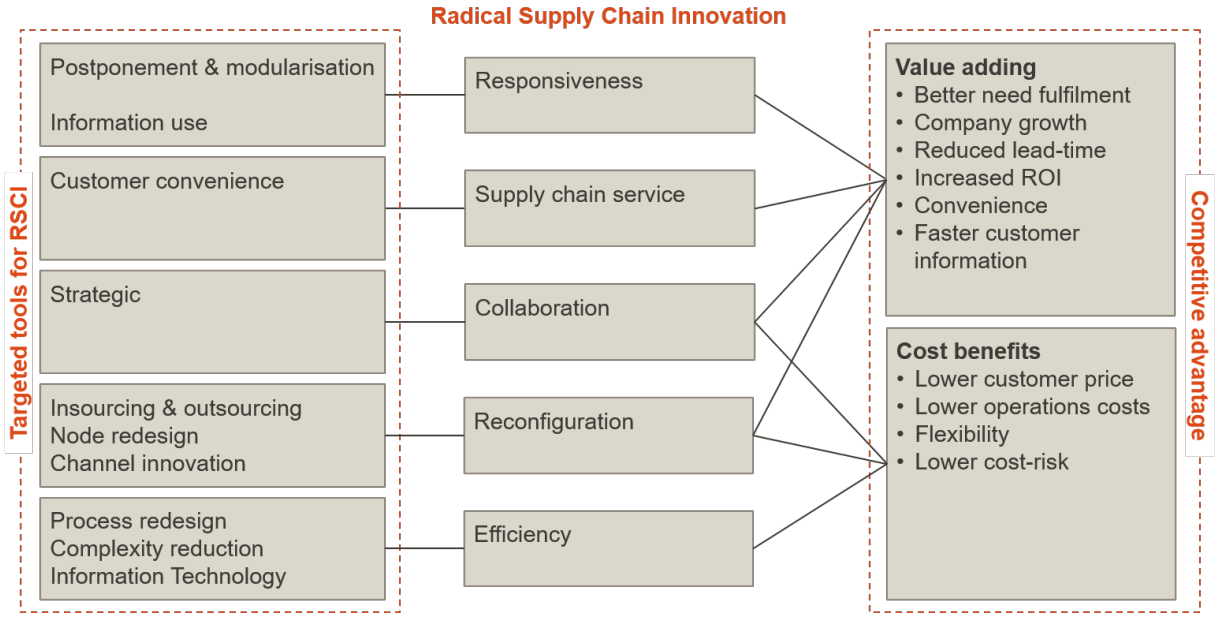

Figure 30: Targeted tools, RSCI and consecutive output compiled from empirics

6.1.1 Responsiveness

Responsiveness has been identified in the cases of Ericsson and Maersk in the multiple case study. In the analysis of Ericsson it was identified to be the primary type of innovation.

Targeted Tools

There are several measures that can be used to achieve responsiveness. In the case of Ericsson, postponement and modularisation was used, which also was the case for Hewlett-Packard, Smart and Benetton, presented in the frame of reference.

In the literature study it was identified that leveraging the sharing economy can be an effective way to achieve responsiveness. The sharing economy provides a high level of scalability and may function as an excellent measure to adapt to fluctuations in demand. The leverage of sharing economy for responsiveness was identified in the case of Amazon Flex, providing fast deliveries with a high level of flexibility.

In the case of Maersk, information from big data was used to achieve responsiveness. Another case where information was used for responsiveness was Zara's use of sales data.

Output
In both the case of Ericsson and Maersk the main output of the innovation was added value. Responsiveness innovation results in outputs such as customer flexibility, reduced lead times and faster access to information. In the case of Amazon Flex, the main output of the innovation was the added value to customer through fast delivery. It can be argued that responsiveness also contributes to cost benefits, for example through reduced inventory levels. However, value adding is identified as the main competitive advantage achieved through responsiveness.

6.1.2 Supply Chain Service Innovation

SC service innovation has been identified in the case studies of Min Doktor and Daimler, where it in both cases is considered to be the main type of innovation. From the frame of reference, Amazon, GE Aviation, and Rolls-Royce are examples of SC service innovation.

Targeted Tools
In both the case of Min Doktor and Daimler, the SC service innovation was achieved through customer convenience. In other words, the innovations made the customer journey more convenient. In the frame of reference two additional tools for supply chain service innovation have been identified; offering extension and selling uptime. Offering extension can be an effective way to increase the SC service and extend the offer before, during or after the sale, and is thereby a powerful tool towards service RSCI. One example of offering extension is *Amazon Prime Now* and their one hour delivery: by offering the fast delivery Amazon provides extended service to their core products of online retail.

The concept of selling uptime constitutes the third tool, which can be an effective way to radically innovate in a SC and create great competitive advantage. Success stories of selling uptime like the cases of GE Aviation and Rolls-Royce can inspire other companies to do the same. Selling uptime is a way for companies to take responsibility for a part of the customer's risk and thereby increase the service provided to customers. In addition it works as an incentive for the supplying companies to produce a product with maximal uptime and longer lifespan, which results in higher quality products.

Output
In both the case of Min Doktor and Daimler the output of the innovation was better need fulfilment, through delivering a service customized after customer preferences. One output of offering extension can be added value through company growth, since it enables the expansion to new business areas. Potential outcomes of selling uptime are for example added value through higher quality and lower risk for the customer. In summary, the main output of SC service innovation is added value.

6.1.3 Collaboration

Radical SC collaboration innovation has been identified in the case of Ericsson, but the main examples come from literature: Smart's cluster facility location; Whirlpool's joint forecasting and shipping; Barilla's VMI; and PACIV's information sharing.

Targeted Tools
The tools for SC collaboration are divided into strategic, tactical and operational. The breakdown is inspired from the classications by Montoya-Torres et al. (2014) and Stevens (1989). The different tools can be separated by the effort put into the collaboration and its time frame. In the case study of Ericsson, strategic collaboration with suppliers for organisational structuring and alignment was identified with customers and a 3PL. Another way to achieve collaboration innovation is through facility location, as shown in the cluster production of Smart car. In addition, to collaboratively shape the value proposition is included as a strategic tool for collaboration.

Radical SC collaboration innovation may also be achieved through tactical measures, where examples would be joint investments, joint planning and joint forecasting, such as Whirlpool's. Tactical measures may be seen as breakdown of the overall strategy into tactical sub-parts.

Radical SC collaboration innovation can also be achieved through operational measures, even though it might not be as common as strategic and tactical. An excellent example is the joint shipment performed by Whirlpool where goods were co-loaded from two different companies and thereby by the transportation resources were cut by 30%. Other examples of operational collaboration is Barilla's use of VMI and PACIV's information sharing.

Output
The output of radical SC collaboration innovation can be both cost benefits and added value. In the case of Ericsson the collaboration innovation resulted in added value through SC integration and cost benefits through reduced inventory in the supply chain. Tactical innovation produces outputs in form of added value (through e.g. improved communication and coordination, increased service levels and increased reliability) or cost benefits through increased efficiency (i.e. EDI, improved forecast and inventory management). In the case of Whirlpool, operational tools created competitive advantage in form of cost benefits. With Barilla, both cost benefits and added value was created, and in the cases of PACIV the main output was added value.

6.1.4 Reconfiguration

Radical SC innovation through reconfiguration was identified in the case studies of Metro, Ericsson and Min Doktor. For Metro it was determined to be the primary type of innova-

tion. In the literature, Dell and Nike provide examples of reconfiguration RSCI.

Targeted Tools
The most effective ways to achieve radical supply chain innovation through network reconfiguration is through insourcing/outsourcing, node redesign and channel innovation. Both channel innovation and outsourcing have been identified in the cases of Min Doktor and Metro, in their novel customer channel approaches and different vertical roles in the supply chain. Although it is not the primary RSCI type of Ericsson, reconfiguration through node redesign proved an important role in the MIT project; both centralisation and near-shoring were included.

Output
As identified in the multiple case study, both added value and cost benefits can be outputs of radical supply chain reconfiguration innovation. The added value can be in form of better need fulfilment and increased flexibility for customers as shown in the case of Min Doktor, or through improved convenience for readers due to the innovative distribution channel of Metro. At the same time reconfiguration through outsourcing can lead to cost benefits due the flexibility and simplicity of up-scaling and downscaling operations.

6.1.5 Efficiency

Radical supply chain efficiency innovation has been identified in the cases of Maersk, Metro and Min Doktor in the multiple case study. In Maersk it was identified as the primary type of innovation.

Targeted Tools
To increase the efficiency in a SC, one way is to redesign processes. This was shown in the case study of Min Doktor were the patient-doctor interaction was redesigned through the anamnesis. In addition, Hammer (2007) claims that process redesign can lead to dramatic improvements in performance.

Efficiency innovation may also be achieved through reducing complexity. To create better understanding of the supply chain and identify how the complexity can be reduced, SC mapping is an option. Possible ways to reduce complexity may for example be consolidation of sourcing (like Ericsson's MIT) or segmentation of products. In addition, simpler processes and cross functional collaboration can contribute to reduced complexity.

In the case studies of Maersk and Metro, efficiency was achieved through Information technology. The efficiency Maersk achieved in RCM was through the use of big data and the effective algorithm developed to handle the data. In the case of Metro, information

technology in form of the latest tools and techniques were the input to the efficiency innovation.

Output
The competitive advantage created through efficiency innovation primarily results in cost benefits. In the case of Metro, the process redesign results in lower operation costs due to more effective use of resources. Metro created a great competitive advantage in form of cost benefits through the use of the latest information technology solutions. The use of big data at Maersk lead to cost benefits through increased SC transparency and reduced need for inspections.

6.1.6 Targeted Tools, RSCI and Output, Compiling Empirics and Theory

So far in this chapter, the theoretical and empirical cases have been categorised and compared. Drawing on these similarities and differences, the individual cases can be compiled into a more generic model. Building on the conceptual model presented after the frame of reference (Figure 12 on page 43), the types of RSCI can now form links with the types of competitive advantage. The connections between targeted tools, RSCI and competitive advantages are displayed in Figure 31. The connections are stronger in the cases where empirics supported targeted tools (non-italicised), since the targeted tools and outputs could be studied more rigorously.

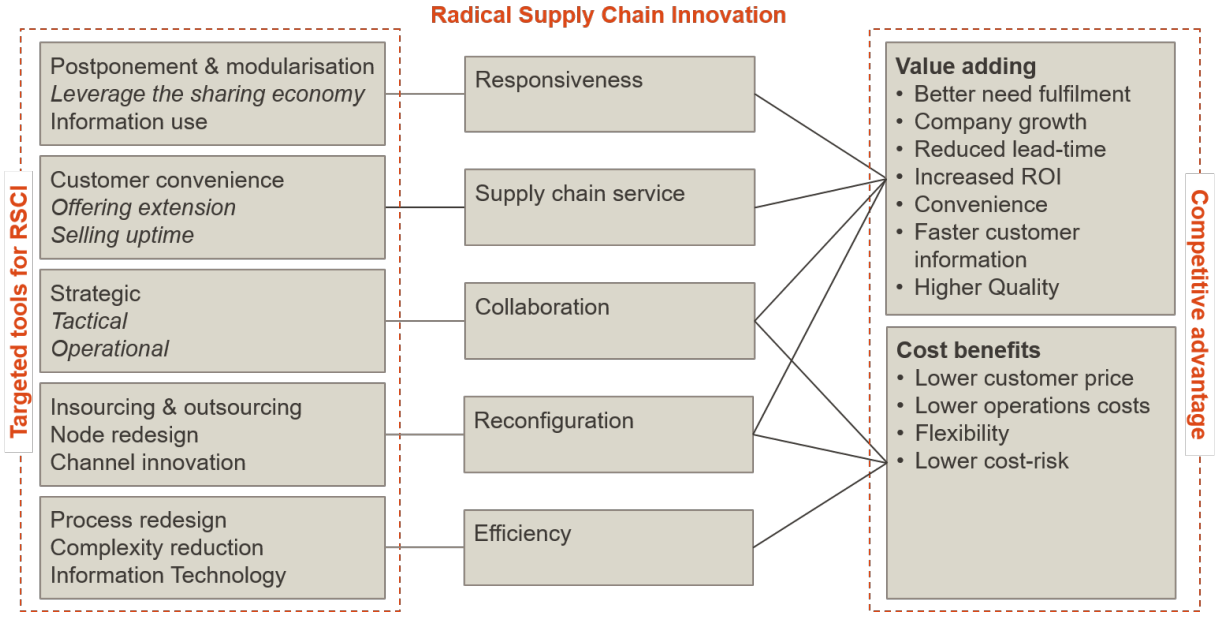

Figure 31: Targeted tools, RSCI and consecutive output compiled from empirics and theory. The targeted tools that have been found in theory but not seen in the empirical cases are italicised in the figure.

6.2 Cross-Case Similarities and Differences

After having analysed the relations between targeted tools, RSCI and competitive advantage, the interrelations between RSCI, inputs and outputs are analysed. The first section discusses how the RSCI types compare in achieving competitive advantage; the second how inputs achieve RSCI; the third how different competitive advantages compare; and the last presents a holistic model.

6.2.1 RSCI Types, Mixes and Contextual Factors

Most of the cases studied used a mix of RSCI types, with the exception of Daimler were only service innovation is identified. This is not unexpected, since according to Keeley et al. (2013), the mixing of innovation categories helps shape a unique offering.

Newness to Industry
Ericsson and Maersk have their primary RSCI type in responsiveness and efficiency respectively, which arguably are classic focus areas of SCM, for example comparing to Fisher's model (Fisher 1997). Metro, Min Doktor and Daimler have focused on SC service and reconfiguration, which are a little bit more outside the box from a SC perspective. The latter three have arguably reshaped their industries to a further extent, which may indicate that an RSCI focus outside of the classic SC views may help produce novel solutions.

6.2.2 Inputs and analyses for RSCI; Mixes and Contextual Factors

Looking at the empirical cases of RSCI, two cases of tremendous impact emerge: Daimler's car2go and Metro. Analysing what these two have in common and what set them apart from the others may produce valuable insights. In this section, similarities and differences such as these are analysed in the inputs to RSCI.

Targeted Tools for RSCI
Min Doktor and Daimler both focused on customer convenience to achieve SC service innovation, which is an interesting common factor. Looking at Metro, the main targeted tool was channel innovation, a concept that is not far from SC service and customer convenience; by moving the delivery closer to the customer, in a convenient location, Metro reduced customer nuisances in the customer journey much like customer convenience does. Focusing on targeted tools addressing issues in the customer journey seems to be a successful strategy.

Antecedents
Antecedents were found to be quite important for RSCI. Most antecedents were imperative

ingoing parts into the process. An interesting reflection is that the most cost-focused RSCI, Maersk, had the least use of network structure and relations.

Generic Innovation Tools
Organisational form may well affect RSCI. In the cases, Metro and Min Doktor were start-ups based on a new idea, entrepreneurial ventures. On the other hand, Daimler, Ericsson and Maersk are large multinational companies driving projects internally. Daimler singles out in organisational though; through the Business Innovation department the RSCI was produced by a group of people wholly dedicated to innovation. Ericsson and Maersk on the other hand organised the innovation within existing structures with help from consultants. One possible explanation is that Daimlers innovation was much more separable from the existing business and therefore the synergies of keeping it within usual structures were small. Another is that since it was separated from the usual organisation, a more novel and separable business *could* emerge. The hypothesis is that organising RSCI in a separate unit may produce more radically new businesses.

6.2.3 Competitive Advantages, Mixes and Contextual Factors

One part of radical innovation is the impact, but is there a connection between certain competitive advantages and impact? As previously mentioned, car2go and Metro was especially radical. Looking at car2go from a customer perspective, there is only one type of competitive advantage, added value, packaged in a specific value proposition. For Metro, there are several: added value through convenience for readers; added value through communication and customer experience for SL; and high exposure per advertisement expense for advertisers. The value propositions are quite different, but highly specific towards one segment of stakeholders, and addressing a critical need of the stakeholder. The customer focus of the competitive advantage may have been an important factor shaping the new industries that car2go and Metro are a part of.

Maersk and Ericsson both implemented projects with large impact without a doubt. What can be stated was that for Ericsson the impact was defensive, a successful effort to thwart competition in a tough industry. For Maersk, a massive cost cut was achieved, but the shipping industry has not yet been reshaped by it. The future potential of Remote Container Management *is* within selling the information to customers and moving into value adding through service extension.

The full impact of Min Doktor still has to unfold, but from the other cases a hypothesis emerges: when looking for RSCI, a strong customer focus of added value is more likely to be successful. The hypothesis fits well with cases in literature, where a customer is more often found than an internal focus.

6.2.4 Synthesising a Generic Interim Model

Building on the compiled model from the analysis (Figure 31 on page 120), the generic innovation tools and antecedents can be added. The resulting model differs from the conceptual model built from theory (Figure 12 on page 43) in that specific connections can be made between types of RSCI and competitive advantages. Resulting is a generic model, albeit not yet actionable, built on both empirics and theory. The final modification to make it actionable is described next, before moving into validation.

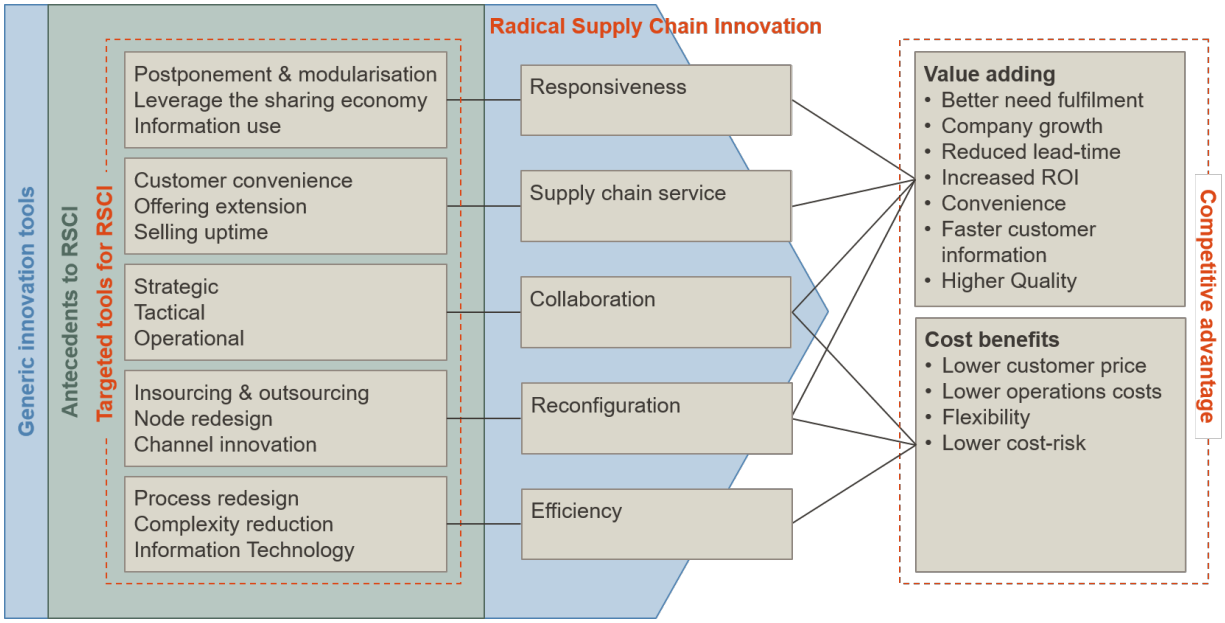

Figure 32: The model with all components of input, RSCI and output produced from litterature and empirics

6.3 The Generic and Actionable Framework

In order to increase the actionability and usefulness of the model in a workshop setting, the model compiled from empirics and literature, presented in Figure 32, is reversed into Figure 33. More concretely, antecedents and targeted tools are moved to the right side and competitive advantage is moved to the left.

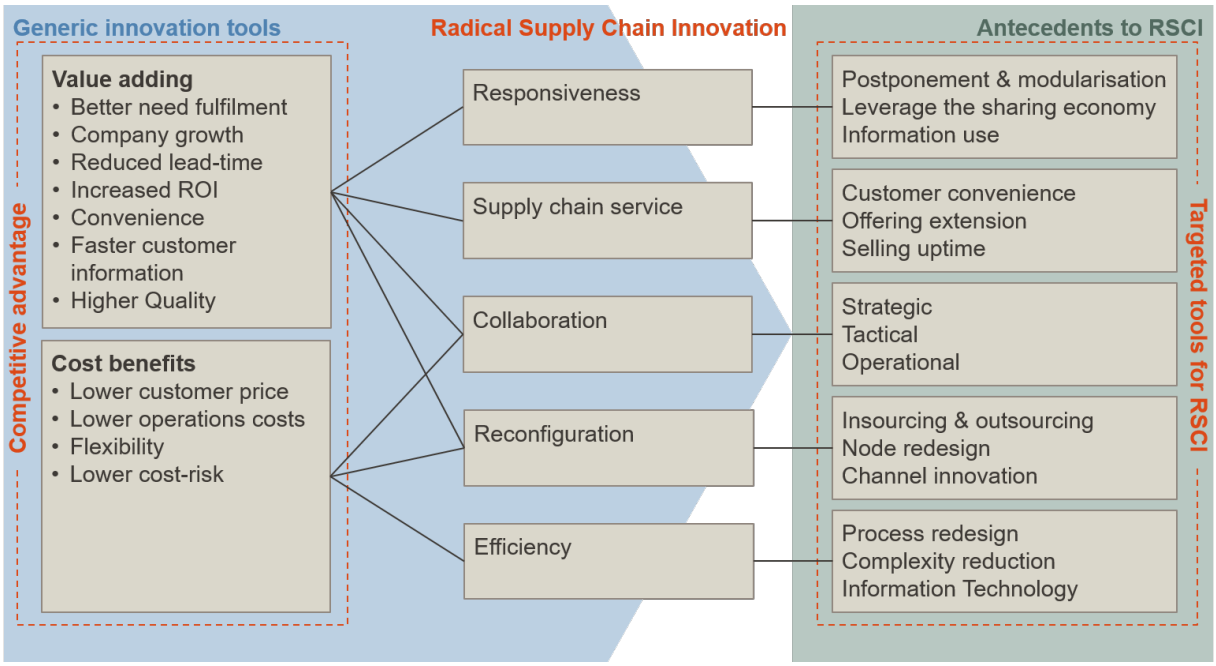

Figure 33: The final RSCI-model produced from litterature and empirics to be used in validation workshops

The reversed design increase the model's suitability in a workshop setting. The report so far has discussed how RSCIs have happened, what preceded them and what the output was. However, in a decision process the first step is to set the output vision. The output focus is recurring in the works of for example Kim et al. (2005), Fisher (1997), Osterwalder et al. (2010), Cooper et al. (2002), and Brown (2008), and has been observed in the empirics; Daimler started with a customer convenience vision; Ericsson realised that customer flexibility was imperative; Metro was founded on an idea of low reader price and high convenience; Min Doktor fully focused on making the customer journey more flexible. Therefore, the model starts from the left with targeting a competitive advantage, a stage where generic innovation models may prove helpful in finding the problem to solve.

After a competitive advantage has been chosen, one or several types of RSCI that can be used to achieve it may be considered. Ideation within the types are boosted by inspiration from targeted tools and generic innovation tools. An effective way to use the targeted tools has been to apply example business models to one's own. Finally, antecedents were found to be important drivers of innovation, which in a process can be turned into next steps to succeed with the innovation. For example, when a promising idea has been identified, requirements on antecedents (knowledge and learning, technology, network structure and relations, and market orientation) can be set up.

7 Validation of Model through Workshops

In this chapter, the validation of the model is described. The descriptions touch upon method, result and analysis, but the reason for the separation is clear; the input to the validation part include all other parts of the thesis, meaning that the format could not be set until after the analysis. A workshop setting performed together with ICG and potential clients were used for the validation. Here follow the workshop execution, workshop data, and workshop analysis.

7.1 Purpose

The purpose of the workshops were to validate the RSCI-model considering its generality and actionability.

7.2 Workshop Execution

Two workshops were executed together with ICG and two different target companies, Lindab and PostNord. The same material and agenda were used in both workshops. A model presenting the general structure of the workshop is visualised in Figure 34. The model was created by the authors with inspiration from *Design Thinking* (Brown 2008), consisting of *Inspiration*, *Ideation*, *Implementation*, further presented in the frame of reference section 2.4.1.

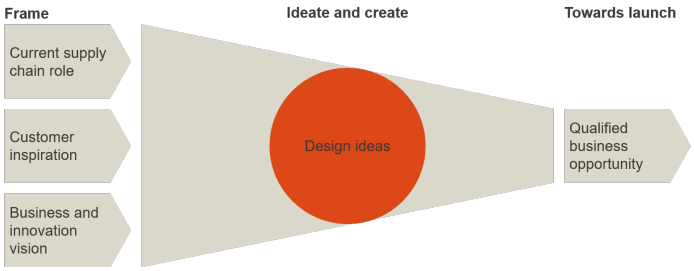

Figure 34: A framework created by the authors visualizing the structure of the workshop. The framework is inspired by Brown (2008) and merged with the RSCI-model, Figure 33.

7.2.1 Frame

In the framework in Figure 34, Frame was interpreted from *Inspiration* from *Design Thinking* and consists of current supply chain role, customer inspiration and setting business and innovation vision.

In order to gain an initial understanding of the SC a supply chain mapping was made, inspired by theory of Lambert et al. (2000) to produce a practical discussion tool. The current supply chain role was evaluated using the *Business model canvas* by Osterwalder et al. (2010) as a *generic innovation tool* and complemented by the ICG interpretation of the *Business model canvas* (Sjögren et al. 2015), shown in Figure 11.

In the *Customer inspiration* part, the generic tool of *Customer Journey Mapping* was used, instead of observing customers as recommended by Brown (2008). In the customer journey mapping, the sales and marketing people proved a valuable asset.

After this initial introduction and application of generic innovation tools the desired output, the business and innovation vision, could be selected. An output matrix was used, described in Figure 35.

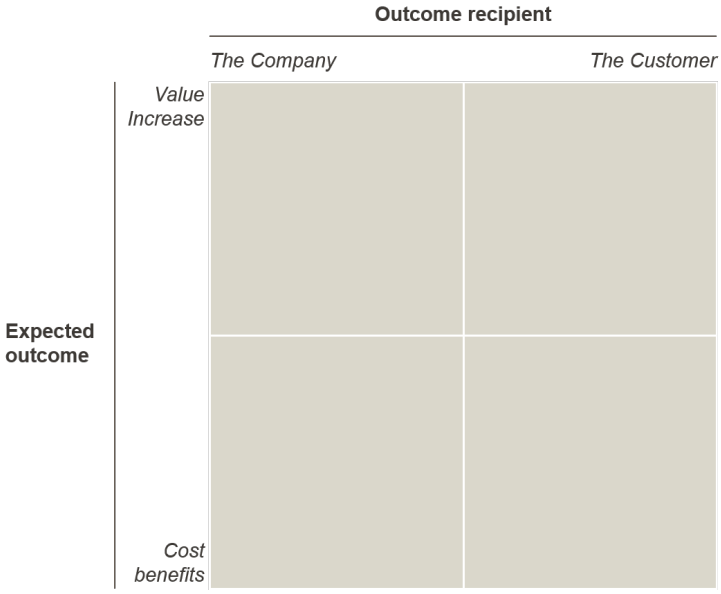

Figure 35: The output matrix, used to describe output

Connecting to the model in Figure 33, the main parts used in the framing were generic innovation tools and competitive advantage. That is, a target competitive advantage was set with the help of generic innovation tool. Those parts are highlighted in Figure 36.

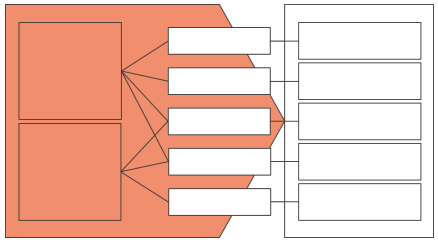

Figure 36: The parts used in the framing part of the workshop: generic innovation tools and competitive advantage.

7.2.2 Ideate and Create

After selecting desired output, the ideate and create stage could start, which was done using the RSCI types and targeted tools of the model in Figure 33, supported by generic innovation tools (highlighted in Figure 37). Ideate and create was interpreted from *Ideation* part of *Design Thinking*. The ideas produced were evaluated after the *Three Fit* model by Osterwalder et al. (2014).

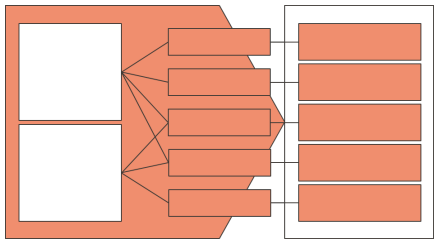

Figure 37: The parts used in the ideation part of the workshop: generic innovation tools, RSCI types, and targeted tools.

7.2.3 Towards Launch

The last step, towards launch, replacing the *Implementation* part of *Design Thinking*, was performed using the antecedents (highlighted in Figure 38) in the RSCI-model and next steps for a qualified business opportunity were identified.

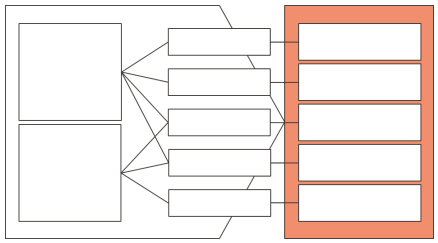

Figure 38: The parts used in the *towards launch* part of the workshop: antecedents.

7.2.4 Workshop Material

The workshops were conducted with the assistance of PowerPoint slides printed on paper in size A1 with the intention of steering the discussion and visualising important parts of the model. Paper cards of different colours were used to write new ideas and put on the wall. All slides used in the workshop setting are presented in Appendix B.

7.3 Workshop Data

The data from the workshops is presented, both qualitative and quantitative. The qualitative data is from the participant's oral comments at the end of workshops, and the quantitative data is from a form filled out by the participants. First the data from Lindab is presented, thereafter the data from PostNord, and lastly the feedback from the consultants at Implement Consulting Group. The validation statements to target companies are presented in Table 24.

Table 24: Validation statements to target companies of workshops

Purpose sub-part	Statement
Generic	**Q1.** The WS covered SCI relevant to our business **Q2.** The workshop was unbiased towards a specific solution **Q3.** The workshop was well structured
Actionable	**Q4.** The workshop produced concrete ideas **Q5.** The workshop produced new ideas **Q6.** The workshop produced ideas worth follow-up

7.3.1 Target Company: Lindab

The result from the Lindab workshop is presented in Table 25. In addition, the participants from Lindab provided qualitative feedback, paraphrased by the authors, such as:

- The firm structure of the workshop provided helpful direction in the innovation process
- Parts of the workshop should be included in the ongoing innovation work
- The SC mapping and customer journey mapping is helpful and should be left intact for the next iteration, thus bringing everyone up to date quicker
- By segmenting the customers according to the customer journey, different needs could be identified; an opportunity for segmentation in SC services was presented
- By discussing which output to aim for with the innovation, expectations were aligned and discussions more to the point
- Getting several functions together in a room provides opportunity for exchanging ideas
- Having example cases for inspiration got the ideation and discussion going
- The workshop exceeded expectations

Table 25: Lindab workshop evaluation, after the statements presented in Table 24

Participant	Role	Q1	Q2	Q3	Q4	Q5	Q6
Björn Andersson	SC Developer	5	4	4	4	5	5
Dag Jarlson	SC Manager	5	5	5	4	4	5
Erik A. Elming	BI & Integration Manager	5	4	4	5	3	5
Martin Nilsson	SC Developer	5	5	4	4	3	5
Paul Olsson	Purchase and Sales Manager	4	4	4	3	4	4
Mean		4.80	4.40	4.20	4.00	3.80	4.80
Range		1	1	1	2	2	1

7.3.2 Target Company: PostNord

The result from the PostNord Fulfilment workshop is presented in Table 26. In addition, the participants from PostNord provided qualitative feedback, paraphrased by the authors, such as:

- The ideation spurred interesting discussions and interesting ambitious ideas were spawned
- The initial customer inspiration part provided valuable direction, but a more detailed tool would help transfer the insights to the types of innovation
- Exciting workshop and discussion

Table 26: PostNord Fulfilment workshop evaluation, after the statements presented in Table 24

Participant	Role	Q1	Q2	Q3	Q4	Q5	Q6
Björn Johansson	SC Manager	5	4	4	4	4	4
Mats Sjöberg	BD Manager	5	4	5	5	4	5
Mean		5.00	4.00	4.50	4.50	4.00	4.50
Range		0	0	1	1	0	1

7.3.3 Implement Consulting Group

The validation questions posed to ICG are displayed in Table 27, to which the feedback after all workshops is presented in Table 28. In addition, the participants from ICG provided qualitative feedback, paraphrased by the authors, such as:

- Presenting RSCI types targeted tools and examples spurs interesting ideas. It should be the focus of the workshop
- An RSCI-specific ideation/design method would be interesting to research

Table 27: Validation statements to ICG

Purpose sub-part	Statement
Generic	**Q7.** The parts of the model are collectively exhaustive **Q8.** The connections between RSCI and types of competitive advantage are clear in the RSCI model **Q9.** The connections between RSCI and inputs to achieve it is clear in the RSCI model
Actionable	**Q10.** The parts of the RSCI model are *sufficiently* mutually exclusive **Q11.** The model worked well in a workshop setting **Q12.** The model helped identifying activities to achieve RSCI

Table 28: ICG consultant evaluation, after the statements presented in Table 27

Participant	Role	Q7	Q8	Q9	Q10	Q11	Q12
Erik Kayser	Partner	5	5	5	5	4	5
Peter Abdon	Consultant	4	3	4	4	5	5

7.4 Workshop Analysis

In this section, the results presented in the workshop results section above are analysed and synthesised. First, the analysis is described; second, the post-analysis synthesis.

7.4.1 Result Interpretation

The two types of feedback, from target companies and ICG, are evaluated according to the purpose of the research: to create a generic and actionable model for RSCI.

Target Companies
From the target companies' view, the generality and actionability was handled as follows.

Generality
The mean of the first question, regarding the relevance of the workshop for the company business, was high for both LindAb and PostNord (4.8 and 5.00 respectively) and the range was low. The high mean and low range for each company between the companies indicate a generic model relevant for different types of businesses. However, the model was only validated for two different companies. If a greater sample would have been used the deviation of range and mean might have been higher.

The results of the second question, concerning the biases of the workshop, had a slightly lower mean, however it was still high. PostNord had the lowest mean of 4.00, which

indicate that the workshop was slightly biased. The range for both companies was low, which disclaim biases towards a specific function.

The third question was regarding the structure of the model and the workshop. The mean indicates that the participants considered the workshop to be structured, however, the structure can be improved. One improvement opportunity identified by the authors is the time management of the workshop. Some activities were given longer time than necessary, while there was not enough time to perform other activities. This may contribute to lower score for the structure of the workshop.

Actionability
The score for the workshops' ability to produce concrete ideas was high, slightly higher for PostNord than LindAb. This indicate concreteness and actionability of the model. The range for LindAb was high (2), which indicates lower satisfaction in a role or function. The lowest score was given by sales and purchasing responsible, and the highest by Business Intelligence and Business development responsible. One reason for the difference may be a low focus on sales and purchasing while the focus on business development was high. Another possible explanation is as simple as the very restricted time frame of the workshops. *Concrete* ideas may be an ambitious goal in a three hour workshop.

In the fifth question, whether the workshop produced new ideas, the score was slightly lower at both LindAb and PostNord. In addition the range was 2 at LindAb which is considered to be relatively high. This might be due to part of the workshop where the employees are given the opportunity to bring forward and integrate ideas that they have considered. However, the old ideas should not take up too much time from the workshop and focus should be at co-creating new ideas.

In the last question for companies, whether the workshop produced ideas worth follow-up, the score was high. At both LindAb and PostNord all participants except one gave the highest score. This indicate an actionable model with great potential to create competitive advantage.

Implement Consulting Group
From ICG's view, the generality and actionability were handled as follows.

Generality
The consultants from Implement scored high on the collectively exhaustiveness of the model, which indicates that the consultants consider the model to be generic. Regarding the connections between types of RSCI and output in the model, the score was high for one consultant and average for the other consultant. This indicates that there are improvement opportunities regarding the connections between the components of the model. For the connection between input and RSCI the score was higher, which indicates generality and clear connections between input and RSCI.

Actionability
Both consultants scored high for the level of mutual exclusiveness of the model, which indicates actionability through usefulness. The consultants gave a high score for using the model in a workshop setting, thereby the consultants consider that the model fit with consulting work format. At the last question, regarding whether the model helps identifying activities to achieve RSCI, both consultants gave the highest score. This show that the model serve to fulfil its purpose and indicates actionability through clear identification of how to work practically.

7.4.2 Post-Validation Synthesis of Model

Overall, the model worked well in the workshop setting and the participants at the workshop seemed happy about the outcome of the workshop. The cases used to explain different types of RSCI and targeted tools served as valuable input and a great source of inspiration. To increase the actionability of the model, the connections between types of RSCI and output can be improved in the model, which is also aligned with the feedback given by ICG. After the workshop, the connections were reviewed and the model updated. In addition, there are improvement opportunities for time management of the workshop and more time should be dedicated to generate ideas using the RSCI framework.

8 Conclusions

The concluding chapter summarises the main takeaways from the thesis. Starting with answering the research questions and purpose, the contributions to theory are presented, ending with limitations and suggestions for future research.

8.1 Fulfilment of Purpose and Research Questions

The authors conclude that the purpose of generating a generic and actionable model of how to achieve Radical Supply Chain Innovation (RSCI) has been fulfilled. The generality and actionability of the model is confirmed through workshop settings, further presented in chapter 7. The final RSCI model is displayed in Figure 39.

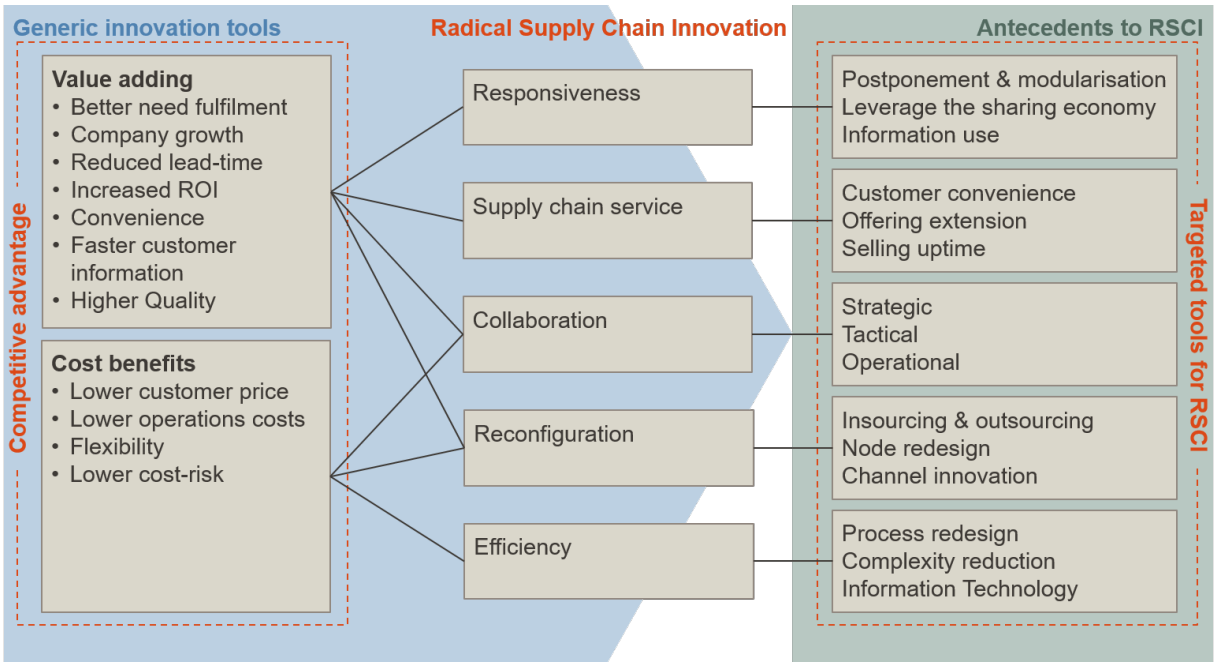

Figure 39: The final RSCI-model, built to be a generic and actionable tool in the pursuit of radical supply chain innovation

Applying the model in Figure 39, which was done in a workshop setting, starts from the left hand side with identification of the desired competitive advantage; either value adding or cost benefits can be chosen, focused towards customers or internally. From the competitive advantage several types of RSCI can be chosen. Both during the goal setting for competitive advantage and ideation within the types, generic innovation tools are helpful, which is visualised in the figure by arrow stretching from competitive advantage, through RSCI types, towards targeted tools and antecedents. When an interesting RSCI type has been chosen, it can be further broken down and applied by diving into the targeted tools.

When a promising idea has been created, next steps can be created from antecedents. Antecedents were identified as important drivers of radical supply chain innovation, which can be reverse engineered to build the requirements to succeed with the idea.

8.1.1 RQ1 What Different Types of RSCIs Can Be Identified?

Five types of RSCI were identified:

- Responsiveness: effectively matching supply and demand, for example through reducing lead-times or cycle time, or through improved feedback loops or information flow.
- Supply Chain Service: service innovation power by the supply chain, targeting an imperative customer need.
- Collaboration: sharing goals, information investments and decisions to solve problems inter-organisationally.
- Reconfiguration: changing the supply chain structure through sourcing, node redesign or channel innovation.
- Efficiency: making the supply chain more efficient.

8.1.2 RQ2 How Does RSCI Affect Competitive Advantage?

RSCI can affect a company's competitive advantage in two main ways: value adding and cost benefits. Value adding includes advantages such as better customer need fulfilment; company growth; reduced lead-times; increased return on investment; convenience; faster customer information; and higher quality. Cost benefits include lower customer price; lower operations costs; flexibility to scale up and down; and lower cost-risk.

Each of the sub-components of competitive advantage can be linked to the types of RSCI, and consecutive inputs. Starting with a desired type of competitive advantage, the model can be traced to find which RSCIs are available and may produce that result.

8.1.3 RQ3 How are Different Inputs Used to Produce RSCI?

Inputs are divided into targeted tools, specific for each type of RSCI; antecedents to RSCI, which are common for all types of RSCI; and generic innovation tools, non-RSCI specific but well suited for RSCI. A collection of the three categories may be used in order to produce RSCI.

The classification of targeted tools is displayed in Figure 39. Antecedents are categorised in (1) knowledge and learning, (2) technology, (3) network structure and relations, and (4)

market orientation. There are many generic innovation tools, which are for the purpose of this report categorised in tools for (1) finding the problem, (2) solving the problem, and (3) organising for innovation.

8.1.4 RQ4 What Analyses Should Be Made in Order to Choose the Right Inputs?

Depending on the type of desired outcome (competitive advantage), different types of inputs may be needed. First, an analysis of which competitive advantages are prioritised should be made. Second, the types of RSCIs available should be reviewed and using generic innovation tools as well as targeted innovation tools, adaptations of the targeted tools should be made. With a set of ideas, innovation tools should be used to evaluate them. Finally, the categories of antecedents should be gone through to lay out a roadmap of what is needed to succeed with the idea.

8.2 Contributions to Theory

This research has constituted an attempt to provide a holistic understanding of the concept of RSCI. Others have ventured deep into parts of the concept (e.g. Arlbjørn et al. (2011), Flint et al. (2005), Grawe (2009), and Munksgaard et al. (2014)), whereas this study reflects an ambition to link the parts together. According to generality, the contributions to research are answers to the question *"What kinds of radical supply chain innovations are there?"*.

Earlier works on SCI have mainly focused on descriptive models (e.g. (Arlbjørn et al. 2011; Flint et al. 2005)), building generic frameworks from theory (Grawe 2009), or mapping outcomes (Munksgaard et al. 2014). The output of this research has been an actionable model validated through company interactions. A contribution to theory in terms of actionability is answering the question of *"How may I achieve radical supply chain innovation?"*.

8.3 Limitations and Suggestions for Future Research

The sample size sets a limit for generality of the study. In order to gain further quality in the findings, literal replications as well as theoretical ditto would be suggestions for future studies on the subject. For example, literal replication studies could be done selecting other successful RSCI cases hoping to find similar results. Theoretical replication studies could be done by selecting unsuccessful attempts at RSCI, hypothesising a misalignment in the inputs to the process or a lack of inputs.

Furthermore, the analysis produced questions based on hypotheses, unverified albeit interesting, worth answering though future research:

- Is RSCI more effectively achieved outside the classic SC focus of efficiency versus responsiveness?
- Are RSCI efforts aimed at simplifying the customer journey more successful than others?
- Are start-ups more radical than large corporations?
- Does the organisational form of innovation affect the success of the RSCI?
- Is a value proposition targeted towards *either* cost benefits or added value more effective than a combination?
- Is a customer focus more effective than an internal cost focus in achieving RSCI?

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A Case Study Protocol

In this section the logic of the data collection using multiple case studies is presented. The section begins with the key research issue, and thereafter follow case study design and the interview guide.

A.1 Key Research Issue

The key research issue is the unit of analysis, i.e. the innovation process consisting of input, RCSI and output. A schematic picture of the unit of analysis is presented in Figure 40 (on page 145). All research questions presented in the Introduction section will be studied during the case study.

RQ_1 What different types of RSCIs can be identified?
RQ_2 How does RSCI affect competitive advantage?
RQ_3 How are different inputs used to produce RSCI?
RQ_4 What analyses should be made in order to choose the right inputs?

RQ_1 aims to categories which RSCI types there are and which can be identified in each case. It can be as a result of an event or action, but also as an outcome of an objective or part of the corporate strategy. RQ_2 concerns the output, i.e. the competitive advantage that succeed RSCI in forms of added value or cost benefits. RQ_3 and RQ_4 are used to study the input to RSCI, i.e. targeted RSCI tools, antecedents and generic innovation tools.

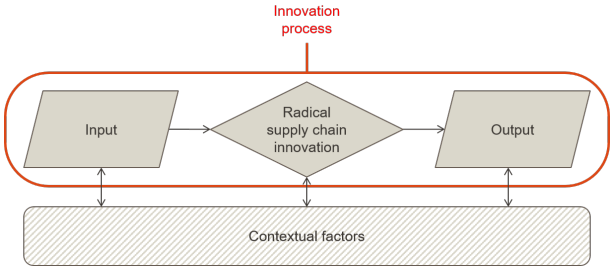

Figure 40: Unit of analysis for the case study research

A.2 Case Study Design

The case study design is here described in terms of sample selection, pilot study, data collection, analysis method, and the case study report.

A.2.1 Sample Selection

The sample will be selected based on the following criteria: *Criteria for Selection*

- The cases should demonstrate radical innovation
- The sample should represent different types of RSCI
- The sample should represent different industries
- The companies must be accessible

The companies best qualifying for the study were contacted and if they agreed to participate in the study interviews were booked. A letter of introduction was sent before initiating the interview.

A.2.2 Pilot Study

A pilot study was performed with Min Doktor. After the pilot study the design of the methodology was reviewed in order to find improvement opportunities for the following studies.

A.2.3 Data Collection

1. *External Documents*
   Before the interview external documents were sought in order the give background information regarding the case.
2. *Interview*
   The interview was conducted with one or two participant from the company. Duration 30 to 90 minutes. The interview followed the semi-structured guide presented in section A.3. All interviews were recorded and notes were taken.
3. *Internal Documents*
   If available, internal documents were requested such as data process charts, descriptions and data from ERP system.

A.2.4 Analysis Method

Data coding, consisting of open coding, axial coding and selective coding, was used to analyse the data.

1. *Open Coding*
   Open coding was used to break down, examine, contrast and compare the data gathered in case studies. The result was presented in tables, Table 29 shows a sample of one table.

2. *Axial Coding*
   Axial coding was used to find connections among the data based on the categories identified through open coding.

3. *Selective Coding*
   Selective coding was used to connect the theory and make it coherent.

Table 29: Example of table used in the analysis section

	RSCI	Input			Output	
	Type	**Targeted tools**	**Antecedents**	**Generic tools**	**Value adding**	**Cost benefits**
Min Doktor	Service* Reconfiguration Efficiency	Customer convenience Process redesign Outsourcing Channel Innovation	Market orientation Technology Knowledge	Segmented market estimations Customer journey mapping	Better need fulfilment Convenience	Lower operations costs Lower customer price

A.2.5 Proposed Outline of the Case Study Report

Company Name

- The Company and its Business Model
  - Company Background
  - Value Proposition
  - Customers, Channels and Revenue Streams
  - Key Activities, Resources and Cost Structure
  - Key Partnerships
- Radical Supply Chain Innovation
- Input
  - Targeted Radical Supply Chain Innovation Tools
  - Antecedents
  - Generic Innovation Tools
- Output
  - Value adding
  - Cost benefits

A.3 Interview Guide

A.3.1 Introduction

"Thank you for taking the time out of your day to meet with us. I hope you got the material I sent in preparation for this, but I would like to elaborate a little bit about the project if that is alright."

Make sure that the purpose of the thesis is clear to the interviewee, as well as our definition of SCI and his/her role in the research. Specifically go through:

- *Purpose*
  "The purpose of this study is to generate a generic and actionable model of how to achieve radical supply chain innovation"
- *RSCI*
  A change in the value chain that is new to the industry. Will often coincide with business innovation
- *Interviewee role*
  The empirics will build on the innovation processes of successful RSCI cases, trying to identify people, sub-processes, analyses made, and enablers for this innovation
- *Case qualification for the study*
  Present how the company qualifies for the study and why the authors identify this as an interesting case of RSCI.

"The interview today is about us picking the brains of a successful SC innovator, and as such we would like it to be informal. We would like you to tell us the story in your own words focused on the the innovation process that led to this particular example of RSCI. In order to keep the interview efficient, do you mind if we record the conversation?"

A.3.2 The Interview

Start the conversation by understanding the interviewee's role at the company (responsibilities, background, orientation etc.). Use probes to dive deeper.

Questions regarding RSCI

- "Could you please tell us about the innovation?"
- "What makes it unique? How is it different from competitors?"
- "How does it deliver value to the customers?"

Questions regarding input to achieve RSCI

- "Can you describe how the process for the radical innovation proceeded? Could any distinct parts be identified? for example the following theoretical parts?"
  - Antecedents: Knowledge and learning, technology, Network structure and relations, customer orientation
  - Generic innovation tools
  - Targeted radical supply chain innovation tools
- "What was deemed critical for success?"
- "What analyses were made as a part of the innovation process?"
- "Where did the idea(s) originate from? For example some of the following theoretical suggestions?"
  - Customers
  - Competitors
  - Other industries
- "How was the data turned into an idea?"
- "How was the data regarding new ideas collected?"
- "Who was involved in the innovation process?"
- "Can you tell me about a personal experience of developing something new to the industry?"

Questions regarding the output of RSCI

- "Did you have a clear objective in the initial phase of the innovation process?"
- "How did the innovation create competitive advantage? (i.e. cost benefits or added value)"

Generic Innovation Questions

- "How does the company choose what areas to innovate within?
- "How are different ideas prioritized?"
- "How are new ideas funded? Sponsors?"
- "Is the prioritisation of ideas related to the company strategy?"
- "How can new ideas in collaboration within functions emerge?"
- "Do you use any framework or structured way to work with innovation at the company?"
- "Can you think of other cases than the one we have discussed where you experienced an innovation process?"

Examples of Probes to Extract Deeper Information

- "Can you tell me more about that?"
- "Interesting, what else happened?"
- "What led up to that conclusion?"
- "What effects did that have?"
- "Was that something that is often done?"

Notes to Keep in Mind During Interview

- When a name or role comes up, try to establish the relevance and get a meeting with him/her
- If a process is formalised in some way, looking at any documentation is valuable
- Meeting notes would be valuable to see
- Establish if a meeting face to face or on-site observation would be beneficial and possible

Wrap-up
Thank the interviewee for participating in the study, offer to send a report when ready (June), get contact details for it, and encourage extended contact.

B Workshop Material

On the following pages, the material used at the target company validation workshops is displayed. The material shows how the findings in this thesis can be applied.

Supply Chain Innovation Workshop

Co-creating ideas to improve the business model

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Starting with background and framing, the focus of the workshop will be on collaborative ideation of supply chain innovation

Background	Introduction
Frame	Current supply chain role
	Customer inspiration
	Business and innovation vision
Ideation	Thesis presentation
	Brainstorming
Towards launch	Screening ideas
	Next steps
Summary	Evaluation

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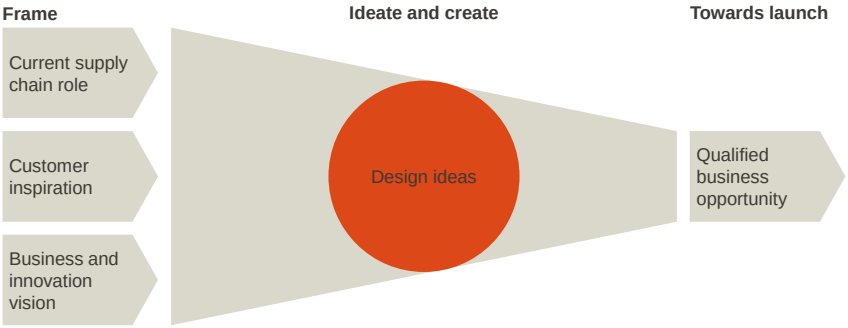
In a funnel method of successive exclusion, brainstorming is targeted towards business and innovation vision and next steps are created



By framing the innovation scope, the ideation is targeted; quality and quantity of ideas are boosted

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In order to envision the transformation and communicate it, a visualisation of the current supply chain is helpful

Mapping the supply chain setup aligns the views of the value chain and is a useful tool for discussion

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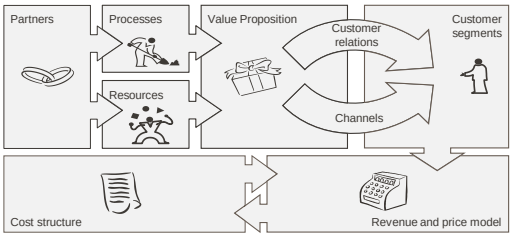
Successful supply chain innovators master different roles in the value chain, which is the current role?

Introducing the business model canvas



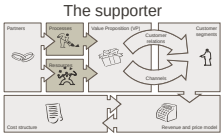
Using the canvas

By considering the entire canvas from a supply chain perspective, new value drivers can be discovered. Not only cost drivers. Ask yourselves…

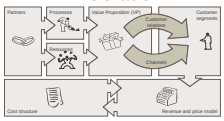
- What does the value chain look like?
  - Challenges
  - Profit pool
- Downstream customers – how does the economic engine work?

The three key roles of the supply chain

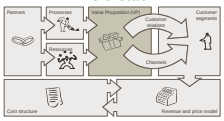
The supporter



The enabler



The creator



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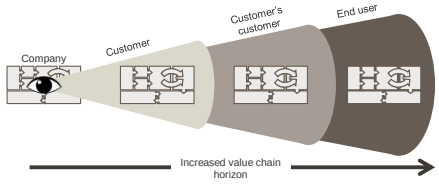
Understanding the customer journey is a vital part for setting business and innovation visions

	Needs	Help?	Buy	Use	Maintain	Dispose
Customer			Job to be done (needs)			
			Pains			
			Gains			
Customer's customer			Job to be done (needs)			
			Pains			
			Gains			



Through segmenting the customer base, horizontally and vertically, and mapping the customer journey, important customer insights can be identified and fed into the business and innovation vision

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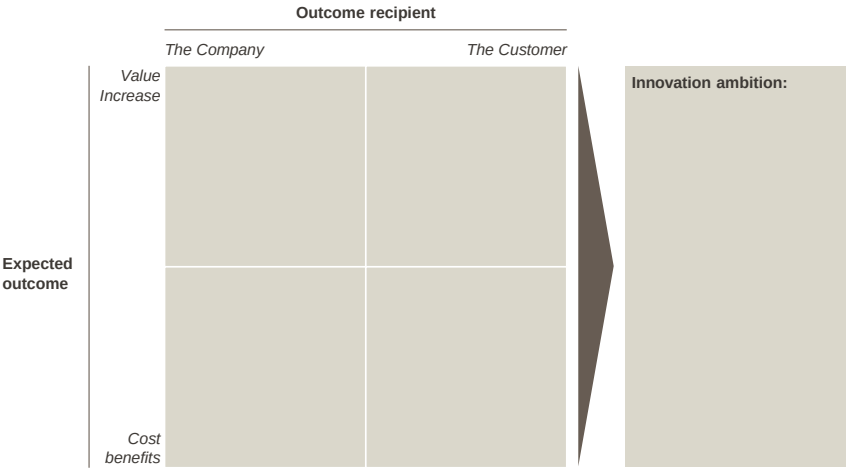
Combining functional goals with strategy and customer insights, a business and innovation vision can be set



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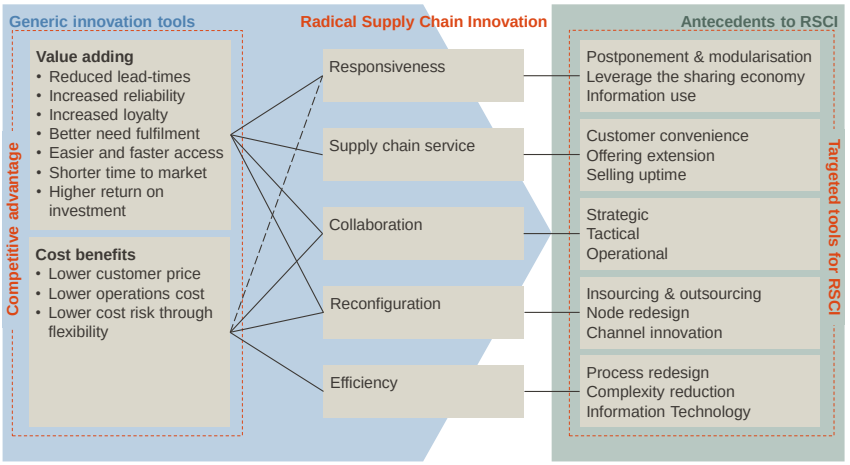
The funnel method is based on a master's thesis at Lund University, built on successful cases of radical supply chain innovation



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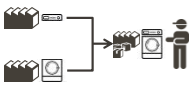
Brainstorming responsiveness-innovation: competitiveness through adaptive capacity

	Postponement and modularisation	Information use	Structural innovation
			
Description	Can responsiveness be achieved through moving activities downstream?	Can information be used more effectively upstream and downstream in the supply chain?	Can the structure be remodeled to fuel responsiveness?
Example	• Ericsson's module production and merge-in-transit • Hewlett Packard's assembly postponement • Benetton's postponement of colouring • Smart car's module production	• Cemex's transformation of resource allocation in concrete transport • Zara's use of point of sales data to improve time-to-market • Maersk uses hourly update of cargo status	• Zara's nearshoring for responsiveness

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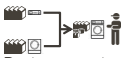
Responsiveness deep-dive: Ericsson's module production and merge-in transit

ERICSSON

Background

- Vision: adapt HP's responsive strategy to Ericsson's business
- Customer decoupling close to customer
- Enabled through sourcing consolidation and ERP system



Postponement

Structural

Radical supply chain innovation

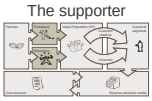
- Pioneered postponement in the TMT business
- Standardized the data formats of the industry

IT-enabled cross-docking

Competitive advantage

	Company	*Customer*
Value	ROI increase due to less WIP inventory	Flexibility in ordering base stations Delivery precision
Cost	Cheaper sourcing through consolidation SC transparency	

Ericsson's take on the supply chain roles

The supporter	The enabler	The creator
		
Assisting Ericsson's core business by swift execution, directly boosting the value proposition and addressing customer needs.	Blurred-out borders between SC and KAM roles.	Merge-in-transit directly contributed to defending the market share, delivering real value and affecting company strategy.

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Brainstorming supply chain service innovation: supporting the core product through higher service

	Customer convenience	Selling uptime	Offering extension
Description	Creating value for the customers based on their preferences	Providing maintenance of the equipment and guaranteeing maximal uptime	Extending the current core offering by providing additional services
Example	• Car2go's carsharing convenience • Min Doktor's online primary health care solution • Intel's Just Say Yes programme for customer convenience	• GE Aviation's OnPoint service • Hilti's fleet management • Rolls-Royce TotalCare program	• Amazon Flex offering one hour delivery

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Supply chain service deep-dive: MinDoktor's online primary health care solution

Background

- Vision: to simplify the customer-doctor interaction process
- Strong involvement of doctors; lead-users

Radical supply chain innovation

- First Swedish online care provider, where clinics are obsolete
- Rapidly growing organisation able to compete with subsided competitors

Competitive advantage

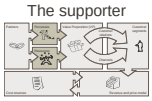
	Company	*Customer*
Value	ROI increase due to less resources employed	Faster care Flexibility Quality care
Cost		Cheaper for B2B customers

Convenience

The customer journey, simplified

MinDoktor's take on the supply chain roles

The supporter



The enabler

The creator

MinDoktor does not have a supply chain department; the focus is purely cross-functional. The IT development is most accurately described as the supporter, along with the doctors. However, IT development is also the enabler and creator. A truly radical supply chain innovation.

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Brainstorming collaboration innovation: partnering horizontally or vertically for joint competitive advantage

	Strategic SC collaboration	Tactical SC collaboration	Operational SC collaboration
			
Description	Collaboration between business on a long term perspective	Intra-organizational collaboration between parts of the organizations	Intra-organizational collaboration on day-to-day basis
Example	• Smart's cluster production • Axis' network incentives	• Barilla introducing VMI • Ericsson's university and 3PL collaborations • Maersk's university collaborations	• Whirlpool's joint forecasting • PACIV's full disclosure for trust building

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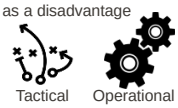
Collaboration deep-dive: Whirlpool's supply chain collaboration through CPFR

Background

- Vision: Focus on customer preferences and improve SC performance
- Low service levels raised a need for better forecasting
- SC served as a disadvantage for sales



Radical supply chain innovation

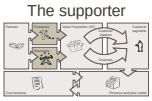
- Strategic segmentation of SKUs and trade partners
- Implementing S&OP and CPFR and sharing forecasts with selected partners

Competitive advantage

	Company	*Customer*
Value	Stabilized product availability	Service levels from 83% to 97% in 5 years
Cost	Drastic reduction of operations cost Reduced inventory levels	

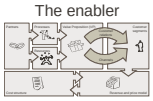
Whirlpool's take on the supply chain roles

The supporter



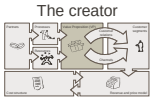
Supporting supply chain partners with continuous improvement to lower inventory levels.

The enabler



Adapting the supply chain to customer business needs

The creator



Creating new collaborative initiatives and strategic alliances.

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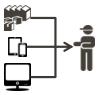
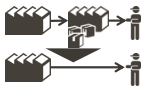
Brainstorming network reconfiguration innovation: achieving a novel supply chain setup

	Channel innovation	Insourcing/ outsourcing	SC node reconfiguration
			
Description	How can different channels be used for customer interactions?	Can competitive advantage be created by in-sourcing or outsourcing of operations?	Geographical transfer, merges or dispersion of nodes in the SC
Example	• Metro's novel distribution • Netflix removing brick-and-mortar shops • Dell introducing direct sales channels • Mathem cut out supermarkets	• Nike's outsourcing and network strategy • Zara's outsourced production	• Ericsson's introduction of merge-in-transit • Ikea merging their warehouses and stores

Reconfiguration deep-dive: Metro's novel distribution channel and outsourced operations

Background

- Vision: provide daily news in a compact, convenient and informative way
- Close relations with readers


Channel innovation


Outsourcing

Radical supply chain innovation

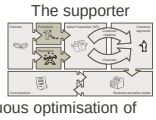
- Cover the costs through advertisement and give away the paper for free
- Extended the market for daily newspapers
- Disrupted the standards for the newspaper industry

Competitive advantage

	Company	*Customer*
Value	Flexibility through outsourced operations 40% market penetration	Accessible in public transport Simple and effective advertisement (for advertisers)
Cost	Lower distribution cost	

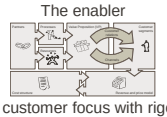
Metro's take on the supply chain roles

The supporter



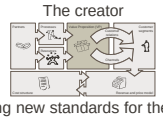
Continuous optimisation of distribution locations.

The enabler



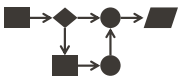
Strong customer focus with rigorous feedback structures. The channel development driving business expansion.

The creator



Creating new standards for the newspaper industry – several ad funded newspaper inspired by metro.

Brainstorming efficiency innovation: achieving cost benefits through streamlined operations

	Process redesigning	Reduce complexity	Information systems
			
Description	Redesigning how tasks and material flows are executed	Simplifying SC layout by redesigning tier structure or interaction points	How can information systems be used to increase efficiency
Example	• Min Doktor's optimisation of patient-doctor interaction	• Ericsson's sourcing consolidation	• Maersk's use of big data to create transparency and pinpoint problem areas • Ericsson's use of EDI for Merge-in-transit

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Efficiency deep-dive: Maersk's use of information systems and Big Data to streamline operations

MÆRSK

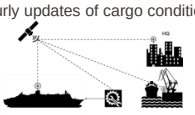
Background

- Vision: Improve efficiency though end-to-end visibility
- High risks and several actors in the value chain
- Device collecting data on each refrigerated container

Information system

Radical supply chain innovation

- Unique ability to identify and eliminate bottlenecks and non value adding activities in the value chain
- Hourly updates of cargo conditions



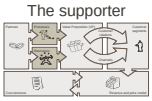
Effective use of big data

Competitive advantage

	Company	*Customer*
Value	Transparency and end-to-end control	Reduced SC risk Increased reliability and quality
Cost	Streamlined operations Effective handling of customer claims	

Maersk's take on the supply chain roles

The supporter



Transporting refrigerated cargo from A to B.

The enabler

Enabling continuous updates of cargo conditions.

The creator

Creating transparency and reducing supply chain risk.

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In order to turn the idea into a business, proof of three supply chain fits need to be established

Business model fit

Is the value proposition scalable, profitable, and fits into your business model?

Product-market fit

Does the idea create value for the recipient – willingness to pay for customers and willingness to implement for the company?

Problem-solution fit

Does the idea answer the jobs, pains and gains of the recipient – the customer or the company?

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Ideas need to meet the business and innovation vision and the three fits in order to pass into the next steps

	Problem-solution fit	Product-market fit	Business model fit	Meets vision	Go/no go
Idea no 1					
Idea no 2					
Idea no 3					
Idea no 4					
Idea no 5					

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Promising ideas are evaluated quantitatively and qualitatively in order to build a complete picture of potential benefits

Quantitative	Qualitative	
	Opportunities	Challenges

Not all benefits can be quantified, but it does not make them less important. Consider both aspects

What do we need to make it work? Next steps for ideas

Technology	Knowledge	Network	Market orientation	Other factors

Evaluation and summary

Key takeaways