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Toxic Textiles

Towards Responsibility in Complex Supply Chains

Natasja Börjeson

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Toxic Textiles

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Towards Responsibility in Complex Supply Chains

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*For my heroic grandmother, Alexandra
and my daughters Selma and Lydia.
May you always have a room of your own.*

Abstract

The governance of the environmental and health problems that follow in the wake of globalised trade is one of the great contemporary challenges. One of these challenges is the management of chemical pollution and associated risks, and one sector facing this challenge is the textile industry, which has complex supply chains spread across continents. At the same time the role of actors on the playing field are changing and market actors are being called on to responsibly manage the issue of chemical risks and associated challenges. However, governance and control are often obstructed due to complexity and considerable knowledge uncertainty. This situation complicates responsibility-taking and makes it difficult to ascribe liabilities to specific actors, as it is not obvious who is responsible for what. This thesis is concerned with the process of how a group of market actors – private and public textile buyers – assume responsibility of chemical risks in their supply chains in a situation that is characterized by uncertainty and complexity. This thesis aims to contribute to an understanding of what happens when market actors are called on to manage the negative side effects of globalisation. The focus is on Swedish textile-buying private and public organisations. The thesis constructs an analytical model based on the key concepts responsible governance, responsibilisation, and responsible supply chain management (RSCM). The thesis explores the barriers, challenges and opportunities that exist for buyers seeking to assume RSCM and whether a process of responsibilisation can be observed in the textile sector. The thesis uses an exploratory approach and interviews, participatory observations and literature studies, as well as case studies to understand the process and to investigate barriers, challenges, opportunities. In summary, the thesis shows that a process of responsibilisation is ongoing on the organisational and sector levels. Further, it is shown that due to the complex structures of the chains, there are more barriers and challenges than opportunities for buyers striving for RSCM. However, it is argued that cooperation, stronger public and private policy, and a reflexive approach could be ways forward towards RSCM and increased responsibilisation in the textile sector.

Keywords: Responsibility, Sustainability, Supply Chain Management, Governance, Responsibilisation, CSR, Complexity, Uncertainty, Chemicals, Textiles

Sammanfattning

En av våra samtida stora utmaningar är hanteringen av de miljö- och hälsoproblem som följer i svallvågorna av en globaliserad handel. En av dessa utmaningar rör hanteringen av kemikalierisker. Inom textilbranschen är produktionen kemikalieintensiv och handelsmönstren karakteriseras av komplexa varukedjor som inte sällan sträcker sig över flera kontinenter. Samtidigt pågår en förändring av inblandade aktörers roller, där marknadsaktörer uppmanas att på ett ansvarstagande sätt hantera frågan om kemikalierisker och de utmaningar som hör därtill. Denna process försvåras ofta till följd av ett komplext samhälle präglad av kunskapsbrister. Detta komplicerar ansvarstagande och gör det svårt att hålla specifika aktörer, såsom företag och inköpande organisationer, ansvariga, då det inte är uppenbart vem som är ansvarig för vad. Denna avhandling undersöker hur en grupp marknadsaktörer – privata och offentliga textilinköpare – tar ansvar för kemikalierisker längs med sina varukedjor i en situation som karaktäriseras av osäkerhet och komplexitet. Avhandlingen syftar till att fördjupa förståelsen för vad som händer när marknadsaktörer uppmanas att hantera miljö- och hälsorisker från till exempel kemikalier i textil. Fokus ligger på svenska privata och offentliga textilinköpare, som exempelvis kläd- och textilföretag, offentlig förvaltning och andra inköpande organisationer. I avhandlingen konstrueras en analytisk modell baserad på nyckelbegreppen responsible governance, responsabilisation och responsible supply chain management. Avhandlingen är explorativ och genom intervjuer, deltagande observationer och litteraturstudier samt fallstudier undersöks en potentiell process av ansvarstagande samt de hinder, utmaningar och möjligheter som de inköpande organisationerna möter i sitt arbete med kemikalierisker längs med sina varukedjor. Resultaten belyser en pågående process av ansvarsförfarande på både organisations- och sektornivå. Avhandlingen visar också att på grund av kedjans komplexa struktur så förekommer större hinder och utmaningar än möjligheter för de textilinköpare som strävar efter ansvarstagande. Trots detta pekar resultaten på att samarbete, kraftfullare styrmedel och ett reflexivt tillvägagångssätt skulle kunna vara en väg mot ökat ansvarstagande inom textilsektorn.

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One might think that writing a thesis is an act of solitude, and in many ways, this is true. But scientific writing is also a process filled with people who in different ways move you forward by teaching and supporting you. These acknowledgements are for all those people who in different ways proved important during my years of researching, writing and completing this thesis.

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List of articles in the thesis

This thesis is based on the following papers:

Paper I: Magnus Boström, Natasja Börjeson, Michael Gilek, Anna Maria Jönsson & Mikael Karlsson, “Responsible procurement and complex product chains: the case of chemical risks in textiles”, *Journal of Environmental Planning and Management* 55:1 (2012), 95–111.

Paper II: Natasja Börjeson, Michael Gilek, Mikael Karlsson, “Knowledge challenges for responsible supply chain management of chemicals in textiles – as experienced by procuring organisations”, *Journal of Cleaner Production* 107 (2015), 130–136.

Paper III: Natasja Börjeson and Magnus Boström, “Towards reflexive responsibility in a textile supply chain”, accepted for publication in special issue of *Business Strategy and the Environment: Challenges of the Sustainability Transition in International Trade*.

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Paper I: Second author. Collecting and analysing the empirical data, discussing results and writing the manuscript.

Paper II: Main author. Main contributor to collecting and analysing the empirical data, exploring different routes, and discussing results. Shared contribution to manuscript writing.

Paper III: Main author. Main contributor to formulating the research questions, exploring different routes, and formulating the case study. Original idea, collecting and analysing the empirical data, and discussing the results. Main responsibility for manuscript writing.

Paper IV: Main author, proposing the original idea, and collecting and analysing the empirical data. Shared contribution to formulating the research questions and writing the manuscript.

Acronyms

CMR	Carcinogenic, Mutagenic and Reprotoxic
CoC	Code of Conduct
CR	Corporate Responsibility
CSR	Corporate Social Responsibility
ECHA	the European Chemicals Agency
EDC	Endocrine Disrupting Chemicals
EU	European Union
GCC	Global Commodity Chains
GOTS	Global Organic Textile Standard
GVC	Global Value Chains
HG/VG	Horizontal and Vertical Governance
LE	Large-size Enterprise
NGO	Non-Governmental Organisation
REACH	Registration, Evaluation, Authorisation of Chemicals
RG	Responsible Governance
RSCM	Responsible Supply Chain Management
RSL	Restricted Substance List
SEAP	Swedish Agency for Environmental Protection
SCM	Supply Chain Management
SSCM	Sustainable Supply Chain Management
SSNC	Swedish Society for Nature Conservation
SME	Small and Medium-sized Enterprise

1. Introduction

Late modern society is portrayed as a dynamic whirlwind of societal processes (Beck, 1992; Berman, 2012). It is depicted as a clutter of developments, drives, transformation, and flows – in short, a ‘runaway world’ (Giddens, 2002). One of the dominant themes of late modernity is the process of globalisation, in which national economies give way to the idea of one single global market (Beck, 2001; Matten, 2004). In late modern society, both the political power and the influence of the nation state have been downsized. The role of actors on the playing field are changing, and the rules of the game are being altered (De Bakker and Nijhof, 2002; Shamir, 2008). Globalisation can be understood as the expansion of societal and interpersonal relations across national borders in the wake of, for example, deregulation, the division of labour to low-cost countries, and information technology (Beck, 2001; Schneider and Scherer, 2015). Another feature of late modernity is the globalised nature of environmental problems and the recognition of their global scope and impact over time, thus reshaping the way societies view them (Najam et al., 2010; Lupton, 2013). In late modernity, environmental problems and their associated risks are going in a new direction, and consequently, their meaning is changing (Lupton, 2013). These problems are no longer strokes of fate; they are manufactured by mankind, and recognising that risks are man-made implies the possibility of human control (Giddens 2003; Lupton, 2013).

In contemporary western society, the term risk suggests responsibility (Lupton, 2013). The idea is that because humanity has manufactured these risks, humanity should also assume responsibility for managing them. However, according to the concept of late modernity, governance and control are obstructed by society’s increasing complexity and permeation by knowledge uncertainty, which complicates responsibility-taking (Beck, 2001; Giddens, 2002).

This thesis is concerned with these issues; particularly, how global environmental problems are governed in a complex and uncertain world, in a post-nation-state era and with actors taking and being called upon to take responsibility. Moreover, this thesis examines the process of moralisation of actors within the late modern structure of governance and the barriers, challenges and opportunities they encounter when they strive to resolve new and emerging problems. Further, the thesis aims to contribute to an understanding of what happens when actors must come forward, assume responsibility and take the lead in solving complicated environmental problems in a situation characterised by complexity, uncertainty and diffuse distribution of power. Further, it aims to shed light on how these actors try to solve the difficult, almost paradoxical, problem of environmental governance.

Globalised trade is an area in which environmental and health risks follow each other. One of these global challenges that affects both the environment and health – and exists alongside other major problems such as climate change and water scarcity – is the management of chemical risks (see, for example, the discussion on planetary boundaries by Rockström et al., 2009, and literature exploring the planetary boundary for chemical pollution, e.g., Persson et al, 2013 and Diamond et al. 2015). Humans and the environment are constantly exposed to a multitude of chemical substances from the production, use and waste of the man-made products that society creates. Although many chemicals on the market are initially deemed safe, many are later shown to be hazardous – causing serious damage to human health and to wildlife through their continued release into the environment. For decades, science has revealed extensive bird death, damaged rivers and lakes, as well as imposex and/or intersex animals,¹ and society has become acquainted with increased risks of adverse human health consequences such as birth defects, childhood and adult cancer, as well as cardiovascular disease and allergies (Woodruff et al., 2011; World Health Organization (WHO), 2012). Moreover, chemical risks are diffuse and knowledge uncertainties widespread (Gilbert, 2011). Environmental and health challenges linked to chemical risks are often complex, as they transcend time and borders, which further complicates their management.

At the same time, one of the objectives of late modern society is that of sustainability, and discussions about how to achieve this goal have intensified in recent decades. The importance of sustainability – or, the capacity of nature and society to endure – is widely acknowledged. However, the precise meaning of the concept and the tools that should be used to achieve it have not been agreed upon. Responsibility is another frequently used concept in late modern times, and it can be seen as a means of achieving the end goal of sustainability. The idea is, in short, that environmental problems will become manageable and sustainability achieved by involved actors behaving responsibly and making informed decisions. We can talk about managing risks when both the structure of the system and the performance of different actors are essentially well understood (Wynne, 1992). However, the vast amount of uncertainty surrounding chemicals and their global presence make it difficult to successfully manage their risks. This is a situation of acknowledged uncertainty (Lidskog et al., 2010) – we know that we do not know.² Today, there is no comprehensive overview of the hazardous substances on the market (Chemicals Agency, 2014), nor is there full certainty regarding their effects or how they interact with each other (WHO, 2012).

One of the sectors illustrating this complex scenario is the textile industry, which is not only chemical-intensive and distributed worldwide but also informed by a

¹ That is, cases where both female and male sex organs or gonad tissue are present in individuals in species with normally separate sexes.

² The development of the precautionary principle is a response to such acknowledged uncertainty (Lidskog et al., 2010)

newly identified risk picture and expectations that it will assume responsibility for sustainability efforts. Globalised trade has disseminated textile production across all continents in an array of expanding world markets. This industry involves a multitude of actors, numerous production steps and an abundance of chemicals. These circumstances create several challenges when managing hazardous chemicals in the textile industry, from the cultivation and extraction of raw materials to the making of the final garment (Assmuth et al., 2011; Roy Choudhury, 2013). The textile sector effectively illustrates how the dynamics of governance are establishing the frame for the management of chemical risks. There is no globally harmonised legislation designed to manage all risks posed by the chemicals used in textile production. Rather, what exists is an arrangement of brand-owning companies, along with actors such as governments, the EU, International Organisations, the chemical industry, consumers and NGOs that together carry the great weight of addressing the risks of chemicals in textiles today. As awareness of chemicals as global environmental and health risks increases, there is growing pressure on the actors involved in manufacturing the problem. Brand-owning companies and, to some extent, procuring organisations bear part of the burden of assuming responsibility for reducing the hazardous footprint of chemicals in textiles. Public and private organisations that buy textiles face growing legal and societal demands that they take responsibility for environmental and social performance – not only for their own activities and final products but also for the whole web of suppliers and sub-suppliers involved in making those products (Seuring and Müller, 2008; Boström, 2015). Such pressure comes from, for example, NGOs, media, customers, the EU legislation REACH (Regulation, Evaluation, Authorisation, and Restriction of Chemicals) and government authorities. Such pressure can be expressed by the company or public procurer in terms of its Sustainability Agenda or Corporate Responsibility (CR) (or Corporate Social Responsibility, CSR) activities (Pedersen and Gwozdz, 2014). The necessity of assigning responsibility to actors and their practices is an idea that now reaches across several societal levels of the industrialised world.

The process of actors assuming responsibility relates to the idea of responsabilisation and the ‘moralisation of markets’ (Shamir, 2008). These terms refer to the idea of the market managing the negative externalities of global production. This idea emphasises the importance of market actors, such as companies and consumers, in managing the negative environmental and health side effects of globalised trade by responding to moral obligations; it can be expressed by the slogan “no rights without responsibilities” (Shamir, 2008, p. 8, referring to Giddens, 1998). Responsibility, in contrast to compliance, presupposes an actor’s engagement in his/her duties and the application of certain moral values as motivation for action. This poses challenges for market actors in their transition towards assuming responsibility for sustainable supply chain management. Given the complexity and uncertainty of responsibly managing chemical risks in their supply chains, the organisations striving towards sustainability face a tough challenge.

1.1 Aims of the study

This thesis aims to contribute to an understanding of what happens when market actors are called on to manage the negative side effects of globalisation. It explores, theorises and discusses the process of responsabilisation and the possibilities of responsible management of a complex and uncertain environmental and health problem, more specifically the management of chemical risks in complex textile supply chains. The thesis focuses on how key actors, mainly brand-owning companies and public procurement organisations, assume responsibility within the structure of governance and what barriers, challenges and opportunities they encounter in this process. Moreover, this thesis intends to contribute to the understanding of the dynamics of responsabilisation shaping the management of chemical risks in the textile sector.

More specifically, the thesis answers the following questions:

1. What efforts are brand-owning companies and public procurement organisations making in relation to responsibility and supply chain management?
2. To what extent is a process of responsabilisation occurring in the Swedish textile sector, and how is it taking shape?
3. What barriers, challenges and opportunities are different actors facing in their efforts?

The aim and research questions are explored through three main concepts: responsible governance (RG), responsabilisation and responsible supply chain management (RSCM). RSCM is explored together with the aspects of commitment and capabilities. These analytical concepts are developed in chapter 5, and they are guided by various theories and literature in the disciplines of environmental studies, responsibility, governance, and global supply and value chain studies. The following factors are identified through both my empirical studies and by review of the research literature, and these inform the analysis and discussion of the thesis: reflexivity, knowledge-uncertainty, policy instruments, cooperation and power in the supply chain.

The aim of the thesis is pursued through four studies on barriers, challenges and opportunities related to textile-buying organisations assuming responsibility for sustainable supply chain management. The first paper addresses the opportunities and challenges that private and public organisations face regarding the development of responsible procurement in the complex and uncertain issue area of chemicals in textiles. The second paper investigates knowledge-related challenges and organisational strategies regarding chemical risks in the supply chain and analyses how efforts potentially relate to expressed commitments and perceived capabilities for RSCM. Paper three describes the process of responsible management of chemicals

in textiles and focuses on a case study of a Swedish company in the outdoor sector. The concept of reflexive responsibility is used to understand and discuss potential possibilities and challenges, how important steps towards responsibility can be taken, and the limits of RSCM in one organisation, albeit a highly committed one. The fourth paper analyses whether and how the EU REACH regulation supports the development and application of green chemistry in the area of textiles and whether there are regulatory barriers that prevent its realisation. The paper discusses how REACH can potentially be developed to better promote green chemistry in the textile sector, and its conclusions add to the understanding of how public policy can either impede green chemistry or help it to play a more prominent role in responsible supply chain management.

1.2 Thesis outline

This thesis is divided into two parts. The first consists of the thesis overview and the second of the published and submitted papers. The thesis overview is organised as follows: the first section introduces the research puzzle and the aims of the study. The second section provides a descriptive background on the problems of chemicals in textile supply chains and presents the thesis research design, methods and materials. The third section provides the theoretical frame of the thesis as well as the conceptual framework used to analyse the empirical material. The fourth section presents the analysis and conclusions.

2. Chemicals in textiles – the empirical context

This thesis studies the management of complex environmental problems and the challenges associated with that management. Specifically, it is concerned with the problem of managing chemical risks in textile supply chains, and the point of departure is private and public Swedish textile-buying organisations. This chapter describes the issue area and presents the frame for the empirical context of the study.

2.1 Chemicals and associated risks

It is possible to identify three different categories of chemicals (Birgersson et al., 1999). First, there are essential substances that are necessary for human survival. There are approximately 50 of these, and they need to be continually consumed for the body to survive (according to Birgersson et al., 1999). These include water, amino acids and vitamins, to name a few. Second, there are so-called natural substances, referring to the large number of substances that are present in nature without human interference, some of which are toxic. Third, there are synthetic substances manufactured by man. These synthetic chemicals have made major contributions to the high living standard enjoyed today through, for example, consumer products and pharmaceuticals. However, awareness of a crucial issue has increased: the extensive use of different chemicals leads to health issues such as cancer and allergies, as well as to environmental problems such as air pollution and damaged water. The use of chemicals is regulated in several ways and on several societal levels by both legislation and voluntary agreements and standards. The dangers of chemicals are surrounded by great uncertainty: “we know that we do not know” (Chemicals Agency, 2014).

Chemical substances may have many different effects on human health and on ecosystems. How hazardous a substance is depends partly on its inherent properties. Some properties are considered especially hazardous and may have particularly strong effects on the environment and health. These effects arise as a combination of inherent hazardousness and level of exposure (Chemicals Agency, 2007). A fundamental question concerning chemicals relates to how they move and are distributed in the environment. Two properties that are considered more important than others with regard to the distribution of chemicals are persistence and bio-accumulative capacity, so-called PB-substances. Examples of chemical groups containing such substances are brominated flame-retardants, perfluorinated compounds and various pesticides. The most problematic group are the CMR-substances, which are toxic (T), including carcinogenic (may cause cancer), mutagenic

(may affect genetic material) and reprotoxic (may harm reproduction). Yet another problematic group receiving increasing attention is that of EDCs, endocrine disrupting substances (substances with the ability to cause harmful effects on living organisms' endocrine systems) (WHO, 2012). Regarding the chemicals used in textile production, several have properties considered to be hazardous. Efficient functional chemicals, for example some impregnation agents and flame-retardants, tend to have more hazardous properties than other chemicals. Some of these, such as chemicals with surface-active properties, can be found in such diverse places as human blood and in the world's deepest ocean trenches (> 10 000 meters) (Yeung et al., 2006; Jamieson et al., 2016). Today, there is no certainty regarding how long these chemicals may persist in nature (Swedish Environmental Protection Agency (SEPA), 2010). Chemical substances produced in increasing volumes around the world, as shown in figure 1.

The chemical industry is one of the world's largest and accounts for approximately 10% of global economic turnover (Chemicals Agency, 2010). One of the most important trends observed in the global chemical industry since 1970 is its rapid growth; the annual world production of chemical substances increased from approximately 7 million tons per year in 1950 to approximately 400 million tons per year in 2000. This is equivalent to a 57-fold increase (Chemicals Agency, 2010). OECD countries account for the largest amount of global production, which reached 65% at the beginning of the 21st century (Organization for Economic Cooperation and Development (OECD), 2001). China is the largest consumer of textile chemicals, accounting for 42 percent of global consumption (United Nations Environment Programme (UNEP), 2013).

The textile industry is also one of the world's largest industries, with a total share of approximately 4% of the global merchandise trade (World Trade Organisation (WTO), 2015). The output of products from the global textile industry has risen from 9,404 tonnes in the 1950s to more than 100 million tons in 2014 (The Fiber Year, 2014). The three largest growers and manufacturers, China, India and the United States, accounted for a world share of more than 60%. More than 70% of clothing imports to EU member states are from developing countries (Laudal, 2010).

Figure 1: Chemical and textile production in numbers.

2.2 The environmental impact of textiles

This chapter presents an overview of the production of textiles and the impact the textile sector may have on health and the environment.

The textile industry is one of the world's largest industries, accounting for approximately 4% of the global (merchandise) trade (WTO, 2015; Roos, 2016). Every year, the textile industry produces almost 100 million metric tonnes of new products, significantly contributing to the pressure on the global environment (The Fiber Year, 2014; Roos, 2016). Textile commodities are typical wear-and-tear products, and rapidly changing trends result in steadily high – and rising – turnover. For example, some companies take pride in being able to offer their customers “new” types of apparel every week, and it is not uncommon for garments to be bought and only used once or twice before being bundled off to the back of the closet, the garbage bin, or perhaps in the best-case scenario, to a second-hand store.

Several environmental problems can be linked to the production of textiles, including the depletion of both natural resources and biodiversity, climate change, the production of pollution and the diffuse release of hazardous chemicals (Allwood et al., 2006; SEPA, 2010; Roos, 2016). Textile production is associated with several environmental problems and affects air, land and water. The major environmental impacts of textile products arise from emissions of toxic substances and the use of water and energy in the production phase of the life cycle. Among these issues, impacts from emissions of toxic substances are particularly difficult to assess (Roos, 2016). The textile sector's contribution to climate change is dominated by the need to burn fossil fuel to create electricity for production and laundry, as well as the need to provide fertilizer and fuel for agriculture (Allwood et al., 2006). In addition, the textile industry demands large quantities of water. Crop cultivation, in particular, uses extensive quantities of water (Allwood et al., 2006; Roos, 2016). Calculations have shown that approximately 350 litres of water are needed, on average, to produce one kilo of textiles; this water is taken from ground-water reservoirs, lakes and rivers (Allwood et al., 2006; Roos, 2016). Further, cotton cultivation occupies 2.5 % of the world's arable land and uses 11% of the global share of agricultural chemicals, including fertilizers, insecticides and herbicides (Roos, 2016).

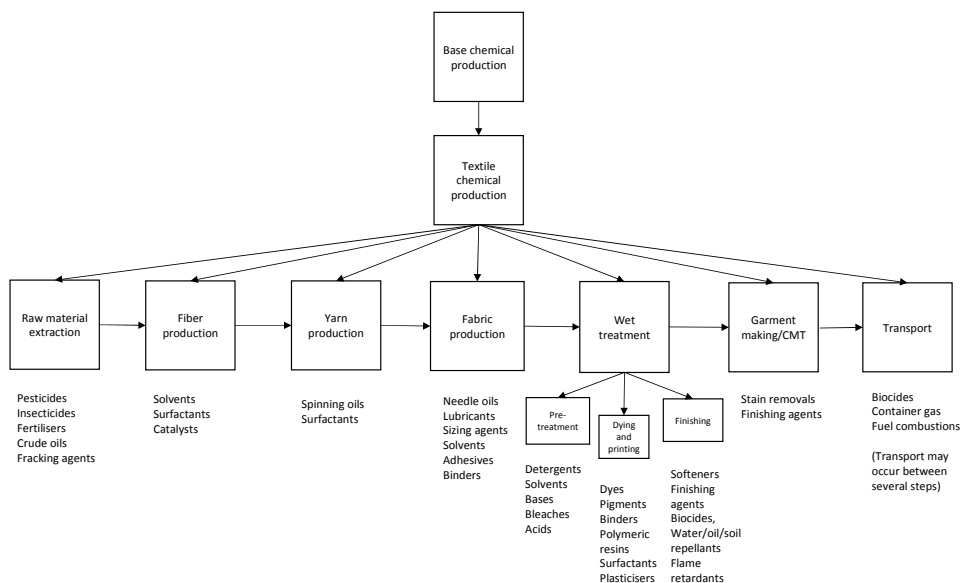


Figure 2: Some chemical-related challenges in the textile supply chain. As most steps of the supply chain are geographically dispersed, additional barriers, challenges and opportunities are created (figure based on The Fiber year, 2014; Roos, 2016 and Chemsec Textile Guide, 2017). The chemicals used may vary across different textile production processes.

Chemical content varies from product to product depending on the material and its induced properties. However, many chemicals included in textile production demonstrate different forms of more or less serious effects on health and the environment (Posner et al., 2009), and the use of chemicals in the production of textiles is considerable (Posner et al., 2009; Roos, 2016). Hazardous chemicals may be used in almost all stages of textile production, from fibre production to packing to transport (Luongo, 2015). However, some stages are more chemically intensive, and these include fibre production, wet processes such as pre-treatment, printing, after-treatment, and finishing (Allwood et al., 2006; Chemicals Agency, 2009b; Posner et al., 2009). Many of the chemicals used have properties shown to be hazardous to humans and the environment; for example, they are skin-irritating, allergenic, carcinogenic or otherwise toxic to reproduction. Whether they are hazardous or not, chemicals may leak – accidentally or intentionally – from the production process at different steps along the supply chain. They also end up in the ready textile or garment, either to add specific functions to the article, such as colour, water repellence or flame resistance, or as by-products of the production process (Assmuth et al., 2011; Luongo, 2015). Hazardous chemicals used in textiles include, for example, chrome, formaldehyde, phthalates, nonylphenol ethoxylates and highly fluorinated

carbons. Moreover, as companies are seldom the sole clients at a factory, it is not unusual for unwanted restricted chemicals – resulting from the production processes of companies with less-strict demands – to end up in the ready garment.

Chemicals used throughout textile production may have acute or chronic toxic impact on health as well as the environment (Posner et al., 2009; Roy Choudhury, 2013). Workers in the fields and in the environs of the textile fabrics may be exposed to hazardous chemicals, either through the production process or when the industry discharges large quantities of wastewater containing toxic chemicals. Further, polluted water may render large quantities of land useless (Chemicals Agency, 2009a, 2009b). Wastewater from the textile industry is frequently released into rivers, and it may be poorly purified or not purified at all. Chemical emissions come partly from the sludge remaining after wastewater purification; this sludge consists of various chemicals and dirt from the production process. If the sludge remains on the ground, hazardous chemicals may wash out and contaminate the ground water. Pollutants also reach the soil through occasional floods, and when the water recedes, pollutants may remain in the ground. The same may happen when river water and groundwater are used for irrigation. Finally, when polluted water reaches other bodies of water (such as rivers and lakes), it may also harm or kill aquatic organisms (Chemicals Agency, 1997, 2009a, 2009b).

Clearly, the production of textiles is chemically intensive. According to one study, producing one kilo of textiles requires an average of one kilo of chemicals (Posner et al., 2009). When producing a t-shirt, for example, the same study indicates that as many as four kilos of chemicals are used per kilo of garments produced,¹ meaning that the weight of the textile itself is lower than the amount of chemicals used (Posner et al., 2009; Roos, 2016). The amount of chemicals used in textile production is not decreasing; on the contrary, more chemicals are being added for an increasing number of purposes. At the same time, the overall output of textiles is growing, which also increases the total amount of chemicals in use (Chemicals Agency, 2009b; UNEP, 2013). For example, fabrics might be treated to avoid shrinking and crinkling or to give the material a certain look or feeling. Chemicals may also be added to the finished product to obtain different functions, such as the antibacterial treatment of sportswear, flame-retardants on furnishing textiles, impregnation of outdoor clothing and anti-mould preparations for transport and storage. Plastic coatings on clothes may contain plasticisers such as

¹ This is shown in a study conducted by the research institute Swerea IVF on behalf of the Swedish Chemicals Agency. The calculations mainly cover the stages of production, but some chemicals used during transport, as well as for laundry, have also been included. The calculations include chemicals used in the following stages: the production of fibers (artificial manure and pesticides in cotton production combined with material used in the production of viscose and polyester); the production of yarn and fabrics (oils, glues, surfactants, liquid caustic soda/soda lye, bleach, foam inhibitors, wetting agents and sequestering agents); dyeing and after-treatment (pigment, cleaning agents and impregnation agents); transport (agents against mold and vermin), and the use of ready garments (laundry detergents and rinses).

phthalates (Chemicals Agency, 2009a; Assmuth et al., 2011). Functional chemicals are not always tightly bound to the material, and over the course of time, they may wear off or be washed out of the textile, resulting in their dispersion into the environment (Chemicals Agency, 2009b; Svenskt Vatten, 2015).

As textile production in Europe has been outsourced to other parts of the world, the textile industry's negative impact on health and the environment in Europe has decreased, while it has increased in the producing countries (Moore and Ashley, 2004; Fransson and Molander, 2013). However, the distribution of chemical substances does not simply follow the boundaries of nations. Chemical distribution is transboundary, and substances are dispersed via wind, water, living organisms and human activity (SEPA, 2010). The textile industry has an impact all along the supply chain, but its strongest influence is in the producing countries. However, hazardous chemicals can also follow textiles to the importing countries. One example is the case of the chemical nonylphenol, which has been found in Swedish treatment plants (Chemicals Agency, 2009a). Nonylphenol is a product of nonylphenol ethoxylate, a chemical often used as a cleaning agent in textile production. Nonylphenol is very toxic to aquatic organisms and may cause harmful long-term effects in the aquatic environment. In addition, nonylphenol is suspected to reduce reproductive capacity in aquatic animals (European Chemicals Agency (ECHA), 2013; Chemicals Agency, 2015). A calculation by Stockholm Vatten AB² in 2007 showed that the nonylphenol found in sewage treatment plants was likely to have come from imported goods such as towels and clothes. Assuming that the calculations were accurate and representative of all textiles imported from countries outside of the EU, this would mean that 9 tonnes of nonylphenol end up in the treatment plants of Stockholm each year (Swedish Society for Nature Conservation (SSNC), 2007). Analyses by the Swedish Society for Nature Conservation (SSNC) also showed that imported towels and clothes might contain heavy metals, formaldehyde, azo dyes and bromine (SSNC, 2007).

2.3 Governing the textile market

This section presents the features of the global textile market and how that market is governed. It elaborates on the issue of industrial outsourcing and how it impacts producing and importing countries. Finally, it describes governance efforts, both legislative and voluntary.

The textile trade is one of the oldest and largest export industries in the world. Most nations produce for the international textile and apparel market, making textiles one of the most global of all industries (Chemicals Agency, 1997; Laudal 2010). The textile industry is globalised and highly diverse (Bruce and Daly, 2004;

² Stockholm Vatten is a municipally owned company that is responsible for managing water on its way from the water source to customers and then eventually as purified wastewater discharged into the Baltic Sea.

Fransson and Molander, 2013), and textile production involves a multitude of production processes performed by different actors (Kogg, 2009). In a standard supply chain, fibres might be grown in one country, or even in several countries, and then shipped to a different country for spinning before being shipped to a third country where the fabric is woven or knitted. The textile is then sent to a fourth, fifth and maybe even sixth location for colouring, processing and the sewing that produces the final garment (Lindholm, 2016). Further, the trims – that is, thread, buttons, zippers, etc. – are produced in different places (Chemicals Agency, 1997; Lindholm, 2016). There are numerous types of textiles dependent on different types of material content, methods of production, and possible uses or purposes; they can be woven, stitched, printed, bleached and coloured. Textile product types are mainly different types of clothing, such as outdoor clothes, fashion and work clothes, and textiles for interior design, such as sheets, blankets, and curtains. Final textile products, especially those aimed at private consumers, are often characterised by short shelf-life, high unpredictability of market demand, low certainty and highly impulsive purchasing behaviour (Cao et al., 2008), implying that the use of dyes and prints may fluctuate according to fashion, making it difficult to predict the chemicals used in production (Fransson and Molander, 2013).

Different actors have diverse interests, a fact that also applies to the textile sector. All actors are trying, based on their different positions of power, to achieve their goals in cooperation or struggle with other actors (Beck, 2001). The textile sector is a sector marked by globalisation and governance systems for public and private decision-making. The term governance is broadly used in the literature to describe the “new” structures for decision-making developed during the last decades; it relates to norms, rules, institutions and the processes of interaction and decision-making among a plurality of actors involved in (finding solutions to) a collective problem (Young, 2009; Hufty, 2011). Simplified, it could be argued that politics is shaped in networks rather than within the boundaries of the national state and that *governance* is a wider structure than *government* (Young, 2009). These somewhat loosely tied networks can make it difficult to ascribe liabilities to specific actors, as it is not obvious who is responsible for what, a problem sometimes described as organisational irresponsibility (cf. Beck, 1992). This problem is observed, for example, in regard to managing the negative side effects of globalisation, such as chemical risks. Another important concept in this context is that of reflexivity, which is developed in, for example, Beck’s (1992) world risk society. This concept is relevant to responsible governance, as it allows actors to address themselves and their responsibility practices in a self-scrutinising way, continuously questioning the way the organisation’s existing habits, perspectives, assumptions, policies, technologies and rules may create and reproduce problems (cf. Voß et al., 2006).

Within environmental and responsible governance literature, there is a commonly stated argument that it is difficult for actors to demand responsibility in situations where power is unclear. Governance implies the de-concentration of

authority and increasing complexity in the process of making and enforcing decisions (Weale, 2010), as well as a regulatory pattern where international rules sometimes replace national regulation (Vogel, 1996; Lipshutz, 2005). The governance frame is useful when trying to understand the governance of global supply chains, which are governed through a worldwide infrastructure of legislation, international agreements and other institutions (Najam et al., 2010). This infrastructure can be said to apply to the actors manoeuvring the global agenda and to the tools at their disposal. As the tools of authority are being transformed, societal objectives and concerns are being managed rather than merely regulated. Certain laws are being replaced with guidelines and agreements that are national, trans-national and international.

The policy-making process in industrialised countries has witnessed an increase in the range of interested parties, also understood as stakeholders, and these are regarded as having a legitimate role in the making of policy decisions (Weale, 2010). The declining influence of the nation state, the expanding roll of non-state actors, and the increasingly complex nature of inter-state interactions places great stress on existing patterns of global governance (Najam et al., 2010). The increasing influence and power of brand-owning companies, such as multinational corporations, and the weakening of state power have resulted in regulation gaps (Beck, 2001; Schneider and Scherer, 2015). Such gaps, together with the outsourced nature of production, point to a growing incapacity of national governments to regulate global business (Schneider and Scherer, 2015).

All in all, many pressing environmental concerns in the new millennia will have to be managed through structures of governance, and chemicals in textiles are no exception. The matter of chemicals in textiles is being investigated and discussed on many levels of society, such as within the UN, national states and non-governmental organisations. There are several fragmented sets of regulations concerning chemicals, and both vertical and horizontal governance (VG and HG) impact the management of chemicals in textiles. VG is, generally, a territorially bounded form of governance within a hierarchical authority structure (Boström and Karlsson, 2013). Any type of formal organisation includes such VG. The nation-state, which relies on representative democracy and aims to govern society through hard or soft regulation, is a main example of this type of governance (Boström and Karlsson, 2013). HG, by contrast, always refers to several autonomous organisations and includes voluntary policy-making and rule-setting initiatives among hybrids or networks of actors. Organisational, political and regulatory arrangements 'crosscut formerly distinct divisions of tasks among state, market, and civil society actors' (Boström and Karlsson, 2013, referring Spaargaren et al., 2006). Unlike VG, HG is neither structured according to a formal authority or hierarchy, nor is it automatically delimited territorially. Policy instruments such as codes of conduct, labelling and certification schemes, as well as voluntary agreements within public-private partnerships are examples of instruments that enable HG (Boström and Karlsson, 2013).

Concerning vertical governance, with the exception of a handful of international agreements on chemicals management, which regulate a limited number of substances, there are no harmonised global regulations regulating chemicals in textiles, and regulation thus varies among countries. On the regional level, the EU regulation known as REACH entered into force in 2007.³ One of the fundamental principles of REACH is that a chemical substance may not be produced or put on the European market without first being registered with the European Chemicals Agency (ECHA). The registration requirement applies to those who produce or import chemical substances, and the purpose is for these producers or importers to identify and manage the risks linked to the substances they manufacture and market. There are, however, several limits to REACH. The registration applies to those who manufacture or import quantities of 1 tonne or more per producer or importer yearly. Restrictions may be imposed on the manufacture, use or placing on the market of substances that cause an unacceptable risk to human health or the environment; however, certain substances may be granted exemptions from some requirements of REACH (Chemicals Agency, 2010a; ECHA, 2016). Currently, there is no harmonised EU legislation that comprehensively restricts hazardous substances in textiles; however, the issue of a textile directive has been discussed within the EU. The governmental authority working to control chemicals in Sweden is the Swedish Chemicals Agency, a supervisory authority that is under the government and is responsible for ensuring chemical control on the part of companies and in society at large. In Sweden, the EU and globally, the Chemicals Agency promotes rules and legislation that contribute to achieving the Swedish parliament's environmental quality objective of "A Non-Toxic Environment". A large share of the legislation that falls within the remit of the Chemicals Agency is regulated at the EU-level (Chemicals Agency, 2012).

Turning to horizontal governance on chemicals in textiles, there are several voluntary tools and efforts directed towards managing hazardous chemicals both in production and in the ready commodity. These efforts may be initiated, for example, by the organisations themselves, by NGOs or by standardisation working groups. They may come in the form of Codes of Conduct (CoC), restricted substances lists (RSL) that go beyond legislation, or voluntary standards and labelling such as the Global Organic Textile Standard (GOTS), the EU Ecolabel and the Good Environmental Choice label. Swedish textile-buying organisations generally have their own restricted substances lists that exceed set legislation, and there are also efforts by buyers and other actors to collaborate on such lists – as well as on other efforts – to responsibly manage chemicals in textiles. Such efforts may, for example, be managed by the buying organisations themselves, by NGOs or by government authorities, and they appear in diverse constellations with possibly varied goals and

³ See more at European Commission (2017). *REACH*. https://ec.europa.eu/growth/sectors/chemicals/reach_sv [2017-10-18].

approaches (see for example Locke et al., 2009; Chemicals Agency 2015a; Egels-Zandén and Hansson, 2016). However, the benefits of labelling are uncertain due to, for example, lack of awareness among consumers and the short life span of fashion (Carlsson-Kanyama et al., 2006). Perceived interest regarding chemicals in textiles is generally low, which may indicate that consumers, in general, have little concern about chemical risks related to products. There are exceptions, e.g., when people are allergic, pregnant or worried about potential health risks affecting their children (Fransson, 2012).

The global nature of environmental problems creates challenges for the networks of actors seen as having a role in setting environmental standards and as bearing responsibility for acting (Najam et al., 2010; Weale, 2010). Both civil society and business are becoming integrated into global governance mechanisms (Najam et al., 2010), and a variety of innovative institutional forms have emerged within the context of voluntary attempts to address pressing social and environmental issues (Fransen, 2012). Moreover, the number of stakeholders posing questions about and engaging in issues of responsibility is increasing (De Bakker and Nijhof, 2002).

Organisations confront several challenges when attempting to develop RSCM, and these challenges may be particularly severe for textile buyers. Committed organisations striving for RSCM are called on to go beyond legal compliance and set stricter requirements on chemicals used in textiles than regulation requires. However, they also need to secure a comparative advantage and manage the complexity of a multitude of suppliers and sub-suppliers following their increased outsourcing of production. Adding to this challenge is the fact that textiles are everyday products whose consumption is increasing. Knowledge of chemicals and their associated risks is low, and uncertainty is extensive. The textile sector suffers from governance shortcomings at the same time as stakeholder expectations of organisational responsibility are increasing. Even in combination, existing VG and HG arrangements are insufficient to govern the field of chemicals in textiles, creating enormous challenges for buying organisations that are making serious attempts to develop RSCM of chemicals in textiles.

3. Research Design, method and material

This chapter presents the methodological approach of the thesis. The choice of structure and the methods used are presented and discussed in relation to the aim of the thesis. The thesis examines how brand-owning companies and public procuring organisations manage chemical risks in their supply chains within the structure of responsible governance. The aim is to capture and understand this process; to explore what barriers, challenges and opportunities there are for buyers to assume RSCM; and to determine whether a process of responsabilisation can be observed in the textile sector. The study is qualitative, and the approach is exploratory, thus enabling an understanding of the issue by drawing an inclusive picture of the complexity of the problem discussed (Moses and Knutsen, 2012; Yin, 2006). It should be noted that the focus is on a specific part of the supply chain, namely the buyers, so full inclusion of the entire supply chain is therefore not possible.

The structure of the thesis is based on case studies, and four papers contribute empirically to the understanding of the phenomenon discussed. The case study approach is suitable for analysing complex situations (Yin, 2006). The study of how buyers strive for RSCM in a state of complexity and knowledge uncertainty – and what barriers, challenges and opportunities they meet – is an example of such a complex phenomenon. The same argument can be applied to the aim of studying the factors shaping actors' potentials to assume responsibility, as RSCM consists of several interrelated factors, and it can also be applied to the possible development of responsabilisation. The exploratory approach has significant advantages when exploring actors' perspectives and identifying factors significant to understanding the phenomenon at large. In this study, the latter corresponds to the larger issue of the challenges involved in trying to govern environmental problems beyond the nation state, in relation to actors coming forward and assuming responsibility, and in situations of great uncertainty and complexity.

Although a case study presents a limited part of a research problem, this need not be a shortcoming. Case studies examine specific occurrences, but they can still contribute to understanding problems of a more general character, as the approach is appropriate for shedding light on and discussing an on-going process (Merriam, 1988; Creswell, 1994), such as the challenges organisations encounter when they attempt to assume responsibility within global supply chains. For example, a focus on Haglöfs is relevant because similar organisations meet corresponding challenges, and a focus on the Swedish textile sector may be significant because it provides illustrative examples of many different buying organisations (for example large/small, public/private) trying to manage highly complex and globalised supply chains.

The aim and research questions of this thesis require taking a broad approach, thematically, by using several methods and types of materials, and by conducting the study over a longer period (9 years). The methods used are semi-structured interviews, participatory observations and round-table discussions. Moreover, documents (both primary and secondary sources) have been used. The variety of methods and the case focus (broad, in-depth and thematic) provide a substantial base for the overall aim explored in the thesis.

In paper one, a broad approach is applied to identify key challenges and opportunities experienced by the Swedish textile sector when developing RSCM in a complex and uncertain situation. This paper aims to shed light on some of the main challenges recognised. An analysis is conducted of 13 cases of textile-buying organisations and 2 other organisations. Empirically, the paper is based on 16 qualitative semi-structured interviews. In total, 19 representatives of the organisations studied were interviewed on 16 occasions during the period 2008-2009.

In paper two, the approach is narrower than that of paper one but based on a larger set of empirical materials. As in paper one, the analysis builds on 13 cases of textile-buying organisations and 2 other organisations. Whereas the previous study identified several key challenges faced by the Swedish textile sector, paper two focuses on one of these challenges – namely, knowledge challenges. The paper is based on the same empirical material as in paper 1, but with a narrower selection of buyers. Further, the interviews were complemented with 20 participatory observations and studies of written texts linked to the studied organisations, such as codes of conducts, restricted substances lists, internal guidelines and sustainability reports.

In paper three, the analysis is focused on one case: the development of one company over time. Empirically, the paper is based on interviews with 7 respondents at one brand-owning outdoor company, Haglöfs. Two of the respondents gave several interviews over the studied period (2008-2017). Additionally, 31 participatory observations, in which the company took part, were made, and further written texts linked to the company were included in the analysis. This study provides an in-depth illustration of one company's management process and the complexity it faced when trying to assume responsibility in a situation of great complexity and uncertainty.

Paper four builds on an analysis of legal texts, research literature, and 31 participatory observations and semi structured interviews with 20 respondents from 12 Swedish textile brand-owning companies. The interviews and observations were conducted during the period 2008 to 2017. The paper explores the relation between the field of green chemistry in the textile sector and public policy in relation to the EU REACH Regulation, in particular from the brand-owning companies' point of view. The paper contributes to our understanding of how public policy can promote the role of green chemistry in RSCM.

For further details about the methods, see the enclosed manuscripts. In the rest of this chapter, I will present the empirical material and briefly discuss its benefits and limitations.

The interviews were conducted with brand-owning companies and public procurement organisations and with relevant actors such as researchers, NGO representatives, and consultants. The staff interviewed had responsibilities and functions related to procurement, quality assurance, CSR, administration, research, or consulting. The buying organisations were chosen according to several characteristics in order to develop a broad picture and access comparative opportunities. These characteristics were the following: 1) private or public ownership, 2) small and medium (SME) or large (LE) size, 3) core or periphery (the character of the textile commodity), 4) laggard or forerunner (perceived high, medium or low commitment and capabilities for RSCM). It was appropriate to use a variety of organisations to make comparisons, which in turn facilitates the identification of various approaches, challenges, and opportunities. As experiences may depend on different factors, a variety of units of study were selected to show and discuss the heterogeneity in the textile sector and its development over the studied period. The idea is not to measure responsibility but to make interpretations of the empirical cases, to understand the development of RSCM and to understand the process of responsabilisation. To capture responsibility-taking empirically, relatively open questions were used in the interview guides. From the analysis of the interview material, a set of indicators was developed, such as ad hoc/systematic, reactive/proactive and level of responsibility-taking beyond the organisational border. These indicators were also used to assess the barriers, challenges and opportunities faced by the sector and to determine whether and how these develop over time.

Apart from their descriptive questions, the interview guides had several overarching themes. These were mainly (in no specific order) Knowledge and Learning, Measures and Priorities, Communication, Internal and External Drivers, Challenges and Opportunities, Strengths and Weaknesses, Responsibility, Organisation, Information flows, Development, Cooperation and Green Chemistry. The guides were used to gain insight into the issue of chemical management in textiles, to identify significant factors and approaches, to make comparisons and to stimulate discussion on the challenges and opportunities of RSCM of chemicals in textiles. The interview guide was modified during the study period to better fit the aim as well as to make certain questions obvious. The respondents were chosen based on their position within their organisations and the practical possibility of interviewing the person, either face-to-face or by telephone. The interviews occurred during the years 2009-2017 and were conducted in person by me, the author of the thesis, in the respondents' working environment. The interviews lasted between 40 minutes and 120 minutes, and some respondents gave several interviews during the period of the study. The interviews were conducted in Swedish and were taped and transcribed verbatim. All approached respondents were told that anonymity was intended. Despite this intended anonymity, there were some difficulties in finding respondents, which could imply a bias towards organisations that are forerunners in the problem area. However, due to the explorative and theoretical aim of

the thesis, this need not be a problem. Moreover, the challenges faced by the forerunners will most likely also be challenges for the organisations lagging behind, implying that forerunners may be suitable for the study of challenges. Moreover, the material also came to include so-called laggards. The broad approach of the thesis was a further attempt to avoid bias, both temporally (short-term and long-term studies were used) as well as through the studied categories. Moreover, the categories used to answer the research questions include not only the key factors described in 1.2 above but also wide-ranging organisational parameters such as size, public/private, core/periphery, and commitment/compliance.

There are both advantages and disadvantages to the studied period lasting nine years. A drawback is that some of the earliest material is not completely up to date. However, this need not be a problem, as the general RSCM and sustainability challenges of the Swedish textile sector continued throughout the studied period and complementary interviews and observations were made. The advantage of studying a phenomenon for a longer period is that it enables observations over time, not only developments but also inertia and persistent challenges.

In addition to the interviews, round-table discussions were conducted with concerned stakeholders such as brand-owning companies, NGOs, the Swedish Chemicals Agency and others. Moreover, I made several participatory observations at stakeholder meetings and workshops on the issue of chemicals in textiles arranged by, for example, the Swedish Chemicals Agency and the Swedish Society for Nature Conservation; these observations were summarised in notes. In total, 31 participatory observations were conducted between April 2008 and January 2017. (For more information, see appendix B). The value of these observations is that they contribute to an understanding of the context: they help create a larger picture of how Swedish procurers discuss and manage hazardous chemicals in textiles, and they allow us to observe how specific actors, such as Haglöfs, interact with other stakeholders, as well as how they debate and collaborate, and which key issues they raise. Participatory observations provide insights into issues such as what is discussed, how it is discussed, whether there are differences of opinion or coherence among the actors involved, and what kind of relations they have. Observations of the roles, actions and opinions of different actors are gained, as are insights into how issues, actors and conceptions change over time. The participatory observations also contribute to the analysis in chapter 6 of the thesis overview.

As a complement to the interviews, written texts related to the organisations were read and analysed. These include texts such as codes of conduct, RSLs, internal guidelines and sustainability reports. These were acquired through the respondents, other stakeholders possessing the information, or the organisations' web sites and/or offices.

4. Research overview – global chains and the responsible organisation

This chapter provides a theoretical discussion of the management of the textile supply chain and responsible organisations. The chapter first untangles the concept of (global) chains and elaborates on different ways of understanding aspects of trade globalisation. Second, it provides an account of the idea of the responsible organisation and relates this idea to the main findings in literatures on supply chain management.

4.1 Global chain studies: Chains, networks and crossing borders

In addition to understanding the complexity of textiles as a product, it is important to understand the organisation of the globalised textile supply chain. Comprehension of the global and complex product chain is essential when analysing the possibilities of an impactful management process, as well as when analysing governance challenges linked to complex product chains. Therefore, I found it relevant to link this thesis to a scholarly field known as global chain studies. The chain concept can, for example, be used to describe production networks and to understand company actions, as well as to understand and discuss management of the environmental and social aspects linked to the different stages of production.

The research on global chain studies is concerned with ways to conceptualise and analyse economic globalisation. Authors such as Gibbon et al. (2008) and Bair (2009) study international trade and production networks, which they understand and describe as the ways in which people, places and processes are linked to each other in the global economy. Chain studies enable arrays of analysis as well as integration of observations from fields such as sociology, political economy, economics, business history, anthropology, and geography (see for example Topik, 2009).

The study of global supply chains is focused on global production networks and is an attempt to understand the relationship between the actors and activities involved in creating and distributing goods and services in the global economy, as argued in Bair (2009), for example. Gereffi and Korzeniewicz (1994) argue that the concept of global supply chains illuminates the infrastructure of international trade and how actors connect to each other and to world markets. The authors' perspective is that the concept is suitable when studying globalised trade through global, national and local units of analysis.

The concepts used in analyses of globalisation under the umbrella of global chain studies are numerous and include networks, flows, chains, linkages, segments, strands,

threads and systems (Bair, 2009; Topik, 2009). And there are several overlapping approaches including global production networks, cross border production networks, commodity chains, global value chains; supply chain management and supply chain governance. However, beyond the terminology, there are some clear perspectives visible in the literature on global production chains, and three approaches dominate: 1) the world-systems tradition of macro- and long-range historical analysis of commodity chains; 2) the global commodity chains (GCC) framework developed by sociologist Gary Gereffi and colleagues as a mix of organisational sociology and comparative development studies; and 3) global value chains analysis (GVC), which is the newest of the three concepts and draws on both the GCC literature and the tradition of transaction cost economics (Bair, 2009). Another related concept in the literature concerned with analysing globalisation is the concept of supply chain management (SCM). The SCM literature has commonalities with the other chain concepts but stems from business literature. On this literature follows sustainable supply chain management (SSCM), which adds the dimensions of environmental, health, social and ethical effects (see for example the findings of Handfield et al., 2005; Seuring and Müller, 2008).

All approaches include the sequence of activities through which raw materials or components are transformed into final products. The concept *Global Commodity Chain* was first developed by Hopkins and Wallerstein (1977, 1986), who wished to make visible the power of the state in shaping global production systems, to a large extent exercised in the form of tariffs and rules applied when goods crossed borders. Hopkins and Wallerstein were also the first authors to present the term *commodity chain* in an article published in 1977 (Hopkins and Wallerstein, 1977). From the perspective of Gibbon et al. (2008) and Bair (2009), the GCC framework has gradually narrowed the scope of this perspective, focusing analytical attention on specific chains or even on a certain link in given chains. Moreover, authors such as Gereffi and Korzeniewicz (1994) and Sturgeon (2009) have refocused the perspective of the GCC concept from the actions of states to the strategies and actions of firms in the context of trade liberalisation and globalisation. The chain literature reveals the relationship between national development and a changing global economy, which is illustrated, for example, through structures of globalised trade in Bair (2009). The GCC theory was revised in 2005 to broaden it towards other forms of coordination in commodity chains, and it was relabelled as global value chains (GVC), as discussed in Gereffi et al. (2005), Gibbon et al. (2008), and Kogg and Mont (2012). The term 'value' is added to illustrate how organisations (such as textile-buying companies) add value to their commodities through different processes, for example when developing a raw material such as cotton into a finished good such as a shirt. The understanding of how changing forms of governance affect the organisation of global industries over time is acknowledged within both the GVC and GCC frameworks.

The concept of governance is widely addressed by both the GCC and GVC literatures. It describes the power relations between actors along the chain and how these relations affect the distribution of costs and profits as well as the movement of responsibilities along the chain. According to the literature, for example in the writings of Coe et al. (2008), Gibbon et al. (2008), Locke (2009), Knudsen (2013), Vermeulen (2013) and Pedersen and Gwozdz (2014), structures of power and control in the contemporary global economy do not necessarily correspond with ownership. The writers rather observe that a variety of lead firms,¹ such as brand-owning companies, have different challenges and opportunities when governing their commodity chains and that external actors, such as NGOs, experts and certification bodies, influence how the chain is governed.

4.2 Supply chain management: competitive advantage through supply chain relationships

The perspective of supply chain management (SCM) has received attention since the 1980s and provides additional perspectives within the chain literature (Lambert and Cooper, 2000; Seuring and Müller, 2008). Like the other concepts, SCM focuses on the governance of actors connected to each other in production networks. Mentzer et al. (2001) argue that this concept may visualise that networks of organisations – including the buyer – are involved in the process of production, through both up- and downstream linkages. Where the GCC and GVC concepts understand the chain as a series of units, supply chain management focuses on the chain as one integrated entity. A well-cited and illustrated quote defines the supply chain within SCM as something that “encompasses all activities associated with the flow and transformation of goods from the raw materials stage (extraction), through to the end user, as well as the associated information flows” (Handfield and Nichols, 1999, p. 2). The term supply-chain management was originally invented by consultants to analyse the “management of supply as though it were a single entity, not a group of disparate functions” (Handfield and Nichols, 1999, p. 2), and it integrates logistics with material and information flows upstream of company supply chains, as argued by Lambert and Cooper (2000), Laseter and Oliver (2003), and Bair (2009). Lambert and Cooper (2000) present the perspective that all firms participate in a supply chain, all the way from the raw materials up to the final consumer; however, the closeness of relationships along the supply chain varies.

Handfield and Nichols (1999) define supply chain management as the integration of production and distribution activities through improved supply chain relationships to achieve a sustainable competitive advantage. One of the common themes in the literature, and argued in Kogg and Mont (2012), for example, is that

¹ Lead-firms 1) rule or govern the supply chains, 2) provide direct contact with the customer and 3) design the product or service offered (Seuring and Müller, 2008). In the apparel industry, these are often characterised as brand-owning companies.

to be competitive, companies must enhance consumer value through increased efficiency and effectiveness in the operations within the supply chain. Modern business management, Lambert and Cooper (2000) argue, has undergone a considerable paradigm shift, wherein organisations no longer compete with each other as independent units but rather through their supply chains. This puts new management demands on the brand-owning companies because it is no longer enough to manage the own organisation to be competitive. To be successful, companies manage networks of all upstream firms that provide inputs (directly and indirectly) (Handfield and Nichols, 1999). Accordingly, research in the SCM field is concerned with how firms influence suppliers and other actors connected to their supply chains (Kogg and Mont, 2012), and the question of improving supplier relationships is considered by Handfield and Nichols (1999) to be the most crucial to further supply chain integration. Åkesson et al. (2007) show that SCM has an increased focus on, for example, company sourcing strategies, and the literature stresses, for example, the need of brand-owning companies to improve their information systems, inventory management and supplier relationships.

4.3 Sustainable supply chain management: the triple bottom line approach

Brand-owning companies and procuring organisations seldom own the production of their products, but employ the services of networks of globalised suppliers and manufacturers (Gereffi, 1999; Coe et al., 2008; Locke, 2013). In recent decades, there has been an increasing focus on how to build an effective and sustainable foundation to manage the flow of information and materials across the supply chain (see for example Handfield and Nichols, 1999; Köksal et al., 2017). In addition to the trend of securing a comparative advantage through the successful management of supply chains, Handfield et al. (2005) find a trend towards integrating sustainability efforts into that competitive advantage. The last two decades, as De Bakker and Nijhof (2002) and Seuring and Müller (2008) argue, have shown an increased pressure on brand-owning companies to take responsibility for the social and environmental issues associated with their products. This institutional pressure comes from several directions, such as NGOs, media, customers and government authorities. In general, the pressure may be understood as presented in Pedersen and Gwozdz (2014, p. 245): “social, legal and cultural forces outside the firm that exert influence on how managers perceive the environment and eventually shape and determine strategic actions”.

In the literature, SSCM concerns issues such as working conditions, hazardous chemicals and energy and waste issues. Seuring and Müller (2008) present the perspective that the core of SSCM is the idea of accounting for a longer section of the supply chain due to the wider set of issues needing to be addressed. Subsequently, a distinctive feature of sustainable supply chain management is that the

procuring organisation must take a longer section of the supply chain into account than what is required from a purely economic perspective. The wider set of criteria that must be met for the company to attain a higher level of sustainability is often referred to as *the triple bottom line approach* according to, among others, Gold et al. (2013), referring to the economic, social and environmental performance of the supply chain. The SCM literature stresses the idea of the supply chain being a set of several entities, which are actively involved in the activities associated with the transformation of goods from raw materials to the final product; the supply chain also includes the connected knowledge flows, both up- and downstream. Like earlier concepts within the chain literature, as Seuring & Müller (2008) note, SSCM emphasises the role of the procuring organisation as the main driver of sustainability efforts. However, scholars are problematising the notion of the buyer as dominant and influential; some, like Anner et al. (2012), increasingly stress the urgency of cooperation among actors in the supply chain. Many textile-buying organisations rely on sourcing strategies that, in practice, limit their power over suppliers and sub-suppliers and therefore subsequently limit their power over the supply chain (see literature from Cox, 2001; Åkesson et al., 2007; Locke et al., 2009; Knudsen 2013). There is also increasing scholarly attention devoted to discussing buyer capabilities, which include elements such as competences, resources and collaborations. These capabilities are developed within firms to meet the requirements of a changing environment and are important factors to include in SSCM (see Bowen et al., 2001; De Bakker and Nijhof, 2002; Seuring and Müller, 2008; Gold et al., 2010; Beske, 2014).

4.4 The responsible organisation

The literature on supply chains suggests that a responsible approach is indispensable for organisations seeking to achieve sustainable supply chain management. It also argues that a shift has occurred in the roles of the public and of the private buyer, who are no longer solely seen as drivers of inequality in a globalised world but may have the potential to be platforms for social and environmental reform (Bush et al., 2015). There are several definitions of responsibility throughout the literature, but in the words of Mueller et al. (2009, p. 510), responsibility “refers to the question of which basic function and purpose companies fulfil within society. [...] According to this, CSR refers to the responsibility of companies towards their social and ecological environment”. Organisations manoeuvring in the global arena are frequently confronted with demands that they acknowledge and assume responsibility for the negative side effects of their activities on the environment and society (see for example Coe et al., 2008; Vermeulen, 2013; Pedersen and Gwozdz, 2014). Studies by Ciliberti et al. (2008), Andersen and Skjoett-Larsen (2009), and Locke (2013) have found the pressures to be both internal and external and require companies and public organisations to ensure that they have considered possible

social and environmental consequences of their production. The pressure comes, for example, from personnel within the company as well as from actors such as government authorities, NGOs, media, customers and industry organisations. Kovács (2008) and Knudsen (2013) have found that social and environmental responsibility is clearly assigned to the buyer, the brand-owner or the procurer. The increased pressure on an organisation to assume responsibility for its products' lifecycles creates heavy demands and is seen as a major challenge (De Bakker & Nijhof, 2002), and contestable (Barraud de Lagerie, 2016).

In an effort to assume responsibility, the organisation may respond by focusing attention on social and environmental issues and embedding them within its own practices. However, Kovács (2008) argues that due to the outsourced structure of the supply chain, organisations assuming responsibility need to reframe their narrow conceptions of responsibility to go beyond their own organisational borders. In the case of managing hazardous chemicals in textiles, this translates to the challenge of assuming responsibility in a complex supply chain. Since the 1990s, most organisations have drawn up internal codes of conduct to respond to increasing responsibilities. However, Lindholm (2016) has found that there is still a high degree of non-compliance in textile supply chains, implying a discrepancy between organisational objectives and the practical results of implementing CR actions in the supply chain. A typical supply chain in the textile sector is complex and is usually envisaged as having a certain company as its starting point. In the literature, this starting point is called, for example, the focal company or lead firm (Gold et al., 2010). However, research has shown that many companies have limited influence and control over the entire supply chain, as they generally only have contact with the first tier, or the direct supplier (Fransson and Molander, 2013). It has been argued that larger companies are more advanced than SMEs regarding sustainable supply chain management and environmental issues (Zhu et al., 2008). It is also suggested that companies with authority over the supply chain may have advantages when motivating suppliers to comply with new social and environmental requirements (Kogg, 2003).

For an organisation to assume responsibility for preventing the negative social and environmental impacts of production and commodities, serious efforts and a committed approach are required. Moreover, organisations need to develop capabilities to assume beyond border-responsibilities in situations of complexity and uncertainty (De Bakker and Nijhof, 2002; Seuring and Müller, 2008; Gold et al., 2010; Beske, 2014). Responsible and sustainable management approaches to outsourced production in situations of risk are the subject of growing scholarly interest (see for example studies by De Bakker and Nijhof, 2002; Seuring and Müller, 2008; Locke, 2009; Locke, 2013; Boström et al., 2015; Lindholm 2016; Köksal et al., 2017). In this context of uncertainty and complexity, the factor of reflexivity becomes instructive. This approach, developed in, for example, the literature on world risk society and reflexive modernisation (e.g., Beck et al., 1992; Beck, 2009), suggests that

the organisation should look at itself and its practices in a self-analysing way. A reflexive approach enables private and public buyers to develop capabilities that will allow organisations to continuously evaluate and organise their capacity to adapt to unforeseen risks and events, such as chemicals in textiles. Reflexivity is an approach that can prove crucial when both implementing and maintaining responsible practices and RSCM.

Several measures and organisational approaches are available to companies and procurers aiming at RSCM. All management models require suppliers to comply with requirements set by the company/procuring organisation. These models range from complying with regulations to more ambitious approaches, including codes of conduct, labelling schemes and chemical restriction lists. However, organisations engage in fulfilling these requirements in a variety of ways. Organisations claiming to have implemented RSCM need assurance of their suppliers' compliance with requirements. A narrow organisational mind-set would be that of the 'traditional compliance model' (Locke et al., 2009) or the compliance approach. A common strategy related to this model is that of monitoring performance, which is usually accomplished through factory audits and surveys. The audits may be conducted by company staff or by external auditors and usually consist of an on-site factory inspection, documentation inspection and sets of interviews with workers. A negligent supplier is seldom discharged at first strike; instead, a correctional program is set up when faults are identified. Another strategy is that of random testing, where supplied commodities are tested for certain hazardous chemicals.

One development in the discussion of management strategies for outsourced production concerns the problematisations and expansion of this model. This discussion builds on the recognition that demand-setting and control are not enough to achieve RSCM (Locke et al., 2009). In addition to being insufficient, the model is also very difficult to implement for several reasons. For example, due to the challenges of control and monitoring, it becomes difficult to follow up with and sanction suppliers that do not comply with requirements or that make errors. Scholars have found that organisations need to go beyond this traditional model towards a more committed approach (see for example Ciliberti et al., 2008; Andersen and Skjoett-Larsen, 2009; Locke et al., 2009). The commitment-oriented approach requires organisations to go beyond compliance and is focused on, for example, capacity-building and awareness-raising in-house as well as among suppliers. This may be achieved, for example, by on-going dialogue with the supplier, local authorities, or NGOs; by education of personnel; or by building long-term relations rather than having a high turnover of suppliers. The literature referenced above has documented that companies that engage in capacity-building show improved practices among suppliers and sub-suppliers, as well as better integration of environmental and social issues throughout the supply chain. The approach has several challenges, a major one being the management of hazardous chemicals in textile supply chains. These challenges include, first, knowledge uncertainties; second,

communication barriers such as distances in time, space and culture; third, power dynamics; and fourth, fragmented policy instruments.

5. Conceptual framework of this thesis

This section presents the conceptual framework of the thesis. The framework builds on the literature review (see 4) and the papers (see 5.1). The aims of this thesis (see 1.2) are explored through the concepts of responsible governance (RG), responsabilisation and responsible supply chain management (RSCM). These concepts create the analytical frame through which the papers and empirical materials are analysed. Further, the conceptual framework should be seen as a conclusion in itself and as a theoretical contribution to the thesis.

In this context, I define RG as a structure of decision making that affects and steers the management of the textile sector and its supply chains. I suggest that responsabilisation and RSCM occur within and are influenced by this structure and may also influence the structure. In the context of this thesis, there are two aspects of responsabilisation. First, it is the process of the moralisation of actors (individual actors and/or market entities) in the local and global textile arena; and second, it is the implementation of morally driven obligations and other governance measures within the organisation. The final concept, RSCM, applies to the implementation of responsibility measures in the supply chain and the associated challenges and opportunities faced by the buying organisation. These concepts will be elaborated through the aspects of commitment and capabilities, as well as the factors of reflexivity, knowledge-uncertainty, policy instruments, cooperation and power in the supply chain. My perspective is that both commitment and capabilities are essential to achieve RSCM. Moreover, I argue that the organisations striving for RSCM must actively foster reflexivity, seriously consider knowledge-uncertainty, reflect on policy instruments, promote cooperation and actively address power in the supply chain, especially in relation to developing capabilities for RSCM. These factors are therefore instructive when analysing and understanding the challenges and opportunities associated with the process by which market actors assume responsibility for the management of the negative side effects of globalisation, in this case hazardous chemicals in textiles.

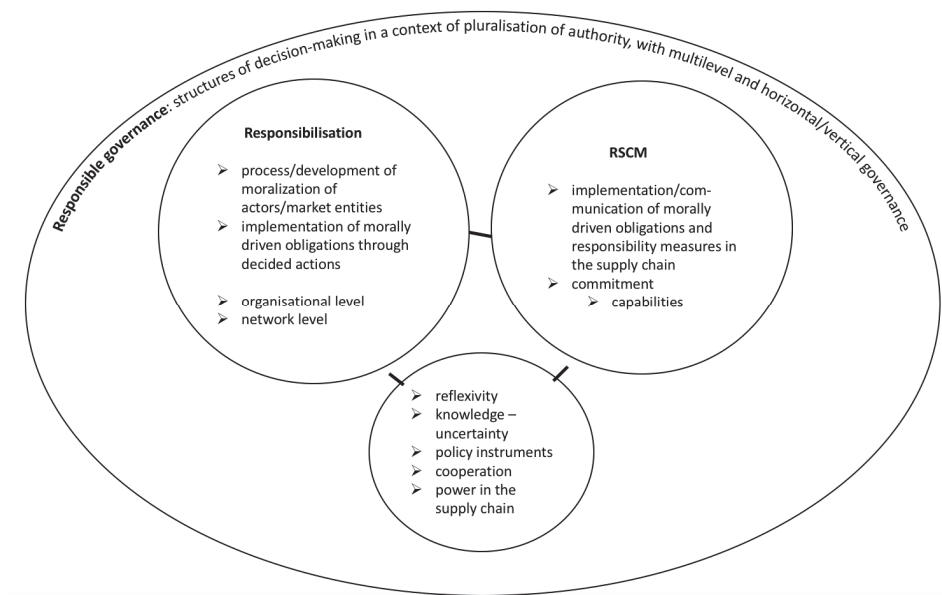


Figure 3: The conceptual framework of the thesis, illustrating the relation between the main analytical concepts.

Responsible governance

Responsible Governance is a useful frame when analysing and discussing the idea of market actors trying to manage the negative side effects of globalisation, such as environmental- and health risks. As explained in 2.3, the global textile supply chain consists of a multitude of production processes performed by a multitude of actors trying, in different ways, to affect this process. I will use RG to analyse these processes of interactions and decision-making to understand what happens when chemical risks must be managed within the structure of more or less loose networks of concerned and involved stakeholders in a context of the pluralisation of authority, multilevel governance, and horizontal and vertical governance.

Responsibilisation

The idea of responsibilisation emphasises the importance of market actors in managing the risks of globalised trade by assuming morally driven obligations, also called “the moralisation of markets” as described by Shamir (2008). The process by which market actors, both individual actors and market entities, become increasingly morally driven and implement these morals within their organisations can be described as a process of responsibilisation. In my understanding, this process is necessary if organisations are to achieve RSCM, and to some extent, it is also necessary for RG to occur. I will therefore use this frame to analyse whether and how a shift towards responsibilisation of the textile market has occurred on two

levels, namely the organisational level and the network level. Respecting regulation is one type of responsibility, another type of responsibility relates to integrating social and environmental concerns in business operations on a voluntary basis. Regarding the textile sector, the responsabilisation process can be observed, for example, in multi-stakeholder dialogues, trade associations, and CSR ambitions.

Responsible supply chain management

In my view, RSCM presupposes the implementation and communication of morally driven obligations in the supply chain. However, there are several factors that potentially promote and impede this process of organisational responsibility-taking. In my understanding, two important aspects of organisations' achievement of RSCM are their commitments and capabilities; consequently, these aspects will be used in analysing the development and level of RSCM at the organisations studied. To further study the process of RSCM, I have – through the literature review (see chapter 4) and subsequently through the work of all papers and empirical materials – identified additional factors of importance that relate to these capabilities in various ways. These factors are reflexivity, knowledge-uncertainty, policy instruments, cooperation, and power in the supply chain, and they are used to discuss challenges and opportunities, especially in relation to achieving capabilities for RSCM as well as in relation to commitment, responsabilisation and RG.

Reflexivity

Reflexivity, or reflexive governance, concerns how actors look at themselves, their actions, and their previous achievements and mistakes. The literature on reflexivity recognises that global environmental problems such as chemical risks in textiles are complex and uncertain and that these characteristics need to be taken into account in management situations (as discussed in Voß et al., 2006; Kemp and Martens, 2007; Walker and Shove, 2007). Thus, actors such as companies, experts, decision makers, NGOs and consumers need to have an 'open mind' when addressing issues about habits, perspectives, assumptions, policies, and rules, as well as how existing patterns may reproduce the generation of problems. Within the concept of reflexivity, one idea I find applicable to chemicals in textiles is the view that there is no final state of knowledge and that problems are not solved conclusively; rather, knowledge evolves and new unforeseen problems may very well appear after decisions are made. This situation demands actors that are adaptive, experimental, responsive and have a self-scrutinising attitude when committing to a responsible approach.

Knowledge-uncertainty

Knowledge in different forms is essential when making informed decisions about strategies and measures for RSCM. The complex structures of supply chains, together with the knowledge uncertainties surrounding chemical risks, constitute a

major challenge in efforts to achieve RSCM. Knowledge is frequently described as what is known and acted upon by individuals and organisations; it includes ideas about types and processes of knowledge connected with 'knowing what', 'knowing how' and 'knowing why' (as argued by McInerney, 2002; Snowden, 2002). In my understanding, for actors seeking to commit to RSCM and to acquire the necessary capabilities for achieving it, it is important to develop, openly share and use both organisational and chemical knowledge.

Cooperation

Another important factor is the issue of cooperation in the supply chain. Textile supply chains are predominantly global, with actors such as retailers, buyers, suppliers, consumers, and decision makers dispersed around the globe. A predominant idea in the literature is that cooperation and close interaction among different stakeholders is imperative to achieve RSCM (see the literature review in chapter 4). The inclusion of dialogue and actors in the process of RSCM could compensate for the lack of governmental and regulatory protection. Moreover, cooperation and communication with colleagues (e.g., companies in the industry or public procurers) can be crucial to the interpretation of legislation and other information exchange regarding chemicals (as discussed in, for example, Fransson, 2012 and seen in the empirical material). Additionally, cooperation or memberships in various organisations, such as standardisation committees, can also enhance actors' capabilities by enabling knowledge sharing.

Power in the supply chain

Power relations between actors along the chain also affect the implementation of RSCM. One view of power distribution in textile supply chains is that primary control over the chain is exercised by so-called lead firms, which, in this case, refers to the buying organisation. It is argued that buyers control the supply chain by outsourcing production to developing countries, where suppliers and sub-suppliers make goods to the specifications of the foreign buyers. Additionally, some scholars argue that this way of organising the supply chain generates profits for the buyer, while the externalisation of risk accompanies the outsourced production to the country of the supplier, a situation that influences the power relations in the buyer's favour (see for example Gereffi 1999; Gibbon et al., 2008; Bair, 2009). This interpretation of power in the supply chain is not seldom accompanied by a view of the buyer as the main responsible actor in achieving RSCM for sustainability. With power and profit comes responsibility. However, many buyers rely on sourcing strategies that, in practice, limit their power over suppliers and therefore over the supply chain. Often, so-called lead firms are small or medium sized, which limits their capacity to influence and exercise power over actors in the supply chain. Moreover, highly competent and popular suppliers may provide their clients with a

full range of services without relying upon the buyers, which could seriously limit the buyers' authority. In addition to buyers and suppliers, external stakeholders such as NGOs, experts, labour organisations, the media, customers and certification bodies influence the processes of responsabilisation and RSCM.

Policy instruments

Chemicals in textiles are governed by both legislative and voluntary policy instruments, and these instruments can be seen as tools of the prevailing governance structure (see examples in section 2.3). This structure is wide and includes a plurality of actors, both governments and actors from other social spheres (see Boström and Karlsson, 2013). The global and trans-national structure of the textile supply chain, together with the abundant but fragmented number of policy instruments, creates serious management challenges for buyers striving for RSCM. The related literature argues for opportunities but also highlights the existence of considerable limitations and gaps in the governance structure of VG/HG (see for example Boström and Karlsson, 2013). In my understanding, a weak VG structure, together with the many voluntary initiatives of HG policy, creates challenges for RSCM and for implementing morally driven obligations in the practices of the organisation.

5.1 Conclusions from the papers

This section is a concluding analysis of the content of the papers. In these conclusions, I use the elements presented in the conceptual model pictured above to offer additional interpretations.

Paper 1

Magnus Boström, Natasja Börjeson, Michael Gilek, Anna Maria Jönsson & Mikael Karlsson, "Responsible procurement and complex product chains: the case of chemical risks in textiles", *Journal of Environmental Planning and Management* 55:1 (2012), 95–111.

This paper aims at developing insights into the opportunities and challenges that private and public organisations face regarding the development of RSCM in complex and uncertain cases. The study focuses on the types of activities that organisations engage in when trying to implement responsible supply chain management concerning chemicals in textiles; key elements of a pro-active, responsible procurement strategy are defined. The paper uses organisational responsibility as an analytical framework, here reframed as RSCM. The results show a rather modest level of responsibility and, at the time of the study, due to increasing external pressure from the media, public debate and campaigning by Swedish NGOs, respondents seemed to have recently been made aware of general risks. Concerns prioritised above hazardous chemicals in textiles were (without ranking) price,

functionality, fashion, social sustainability, other environmental risks such as climate change, other chemical risks related to aspects of the organisations' activity, and long-term and secure relationships with suppliers. A low level of responsibility was visible in that most organisations were ad hoc and reactive; for example, organisations may have responded only after being confronted by media or NGOs instead of having a proactive, integrative and systematic approach and developing knowledge and tools to manage hazardous chemicals, which could have indicated a higher level of RSCM. Moreover, the results show that knowledge and education about chemicals and "what is good" were generally low among the employees responsible for CSR-issues, and this further impedes the possibilities of RSCM. However, it is clear that there was not a total lack of external advisors on the theme, and therefore opportunities for improving knowledge were within reach.

Results not reflecting the development of RSCM are the observation that most organisations had low transparency and a head-in-the-sand approach rather than an open dialogue with suppliers, sub-suppliers and other actors within and surrounding the chain. Further impeding RSCM was that most communication with suppliers was one-way. Moreover, the buyers tended to restrict their communication to the closest suppliers and often did not know who the sub-suppliers were. Regarding enhancing RSCM, some respondents mentioned the need to stay ahead of legislation, and policy instruments such as RSLs and labelling were seen to play a role here. Respondents also struggled in other ways in their communication with suppliers, both because they lacked chemical knowledge and with motivating the suppliers to meet demands that go beyond legal requirements. Despite a rather reflexive risk-awareness, some respondents demonstrated an almost naive trust in certain actors and regions (for example, suppliers within the EU were seen as more trustworthy than those outside the union) rather than efforts to foster cooperation and knowledge-exchange. One of the big challenges in organising RSCM was not so much the establishment of chemical requirements but rather checking compliance with those requirements. In most cases, the buying organisations responded by relying on mere trust in certain suppliers and monitoring systems, indicating a low level of reflexivity, and accordingly a low level of RSCM. Small companies particularly rely on this type of trust, as they lack the resources and knowledge – as well as the power – to have a strong impact on suppliers. This observation, I argue, clearly returns to the discussion of power in the supply chain and the need to problematise the picture of the powerful buyer and its ability to achieve RSCM. However, it is possible to observe an initial process of responsabilisation in the textile sector. Organisations are expressing their commitments and increasing capabilities of moving towards RSCM and associated procurement strategies. As one respondent says, "one feels that there is a big change occurring".

Paper 2.

Natasja Börjeson, Michael Gilek, Mikael Karlsson, “Knowledge challenges for responsible supply chain management of chemicals in textiles – as experienced by procuring organisations”, *Journal of Cleaner Production* 107 (2015), 130–136.

The second paper investigates the knowledge requirements and knowledge strategies experienced and applied by textile-buying private and public organisations when they strive to satisfy expectations from external stakeholders and respond to internal pressures. The study departs from previous research on the identification of general organisational commitments and capabilities because these have been argued to be of key importance for achieving serious RSCM. Challenges and efforts regarding chemical risks in the supply chain are analysed in relation to the organisational characteristics mentioned in paper one (e.g., company size, ownership). The results show that several textile-procuring organisations express serious commitments to achieving RSCM and that most cases of strong commitment are found in private companies that have textiles as their core commodity, although strong commitments are found in some public procurers as well. Concerning capabilities, the results show that organisations seen as forerunners are setting and controlling demands for chemical safety, as well as for work on capacity-building, among some of their suppliers. In general, however, respondents believe that they ought not to be responsible for what happens farther up the supply chain, as they perceive themselves to lack the capabilities required for RSCM. Further, the results indicate a poor state of knowledge of many substances and inherent difficulties in both acquiring and understanding knowledge of chemical risks and how to facilitate RSCM. There is a general recognition of the importance of educating suppliers and customers about matters of risk and sustainability, as this knowledge is perceived to be very limited among these actors. However, the task of transmitting such relevant knowledge along the supply chain is seen as highly difficult.

Regarding the in-house situation, the results show that units within the organisations do not always cooperate and do not always share information, which may hinder RSCM. Considering strategies for knowledge-gathering, the organisations in general see themselves as too small to be able to assume full responsibility for the entire supply chain, but they have several internal and external sources of knowledge. The organisations that are comparatively committed to and capable of achieving RSCM are those where textiles are the core activity. However, in regard to knowledge-demand, there are no fundamental differences. All studied organisations face a number of serious knowledge challenges related to chemical risks in their supply chains, and they generally lack the necessary knowledge to fully meet their own commitments. Examples of these knowledge gaps are lack of sufficient knowledge on policies such as REACH, how to acquire and understand chemical properties and how to obtain and understand information from suppliers and sub-

suppliers. A fully committed approach requires investing enough resources in employees dealing with CSR-issues in general and chemical issues in particular, as well as having skills and opportunities not only to control activities but also to build relations and a constructive dialogue with suppliers. The organisations studied do not do this, and the existing situation – with limited knowledge and learning opportunities – is far from sufficient to achieve RSCM. However, because uncertainty can never be completely avoided, the organisations will always be confronted with complex risks that are far from easy to control. In my understanding, the organisations studied are far from the reflexive approach that would help them build the internal capacity to manage and organise a readiness for knowledge uncertainty and unexpected events. Returning to responsabilisation, it could also be argued that the identified knowledge gaps are likely to impede, if not the moralisation of actors, then the implementation of morally driven measures.

Paper 3

Natasja Börjeson and Magnus Boström, “Towards reflexive responsibility in a textile supply chain”, accepted for publication in special issue of *Business Strategy and the Environment: Challenges of the Sustainability Transition in International Trade*.

The third paper begins where the others end and digs deeper into the issue of how one committed company builds the capacity to handle complex and uncertain situations. The paper aims to contribute to an understanding of how a brand-owning company in the textile sector initiates and assumes responsibility in a supply chain. The paper argues that a management process defined by reflexive responsibility is needed to handle such complex situations as organisations assuming RSCM for chemicals in textiles, as well as when developing and maintaining corporate capabilities. The study focuses on a Swedish outdoor company and its efforts to manage chemical risks in general and highly fluorinated compounds in particular. The main objective is to shed light on the company’s management process over time as well as the complexity faced when striving to assume responsibility when neither demand nor regulation send clear signals, when possibilities to influence suppliers are limited and when substitution possibilities – as well as knowledge of chemical properties – are sometimes limited. The results show that Haglöfs’ three objectives – function, durability and sustainability – are not always compatible, which is quite a challenge for the company. To fulfil all three objectives, Haglöfs has an outspoken long-term, process-oriented approach, where it clearly acknowledges that it is not perfect but keeps striving towards improvement and is not overly afraid to fail or take corporate risks. This approach encompasses a sort of trial-and-error process, which can be said to represent corporate reflexive responsibility and to strive for a sustainability perspective. The company’s goal is for these values to permeate the entire organisation and to utilise several strategies to obtain

spheres of influence. The study also provides a picture of a responsabilisation process on an organisational level. For example, it demonstrates how and why the organisation strives to implement these morally driven obligations both within itself and in the supply chain. As I see it, there is an awareness of the ongoing responsabilisation process within Haglöfs, here expressed in relation to policy instruments. As one respondent frames it, the issue of responsibility and RSCM becomes a moral one in the absence of strong legislation.

In my understanding, the results demonstrate that a committed approach is far from a guarantee of sustainability. A company must also address, for example, opposing business interests; it must balance risks, knowledge uncertainties, internal fragmentation, a fragmented supply chain and 'weak' legislation. The paper finds that a reflexive approach can be vital when building a foundation to manage the unexpected, and such an approach may enhance a company's possibilities for RSCM. Finally, from my perspective, the results imply that on a systemic level, there are limits to what a company, even a committed one, can achieve. In its efforts to achieve RSCM, Haglöfs applies pressure in different directions simultaneously: upstream towards suppliers and manufacturers, as well as through horizontal networks that include peers, NGOs and labelling schemes. The company does this, for example, by initiating voluntary standards and lobbying for stricter legislation, particularly on the transnational level. Returning to the discussion on power in the supply chain, the limitations of applying such pressure should be noted, and it should be recognised that developing reflexive responsibility will involve sharing responsibility as well as taking initiatives and exerting pressure along the supply chain. Here, I argue, the importance of cooperation becomes visible, as Haglöfs, to compensate for its lack of power in the supply chain, actively engages in – and more importantly initiates – collaborations to promote RSCM.

Paper 4

Natasja Börjeson and Mikael Karlsson, "Green Chemistry, the REACH Regulation and Textile Companies". Manuscript submitted to *Regulatory Toxicology and Pharmacology*.

Committed brand-owning companies implement various chemical risk management systems and tools along their supply chains to, for example, meet sustainability objectives, fulfil the safety requirements of products and prevent detection of hazardous – or even restricted substances – in their products. This paper explores the possibilities of one such tool, namely the prospects of implementing green chemistry. Essentially, green chemistry can be seen as a pollution prevention initiative and a new way of thinking about chemistry rather than as a new branch of chemistry. The paper places itself at the intersection of green chemistry, regulation and textile buyers. There are several obstacles to the adoption

of green chemistry as a supply chain management tool that can be used to promote sustainability. However, regulatory frameworks could potentially counteract some of these challenges and strengthen risk management. Consequently, the paper focuses on the relations between public policy and the key principles of green chemistry in the textile sector, with a focus on the EU REACH regulation, which often is considered one of the most ambitious chemical instruments in the world, with the potential to influence other policy instruments. The study analyses whether and how REACH supports the application of green chemistry in the textile area, whether there are regulatory barriers preventing its development, and whether it has untapped regulatory potential.

Is it found that REACH may promote various principles of green chemistry. The principles are found to vary in significance but may be relevant to the control of particular hazardous chemicals, such as phthalates, nonylphenol ethoxylates, formaldehyde and decaBDE, which may be present in textile production and products. However, the four key building blocks of REACH are generally quite vaguely formulated in relation to the ambition of promoting green chemistry. Moreover, the results show that REACH is a weak promoter and facilitator of the idea of green chemistry, not least in connection to textile supply chains. It is found that although REACH does not necessarily impede the application of green chemistry, it does not clearly promote it, either. However, REACH is concluded to have untapped potential: it could be further developed to incorporate provisions that better express several of the principles of green chemistry. If such changes were implemented, hazardous chemicals could become less competitive. REACH indirectly enables buyers to exert certain pressures upstream in the supply chain, in the sense of requiring imported products to be free from substances that are not allowed to be produced within the EU, either fully or as components of other substances. REACH thus simplifies the process by which brand-owning companies can introduce company-specific limitations concerning the production or placement on the market of substances, preparations and – sometimes – articles. This finding, I argue, is an example of enabling buyer-power in the supply chain because the results show that legislation may enhance buyers' demand-setting ability and strengthen RSCM. The results show that the respondents find REACH to be weak when managing chemical risks in textiles. Consequently, several respondents rely on other tools, such as labelling schemes and third party certification, when working towards chemical sustainability along the supply chain and in their final products. This, in my understanding, clearly relates to the discussion on policy instruments. When legislation is weak, buyers need to complement it with voluntary tools when aiming for RSCM. Many buyers in the study apply such voluntary policy instruments, a fact that, in my interpretation, suggests a shift towards responsabilisation within the sector.

6. Towards responsibility in complex supply chains

The aim of this thesis is to contribute to an understanding of what happens when market actors are called upon to manage the negative side effects of globalisation. The aim and research questions are explored, theorised and discussed through three concepts: responsible governance (RG), responsabilisation, and responsible supply chain management (RSCM); in relation to the dimensions of commitment and capabilities; and in relation to the factors of reflexivity, knowledge-uncertainty, policy instruments, cooperation and power in the supply chain. This thesis describes what efforts brand-owning companies and public procurement organisations are making in relation to responsibility in complex supply chains. These efforts are addressed in the different papers and also in section 6.1. The thesis also describes and discusses a process of responsabilisation, especially in sections 6.1 and 6.2. The challenges, barriers and opportunities the different actors face in their efforts are also presented in the papers, particularly at an analytical level in chapter 5 and through a final analysis in section 6.3.

6.1 Stages of responsabilisation at the organisational level

Swedish textile-buying organisations can, according to my research, be categorised into three stages of responsabilisation. The findings of this thesis reveal ongoing development within the textile sector. Therefore, I argue that the categories ought to be seen as development phases rather than divided into fixed types of RSCM with static management structures. Below, I propose and describe three different stages of responsabilisation at the organisational level: 1) the responsibility displayer, 2) the responsibility distributor and 3) the responsibility driver. These development phases should be seen as analytical categories that do not conform precisely to the concrete organisations, although the concrete organisations may be positioned more in one category and less in another.

The responsibility displayer

The first category, the responsibility displayer, refers to a stage of immature responsibility characterised by low commitment and an RSCM approach mainly based on monitoring and control. This type of company or procuring organisation seldom has employees especially assigned to the management of chemicals in textiles. Such a company is, however, likely to have some type of 'CSR and quality' department. Often, this department consists of one person with the overarching aim of managing all sustainability and quality issues. This type of organisation views the

issue of chemicals in textiles as “new” and “confusing,” and the issue is predominantly handled reactively, for example when the organisation responds to responsibility demands and alarming reports from external stakeholders, such as media, NGOs and investors. Many examples of this category were found in the interview study and are documented in Paper 1. In organisations at this stage, demands and alarms may become incorporated within management practices, for example by adjusting and expanding RSLs, product testing or using organic cotton in collections or products. The responsibility-displaying organisation may show elements of working internally and proactively towards RSCM, but such work often accumulates in the CSR department. Communication with suppliers is predominantly one-way and is done through documents rather than personal communication and meetings; this form of interaction could be seen as information rather than communication. When aiming to ensure compliance with guidelines and restrictions, some organisations send documents to suppliers without any follow-up, while others oversee suppliers via factory audits and/or random testing. This static state of supplier-relations indicates a low level of RSCM rather than a reflexive approach based on factors such as cooperation, education, knowledge exchange and capacity-building.

Often, the responsibility displayer may and does set demands for its suppliers – concerning the management of chemicals in textiles – that equal or sometimes even exceed legislation, but the enforcement process is weak. This approach puts less demand on capacity-building because relevant knowledge of the management of hazardous chemicals need not be integrated into the entire organisation. Moreover, the acquired knowledge that accumulates in the organisation may stay in-house because the management approach of the responsibility-displaying organisation does not require knowledge flows in the supply chain. I call this organisation a ‘displayer’ because it does indeed have sustainability goals in place, and these goals often equal or exceed legal demands. This ‘displays’ a development of the so-called moralisation of actions, albeit an often reluctant one. Without committed management practices based on approaches such as reflexivity and integration, to name a few, the sustainability goals in place may prove to be difficult to meet. To summarise, responsibility-displayers demonstrate a low level of RSCM as well as an early phase of responsabilisation. In general, they are reluctant to assume responsibility proactively because they consider other actors, such as suppliers, to be more or equally responsible for following rules and guidelines. This is, I would argue, a situation that could be described as “someone else-ism”, meaning that there is always another actor involved in the supply chain, in one way or another, who can be blamed by the buyer for the lack of RSCM.

The responsibility distributor

The responsibility-distributor ranks higher in commitment than the displayer and addresses the (perceived) lack of capabilities in several ways. The organisation is

aware of the issue of chemicals in textiles and RSCM and has, to a greater extent than displayers, accepted the need to assume responsibility. However, it struggles with knowledge-uncertainties and how to implement these into management practices. I observed, during several participatory observations, that it is not unusual for concerned employees in this organisation to take part in meetings and workshops with the goal of gaining more knowledge on, e.g., management measures as well as to network with other actors.

In this type of organisation, the level of demand-setting towards suppliers exceeds what is required by legislation. An organisation at this developmental stage works both proactively and reactively to incorporate demands equal to and exceeding legislation, both within its management practices and in the supply chain. Such management practices may, for example, be incorporated by proactively communicating to suppliers a company-specific restriction on a chemical that is not prohibited by law. Another practice could be to reactively test plastic prints for restricted chemicals after alarming reports are released by an NGO. To ensure that demands are followed, the organisation takes a different position from those discussed in the previous responsibility category, which relied on a pure monitoring approach. Instead of merely controlling suppliers and communicating via closed written documents, the responsibility distributor strives for more open communication; it facilitates knowledge-sharing and education both within the organisation itself and along the supply chain. Such supplier-communication may be handled by the employees of the organisation, or by hired agents and third party initiatives. Employees strive to educate themselves internally and by attending workshops and seminars on chemicals in textiles that could prove informative, especially concerning factors such as knowledge and policy instruments.

In the distributed responsibility phase, demands are placed on capacity building and cooperation both in-house and upstream. However, an organisation at this stage of development also demonstrates the view that the buying organisation is not the only actor in the supply chain that is responsible for RSCM, including the occurrence, or non-occurrence, of hazardous chemicals in textiles and other sustainability issues. It is characteristic of the distributor to assume responsibility by sharing or outsourcing responsibility to other actors. For example, communication may facilitate sharing the burden of responsibility among several actors along the chain through systems of traceability and distributed information flows as enabled by, e.g., REACH article 33. Such information systems require both knowledge and action: for example, consumers need to perform the act of knowing about and asking for chemical information, and suppliers need to find answers and provide them to the buyer, who then forwards the information to the consumer. Another approach is to use eco-labels to provide information on the chemicals used to make the garment; in this way, some responsibility is shared with the consumer, who can make the active choice to buy a more 'sustainable' product. Another feature of the distributed responsibility phase is that the organisation may outsource some of the

actions required to achieve sustainability goals to actors deemed more competent, as observed in paper three, where Haglöfs places its trust in Bluesign.¹ For this approach to be successful, however, there is a need for internal knowledge-capacity to assess the credibility and competence of the assigned third party.

In this stage, there is indeed an observable process of responsabilisation that pertains to both the development of responsible actions and the implementation of these actions in the organisations; there is also a visible goal of moving towards RSCM. In saying this, my interpretation is also that the organisation assigns, or strives to assign, the task of RSCM to other actors in the supply chain. Although organisations may be working proactively, they also lean quite a bit on someone else-ism, where another actor can always be blamed.

The responsibility driver

The responsibility driver is the most committed and capable type of organisation with regard to RSCM. This organisation is a forerunner that strives towards a proactive approach and aims to stay ahead concerning knowledge of hazardous chemicals and how to avoid them. Development of responsible action occurs through internal initiatives, through the efforts of committed employees and through measures taken in response to external pressure. This development is accomplished by developing capabilities in-house and then by actively striving to integrate issues of chemicals in textiles throughout the entire organisation. One idea behind this aim is to incorporate thinking about chemical risks at all stages of product development. Employees both initiate and participate in numerous efforts at cooperation with external stakeholders such as NGOs and industry peers. Moreover, the driver works to convince concerned actors, such as suppliers, consumers and chemical companies, to improve their awareness of chemicals in textiles. The driver applies chemical restrictions that are considerably stronger than those demanded by legislation, and it does so across all products rather than singling out parts of its textiles for stricter restrictions or eco-labelling only a few. Another example is that the driver, regardless of the country in which it operates, consistently surpasses the legal requirements of the most ambitious country globally. The driver promotes cooperation and long-held relationships with suppliers and invests in capacity building in the supply chain. These observations of the driver's cooperation with both suppliers and external actors, obtained through interviews and participatory observations, pertain to the notion – presented in section 5 – that cooperation and close interaction among different stakeholders are imperative to achieving RSCM. On-going capacity-building, cooperation and communication efforts are stressed, both in-house and in the supply chain. The sustainability driver

¹ Bluesign is a voluntary initiative through which textile manufacturers aim to improve the environmental performance of their production. The organisation provides organisations, such as companies, with chemical expertise and creates Restricted Substances Lists (RSL) that suppliers must comply with if they are to be certified as Bluesign suppliers.

often educates and (when possible) supports suppliers. It is not unusual for the driver to directly communicate and set demands for both suppliers and sub-suppliers.

The organisation may have a department designated to work specifically on sustainability, with specific employees dedicated solely to the issue of chemicals in textiles, but it could also be that only one employee works on the entire array of sustainability issues. The latter is not unusual for the Swedish textile sector, which consists of many SMEs with limited resources. What characterises this organisation – compared to those mentioned earlier – is the way in which the responsible person or group of persons succeeds in integrating issues of sustainability and RSCM within the rest of the organisation. This may, for example, be achieved due to factors such as available time, sufficient resources, adequate knowledge, strong overall interest, and committed corporate culture. However, it is not necessarily the size of the organisation that matters but rather the mind-set of the people working there and the opportunities they are given by the owners and investors. Other characteristics of the driver are reflexivity and the recognition that it is nearly impossible to achieve full and certain knowledge of chemicals in textiles, which may lead to a precautionary management approach. The organisation demonstrates reflexivity in striving towards RSCM and building a readiness for uncertainty through continuous improvement and evaluation of both chemicals and measures taken. The empirical results show that the driver uses several types of responsibility measures. For example, it may employ eco-labels that enable customers to make informed choices, opportunities for recycling old textiles, as well as a relatively high level of chemical restrictions on the entire range of sold products, even though these restrictions are seldom communicated to customers. The organisation is not a stranger to distributing responsibility to other actors, nor does it hesitate to express the idea that other actors are equally or more responsible for RSCM than the organisation itself. However, it demonstrates serious commitment, and it recognises the need to accept more responsibility than others and to set “a good example”. This is done for several reasons, not only because the organisation aims to do the right thing but also because it believes it may benefit from such actions in the long term. The organisation shows a clear drive for RSCM, and the responsabilisation process is ongoing, with regard to developing morally driven, responsible actions and implementing these in-house and along the supply chain.

6.2 Responsibilisation of the Swedish textile sector

Looking at development over time, when my two first studies were conducted, the organisations studied showed evidence of being positioned in and around the responsibility displayer phase when managing chemicals in their supply chains. Most organisations encountered at that time were still far from a commitment-oriented approach – an approach characterised by, for example, reflexivity, integration, cooperation and systematic management. Rather, they restricted communication to their closest suppliers, and it was common for respondents to have

no idea who their sub-suppliers were. A low level of RSCM was noted, with modest levels of capacity-building as well as little recognition of the idea that responsibility could and should go beyond the organisational borders. Supply chain management in the textile sector was not integrated, and clearly many steps had to be taken if the organisations were to assume any advanced RSCM. During the years of this study, an increased commitment to responsible supply chain management, as well as attempts at handling the obstacles in the way, have been observed, not only in the series of participatory observations but also in the case-study on Haglöfs. By the time the study was concluded, most organisations observed in the Swedish textile sector – at least those I met during my studies – were close to the distributor-phase. Some organisations did less, and a few organisations a lot more, than the middle group. However, most organisations studied saw themselves as too small to successfully cope with the challenges they were experiencing, regardless of their commitments in the area of RSCM. Many organisations worked toward responsibility because they perceived they must; respondents perceived it to be unacceptable for an organisation not to declare its concern about sustainability. Others, however, had employees who expressed a stronger wish to “do the right thing,” and several respondents expressed serious commitments to RSCM. According to the findings of the thesis, and mainly based on the interviews and participatory observations, the observed organisations perceived as committed and capable are mainly those with textiles as their core activity, and private actors with textiles as their core business stand out as most likely to be moving towards the driver-phase, together with several public procurement organisations that demonstrate a far-sighted approach.

Among the organisations studied, a shift towards an increased openness and cooperation is visible, especially through my participatory observations and the study on Haglöfs. In describing the developments I observed in the Swedish textile sector during the period of the study and by using the stages of responsibility I presented at the beginning of the chapter, it is possible to observe organisations moving from being characterised as displayers towards distributors and, in some cases, drivers. Many organisations try to learn from each other, and the level of interest in the issue has grown considerably. Collaboration efforts are obvious. Conversations I observed during my participant observations show that buyers are willing to collaborate on, for example, developing knowledge of practical measures for achieving RSCM, including RSLs and policy-related issues; they may discuss the pros and cons of voluntary policies or legislation. For example, at the beginning of the study, REACH was seen as too difficult to understand by several of the organisations observed and interviewed. According to some of these organisations, “there was no one that could answer” the questions organisations had about the regulation. Later in the thesis process, I observed that this perspective had evolved from several buyers not understanding REACH at all to buyers expressing the frustration that REACH is not rigorous enough when setting demands; these same buyers were striving towards RSCM. Further, during my participatory observations and through

some of the interviews, I observed that another development had occurred, with some organisations discussing whether and how it would be possible to work together towards policy amendments to strengthen chemical policy on the EU level. Such discussions could arise within fora facilitated by government and city authorities, such as the Chemicals Agency and the Environment Department in the City of Stockholm, as well as through the organisations' own initiatives and workshops. I would argue that the 'new' awakened state within the textile sector has, during the years of the study, initiated a certain reflexive development in how certain actors look at themselves and their actions, as well as at previous practices and ways of implementing the management of chemicals in textiles. The stages of reflexive thinking among buyers and other stakeholders are far from identical, however. The fora offered by, for example, the Swedish Chemicals Agency and the Swerea chemical group, have brought about a discussion of achievements and mistakes, while simultaneously providing a space to compare, for example, different RSLs and other management practices. In addition to the initiatives of the fora, external stakeholders continue to pressure buyers towards a process of scrutinising their RSCM-practices and achievements.

In my interpretation, this study's observations of how different actors – whether a buying organisation, an NGO or the Swedish Chemicals Agency – debate, collaborate and try to further their organisational agenda, nicely fit the understanding of what is going on when risks are governed and regulated beyond the nation state. An additional observation made through both interviews and participatory observations, which provides insight into the responsible governance of the textile sector and that can be of some importance, is that it is not uncommon for actors such as concerned employees or NGO employees working with sustainability and chemicals in textiles to change their affiliations. For example, someone working at an NGO may quit that job for a position at the Chemicals Agency. Or, someone working at a private company or in public procurement may move on to a consulting firm. How this affects the development of the sector is, however, difficult to determine based on the empirical material of this thesis.

Both the empirical material and earlier studies show that cooperation among companies in the textile sector has limits. This is particularly visible in the participatory observations, where many company representatives expressed different needs depending on scale, type of commodities and collections. The organisations do not always agree on, for example, which chemical restrictions to press for, and they do not always express a willingness to cooperate with each other on how to move forward. For example, as I observed during some participatory observations, and as was also brought up in interviews, some organisations may want to work towards a restriction on a certain chemical and want to use the forum to discuss how to collaborate in that direction. Other organisations stress that they do not necessarily want to see a restriction on that chemical, perhaps because the mentioned chemical is important to one group of organisations, while others do not

depend on its properties to produce their commodities. In my understanding, there is, however, a general recognition of the need to improve the implementation of various measures in striving towards RSCM. Some organisations also build capacity by working together with actors such as Bluesign, which – due to its size and knowledge – is seen to offer greater opportunities to place and enforce demands on suppliers. An example of how such a process works can be observed in the case study of Haglöfs. Turning to public procurement organisations, these face additional difficulties because they are bound by the laws of public procurement, which leaves less room for improvisation. They do, on the other hand, have another tradition of networking on various issues and can use already established structures of interaction, in contrast with the private buyers. This is observed mainly through the interviews with public procurement actors. Several of the public procurement respondents have also participated in networking, as noted in my participatory observations.

The findings of the thesis, particularly the interviews and the literature review for paper 3, point towards institutional pressure –together with dedicated personnel – being important to generating increased commitment among textile buyers. In my interpretation, the process of moralisation among the observed buyers has been somewhat reluctant if viewed from the buyers' perspective. Responsibilisation has increased from this perspective, but the entire sector is permeated with the view that RSCM is very difficult and sometimes impossible to achieve. Responsible governance presupposes that several actors take action, but the findings of this thesis demonstrate a discrepancy between such a situation and the conceptual idea of moralisation of markets. That is, there is a visible moralisation process in the Swedish textile sector, but the application of certain morally driven obligations, and the motivation for action, are characterised by reluctance rather than by genuine care for one's duties (cf. Shamir, 2008). I draw this conclusion based on conversations held during my interviews and based on discussions I observe during my participatory observations. Another way of describing the ongoing process of moralisation and RSCM is that it is sometimes forced, e.g., by legislation, sometimes pressured, e.g., by NGOs, and sometimes driven or avoided, e.g., by buyers. The different actors affiliated with this process – and their separate agendas – could prove both a challenge and an opportunity for the responsabilisation of the sector and could prolong the path to RSCM, as they may both impede as well as mutually support each other.

In my understanding, the complexity of RSCM of chemicals in textiles creates huge challenges, but the idea of complexity is also something to hide behind. No organisation wants to present itself as irresponsible or as knowingly acting irresponsibly. The loose governance structures however, with their weak vertical and complementary horizontal governance, create an irresponsibility game where responsibility is, to some extent, passed around like a hot potato. This situation links back to the notion of organisational irresponsibility (cf. Beck, 1992) and to the difficulties of ascribing liabilities to actors within the wide and loose structure of

governance. Such a structure of irresponsibility would, in turn, suggest difficulties for the implementation of RSCM and the development of RG. Both frequent recurring discussions, noted in the participatory observations as well as the material from the interviews, show that there is always another actor somewhere that is seen as not acting responsibly enough. Sometimes, customers are targeted for not paying attention to sustainability. Sometimes, suppliers are accused of being unwilling to listen to or understand the demands. Sometimes, the legislation is said to be too weak. Sometimes, it is argued that research is insufficient. And sometimes, buyers are blamed for not paying suppliers the amounts needed to produce the textiles in a sustainable way. From my perspective, these findings demonstrate that there is a dominant view in the sector: this view holds that there is no individual good actor or bad actor concerning the issue of chemicals in textiles and that there are several challenges related to the framework of today's production system and the governance structure designated to steer it.

At the beginning of my study, many discussions revolved around the idea that RSCM could not be achieved; the issue was just too complex. All actors categorised within the different stages of responsabilisation encountered both challenges and opportunities when striving to assume RSCM. Even the buyers with the clearest commitments and strongest capabilities experienced serious challenges in their efforts to develop RSCM. The study shows that even for the most committed buyers, capabilities are difficult to obtain and maintain. Even when the culture among buyers around learning, sharing and implementing capabilities can be characterised as generous and open, the buyers present their ongoing work towards RSCM as a struggle. They claim to struggle with both the building of internal capacity and with finding ways to cooperate with similar actors. Especially at the beginning of the study, the empirical material showed that there was a tendency to hide behind challenges and the complexity encountered. The respondents portrayed their organisations as too small, as lacking expertise, and they complained about the lack of legislation to back up their demands for sustainability efforts concerning chemicals in textiles. Further, many buyers participating in the study or during the participatory observations perceived external pressures to be unfair, as they had so little leverage related to their suppliers and RSCM. This view has, during the time of the study, successively become more nuanced. Buyers still perceive themselves as lacking power, and to some extent they still hide behind this claim. However, most organisations I have observed are working towards management practices that target RSCM, even if they sometimes do so reluctantly. One of my conclusions, following an analysis of my collected empirical material and related literature, is that the textile sector appears more collected and unified at the end of the study period.

6.3 Crucial challenges, barriers and opportunities experienced by the sector

This thesis has described and discussed several challenges, barriers and opportunities that impede or strengthen buyers' efforts at RSCM. The section below discusses my assessment of the most crucial of these issues faced by the studied organisations.

Size

A dominant issue relates to the size of the organisation. The participatory observations and interviews show that there is an idea among most buyers studied that the bigger the organisation, the greater the possibilities for RSCM. This idea is also found in the literature. The dominant argument is that larger organisations have more leverage. Large buyers can place large orders, which gives them more power to place demands for RSCM on their suppliers. Most organisations in the study are SMEs, and several, even the committed ones that are making serious efforts towards RSCM, hope that one of Sweden's larger textile-buying organisations will cooperate or in other ways make demands that will have a spill-over effect on their possibilities for RSCM. For example, smaller buyers hope that large organisations will use the same third-party initiatives as smaller ones, as this would give extra weight to an initiative such as Bluesign. Size is perceived as a barrier by most studied organisations, but it can also be an opportunity because the integration of sustainability-efforts, as well communication in-house, may be easier due to a smaller, more flexible and closer organisational structure. Another opportunity in this context could be for SMEs to cooperate with each other and to increase their leverage through cooperation. However, the analysis indicates that cooperation is a challenge and mainly comes in the form of knowledge-exchange about, for example, the implementation of certain practices such as RSLs rather than in the form of mutual efforts at RSCM through common attempts to influence suppliers or legislation, or by cooperating on developing RSLs and joining standards.

Price

Another barrier faced by the textile-buying sector concerns price. A common argument voiced in interviews and literature is that the more a buyer pays the supplier, the more influence they have. However, buying organisations generally wish to keep their costs down which, in this context, could translate into not paying the supplier enough to have influence on the suppliers' management practices or to enforce RSCM. Moreover, it is shown throughout the empirical material that investments in RSCM and other sustainability efforts commonly play second fiddle to keeping costs and prices down. In my interpretation, this discrepancy between wanting to keep costs down and investing in sustainability efforts is an obvious challenge for the organisations. Price is also a barrier in that customers are (per-

ceived as) price-sensitive, and if the commodity is too expensive, they will not buy it, regardless of whether it is more sustainable than other alternatives.

Business model

The way in which buyers organise their supply chains also impacts how much they can influence RSCM. Buyers who frequently change suppliers with whom they have more compliance-based relationships would have more of a struggle in implementing RSCM, as argued in paper one. However, the choice of business model could also be an opportunity for buyers to assume RSCM. For example, when buyers have fewer suppliers with whom they have long-term mutual relationships, they have greater possibilities to receive positive responses for responsibility measures. Further, buyers who assume RSCM beyond their first sub-supplier have greater opportunities to achieve RSCM, as found in the Haglöfs case study, as the organisation also assumes RSCM for sub-suppliers through measures such as designating² fabric and trim suppliers. This arrangement may be seen in contrast to buyers with a business model that restricts their communication and demands to the first sub-supplier, as these buyers experience greater barriers to RSCM in demand setting and communication, for example. If a buyer were to own its production instead of outsourcing it, its potential for being responsible would probably increase considerably. However, as none of the organisations studied in this thesis owns their entire supply chain, it is only possible to speculate on such outcomes. I conclude that different approaches meet with different challenges. The buyer characterised by a compliance-based business model with high turnover of suppliers may have difficulties in enforcing RSCM in the supply chain and experience knowledge challenges connected to knowing what, knowing how and knowing why with regard to chemicals in textiles. The buyer who has an integrative and responsible approach instead faces challenges such as requirements for having chemical knowledge in-house, and it may also experience corporate risks that accompany the assumption of responsibility for a longer part of the supply chain (this is also argued in papers one and three).

Power in the supply chain and actor affiliations

As shown, supply-chain power is distributed among several actors. Actors such as owners, large suppliers and factories all govern their parts of the supply chain. To say that the buyer has the opportunity and power to steer all suppliers is too simplistic, and this power-distribution is a serious challenge for buyers assuming RSCM. However, as mentioned, buyers may also increase their challenges by, for example, choice of business-model and keeping costs low. Especially when considering challenging factors such as those mentioned above, cooperation through

² A designated supplier or sub-supplier is a supplier who is assigned by the buyer as the source for purchasing approved products to maintain a certain standard of quality for those products.

trade associations or buyers working together with other buyers or stakeholders, such as NGOs and labelling scheme organisations, could strengthen buyer opportunities to increase power in the supply chain. Generally, distribution of power to several actors is a good thing. The results of this thesis suggest that power is indeed distributed in the supply chain; however, responsibility does not seem to be shared to the same extent. This observation may be related back to the idea of it being difficult to ascribe liabilities to specific actors when it is not obvious who is responsible for what (cf. Beck, 1992).

Policy instruments: Regulation vs. Voluntary action

Weak legislation in producing countries and the weakness of REACH may hinder buyers' opportunities to enforce chemical restrictions. The thesis shows that knowledge of legislation such as REACH has increased. Earlier, buyers found the legislation to be very difficult and confusing, while by the end of the study, they found the legislation insufficient. Generally, the organisations studied are ahead of the legislation, though the results and analysis in paper 4 show that mandatory regulation needs to be complemented by voluntary measures to promote RSCM. This "absence of regulation" has led to many RSCM measures being voluntary in nature. Without having control over ownership, price, etc., the buyers state that they encounter several difficulties in imposing voluntary measures such as chemical restrictions, standards and even investments in the supply chain. Such difficulties may be encountered especially when such standards increase the workload and cost for the supplier. Private standards that interact with state and EU regulations could, however, also be an opportunity for the buyers, as they may raise expectations of and demands on public policy. Moreover, if conducted in a transparent way, learning and mutual support between regulation and voluntariness could occur. This study, however, shows that lack of strong legislation is a barrier to RSCM because, as expressed by the observed buyers and voiced in related literature, it is difficult to enforce morally driven measures in the supply chain. Moreover, the study shows that voluntary policy instruments are close to mandatory for a private organisation that wants to be perceived as responsible by external stakeholders, such as customers and NGOs. Public organisations are, however, not subject to the same moralisation process, although the pressure on them is also apparent.

Uncertainty

The lack of knowledge of which chemicals are used and where, and the risks connected to them, is a barrier that obstructs responsibility, as buyers require such knowledge to know how and when to act. Moreover, uncertainty leads to difficulties for buyers wanting to communicate and to assume an educational role, especially for small and medium-sized organisations. When buyers lack understanding themselves, it becomes very challenging to explain a matter as complex as chemicals in an

adequate or accessible way to other actors. Lacking knowledge on chemical risks – and not being experts – buying organisations may be perceived by suppliers as not having sufficient authority concerning chemicals in textiles. Even when buyers actively work to enforce the precautionary principle as a measure to cope with uncertainty, such measures may be obstructed when the buyer does not actually know which chemicals are used and where. However, the precautionary principle could also be an opportunity if incorporated and successfully communicated in the supply chain. Adoption of a reflexive approach could be an opportunity for an organisation working against uncertainty, as it allows the organisation to question its processes and habits and how these may reproduce and create problems. Moreover, reflexivity acknowledges the idea of there not being a final state of knowledge and that problems may appear after decisions are made. This idea could prove meaningful for an organisation striving to build its capacity for the unforeseen and uncertain. Despite these obvious barriers and challenges, I have observed, through participatory observations and not least the study on Haglöfs, that knowledge of chemicals has developed among organisations in the Swedish textile sector.

Time

Time is a barrier to RSCM, especially for the brand-owning companies. Factors such as communication barriers, organisational inertia and the time it takes to find ‘acceptable’ substitution alternatives for chemicals is set opposite to the fast pace of fashion. As shown in the papers, and especially in paper 3 on Haglöfs, the buyers struggle with this barrier, and even the reflexive approach is characterised by time consuming trial-and-error processes. Finding ways to address this time paradox, the fast pace of fashion and the time-consuming process of RSCM is one of the challenges the textile sector will have to confront in the future to strengthen its shift toward RSCM.

6.4 Responsibility in a complex and uncertain world?

In this thesis, I have combined the concepts of responsible governance, responsible supply chain management and responsabilisation to describe, analyse and discuss how the environmental problem of chemicals in textiles is governed in a complex and uncertain world, in an era of plurality of authorities – both governmental and non-governmental – and with actors taking and being called on to take responsibility. The concepts, together with a broad basis of empirical material, have been used to capture and understand this process and to explore what challenges and opportunities there are for the market actors – public and private textile buyers – to assume RSCM. Moreover, these concepts have been used to assess whether a process of responsabilisation can be observed in the Swedish textile sector. The thesis contributes to an understanding of what happens when these market actors are no longer seen as only drivers of ‘inequality under conditions of globalisation’

(Bush et al, 2015) but rather are claimed to be actors that have aspirations and opportunities to achieve social and environmental change and are therefore called upon to act on these possibilities.

There is a rich body of literature on global chain studies and governance, but the literature on responsible governance and RSCM is not as substantial. With this thesis, I hope I have demonstrated that there is research potential in combining literature on GCC/GVC/SCM/SSCM/RSCM and responsible governance when describing and discussing the difficulties that arise when market actors attempt to manage environmental problems in a globalised world characterised by complexity and knowledge uncertainty. This approach offers a picture of what may happen when the wider structure of governance is combined with the linearity and power-distribution of supply chain management and what consequences this may have for responsabilisation and RSCM. It is a picture of flows of, for example, knowledge and power in supply chains following a linear track, combined with the more diffuse distribution of flows in loosely tied networks that characterises the structure of governance. This research is needed because it provides an understanding of how and why these actors struggle to assume responsibility concerning the management of chemicals in textiles in supply chains. It is needed because it presents the challenges, barriers and opportunities that these actors face while striving for RSCM. Further, it contributes to knowledge of the factors that influence this process and what implications the process may have for RG by market actors.

7. Concluding remarks

The results of the thesis indicate that the complex structure of the chain, together with the many knowledge uncertainties and distributed power relations in the supply chain, create more barriers and challenges than opportunities for buyers striving for RSCM. I would like to argue that although these factors have their limits, cooperation, stronger public and private policy and a reflexive approach could be ways of moving forward towards RSCM and towards the development phase of the responsibility-driver. From the perspective of this thesis, to further develop RSCM, a buying organisation needs to reframe its management approach towards committed and reflexive management practices and to integrate this approach within the entire organisation. If the goal is to strive towards RSCM, then the buyers will have to build capacity both in-house and upstream as well as build a web of both internal and external knowledge input on hazardous chemicals. Moreover, RSCM requires the organisation to go beyond the organisational walls, as complex and uncertain issues such as the handling of chemical risks in globalised supply chains require repeated dialog with concerned actors. Additionally, the responsible buyer needs to continuously organise for the unexpected in response to the abovementioned uncertainty and complexity.

This thesis has described and demonstrated the importance of cooperation, reflexivity, knowledge and capacity-building, as well as a combination of both legislative and voluntary policy instruments, to achieve RSCM. Additionally, this thesis has further problematised the power of the buyer by describing and analysing how its position of power in the supply chain is constructed by both the structure of the global and complex supply chain and by the buyer itself through more or less active choices. However, I wish to emphasise that it is extremely challenging for a dedicated actor to achieve RSCM even when the factors above are all accounted for. Rather, it can be concluded from the results that for meaningful development towards RSCM to occur, other actors in the supply chain ought to also commit to such initiatives. For example, responsibility could be assumed by suppliers, sub-suppliers and the chemical industry. Further, efforts to achieve RSCM are also needed in public policy and among NGOs, labour organisations and consumers, together with continued pressure on public and private buying organisations.

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Appendix A: Interviews

A: 1 Interviews paper 1, 2 and 4: Type of procuring organisations included in the study, as well as main functions of the respondent.

	Core activity	Function of respondent(s)
Org 1	Clothes retailer	I-1: CSR and quality assurance
Org 2	Clothes retailer	I-2: CSR
Org 3	Clothes retailer	I-3: Environment
Org 4	Clothes retailer	I-4: Procurement
Org 5	Sports and leisure wear	I-5: Logistics I-6: CSR
Org 6	Leisure wear	I-7: Sustainability
Org 7	Hotel	I-8: Housekeeping manager
Org 8	Train transports	I-9 and I-10: Procurement of uniforms
Org 9	Train transports	I-11: Quality assurance and environment I-12: Uniforms
Org 10	Public transports (buss and trams)	I-13: Procurement of clothes
Org 11	Procurement for public organisations	I-14: Procurement of clothes I-15: CSR
Org 12	Municipality (education etc.)	I-16: Environment in procurement
Org 13	County council (health care etc.)	I-17: Environment
Org 14	Bag and accessories retailer	I-18: CSR and quality manager

A: 2 Interviews paper 3: Type of procuring organisations included in the study, as well as main functions of the respondent.

Swedish outdoor company Haglöfs	Director of sustainability
	Director of sustainability
	Materials manager
	Materials coordinator
	Product developer
	Head of logistics
	Sales

Appendix B: Participatory observations

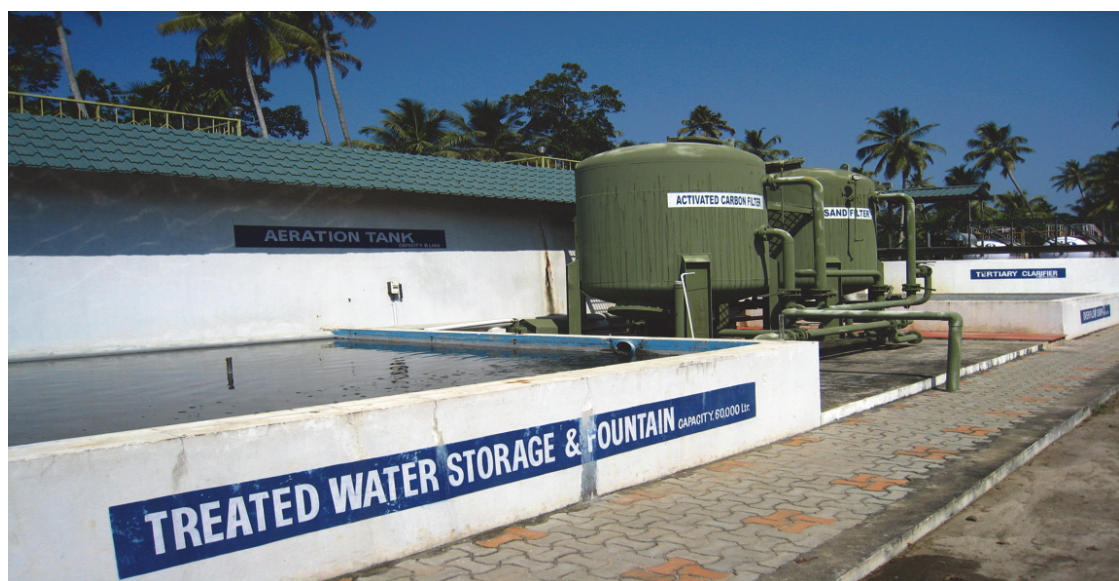
Organiser	Seminar/meeting	When
The Antonia Ax:son Johnsons Foundation for Sustainable development & The Royal Swedish Academy of Agriculture and Forestry	Should we throw out the towel or replace it?	20080403
Compass Network	Why is not Patagonia Swedish?	20080418
The Swedish society for nature conservation	Industry dialogue x2	20080508
The Swedish society for nature conservation	Actor meeting	20080514
The Swedish Chemicals agency	Meeting on chemicals in textiles	20080828
The Swedish Water & Wastewater Association	Meeting on chemicals in textiles	20080901
Stockholm environmental department	Stockholm road towards a non-toxic environment	20081002
The Swedish Chemicals agency	Seminar on chemicals in textiles	20081127
Chemtex	Workshop on chemicals in textiles	20081205
Chemtex	Indo-Swedish Interactive Session on Environmental Risks	20090220
The Swedish Chemicals agency	Meeting on chemicals in textiles	20090514
The textile and leader laboratory	Textile science on materials	20100506-07
The Swedish Chemicals agency	Forum for a non-toxic environment	20101118
Swedish society of toxicology & The royal institute of technology	Eco-labelling as risk-reducing strategy	20101126
The Swedish society for nature conservation	Conference: save the man!	20111118

The Swedish Chemicals agency	Forum for a non-toxic environment	2012101
Green women	Woman what is to be found in your clothes?	20121030
Miljörapporten	Chemicals management summit	20130529
The Swedish Chemicals agency	Industry dialogue on chemicals	20130912
The Swedish Chemicals agency	Seminar: Current initiatives on hazardous chemicals in textiles	20131204
The Swedish Chemicals agency	Meeting representatives from textile stakeholders and Fluorocouncil	20140407
The Swedish Chemicals agency	Seminar: Scientific areas of development: textiles	20140604
Elsevier	Green and Sustainable Chemistry Conference	20150404-06
The Environment Department – City of Stockholm: Unit for Environmental Analysis, Chemical Centre	Seminar: Food contact materials	20151009
The Environment Department – City of Stockholm: Unit for Environmental Analysis, Chemical Centre	Seminar: Cosmetic products	20151110
The Environment Department – City of Stockholm: Unit for Environmental Analysis, Chemical Centre	Seminar: Textiles, EU-initiatives and research	20160212
The Environment Department – City of Stockholm: Unit for Environmental Analysis, Chemical Centre	Seminar: Alternatives to perfluorinated compounds in textiles	20160311
The Swedish Chemicals agency	Seminar: EU-information and regulation concerning articles	20160425

The Environment Department – City of Stockholm: Unit for Environmental Analysis, Chemical Centre	Seminar: Chemical demands for articles with focus on the legal acts REACH and RoHS	20160914
Cradlenet	Seminar: the road to circular economy	20161006
The Environment Department – City of Stockholm: Unit for Environmental Analysis, Chemical Centre	Seminar: effective flows of information	20161007



Mats Grahn, Stockholm (2017).



Textile factory, yarn dye unit, Karur, India. Natasja Börjeson (2009).

Can and should market actors, brand-owning companies and public procurers alike, manage environmental and health problems that occur as a result of the production of their commodities? Textiles is one sector where such a demand for responsibility has been voiced. This thesis contributes to an understanding of what happens when market actors are compelled to manage the negative side effects of globalisation, such as chemical risks in complex textile supply chains.

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