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Knowledge challenges for responsible supply chain management of chemicals in textiles – as experienced by procuring organisations

Natasja Börjeson*, Michael Gilek, Mikael Karlsson

School of Natural Sciences, Technology and Environmental Studies, Södertörn University, Alfred Nobels Allé 7, 14189 Huddinge, Sweden

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ABSTRACT

A great number of chemicals – many of which are hazardous to human health and the environment – are used along the complex supply chains of textiles. These complexities and hazards make knowledge for understanding chemical properties and management practices at multiple nodes central to the responsible management of textile supply chains. This study investigates the knowledge requirements of, and the knowledge strategies used by, textile procuring organisations in response to both external stakeholders and internal pressure. Based on a qualitative study of small and medium-sized Swedish textile procuring organisations, the paper describes these knowledge challenges and analyses how efforts to meet them relate to expressed commitments and capabilities for responsible supply chain management (RSCM), as well as to organisational characteristics (i.e. whether the organisation is private or public, small or large, and whether textiles is a core or peripheral activity). It was found that several textile procuring organisations expressed commitment towards achieving RSCM. However, most organisations felt that they lacked capacity to rise to the challenge. There was a poor state of knowledge regarding many chemical substances and inherent difficulties in gaining knowledge of chemical risks and how to manage these. Moreover, the input of knowledge was limited and based on only a few key sources. Such factors proved to be obstacles for procuring organisations when attempting to facilitate responsible management upstream in complex supply chains.

1. Introduction

Today, many organisations are faced with managing highly complex environmental and health risks along globalised supply chains in which buyers, suppliers and customers are widely dispersed but linked by material, capital and information flows (Crona and Parker, 2012; Karlsson, 2005; Lambert and Cooper, 2000; Seuring and Müller, 2008). The presence of hazardous chemicals in textiles is a striking example of these complexities for at least four reasons: First, textile procuring public and private organisations nowadays seldom own production facilities but, rather, employ the service of suppliers and sub-suppliers dispersed over the globe (Müller et al., 2009), a choice usually motivated by low labour costs in developing countries (Ciliberti et al., 2008). Second, the environmental and health impact of textile production is high and risks caused by the use of hazardous chemicals are evident at several steps along the supply chain (Assmuth et al., 2011). Many substances linked to fibre production (e.g. pesticides), washing (e.g. nonylphenol ethoxylates), dyeing (e.g. azo dyes) and functional additives (e.g. flame retardants, biocides, water repellents) cause significant risks. However, even more challenging from an organisational point of view is the shortage of knowledge and data on properties of most substances on the market and used in the textile sector (Assmuth et al., 2011; Boström et al., 2011, 2012a, 2012b; Scruggs and Ortolano, 2011). This is particularly so in relation to the potential combination (or 'cocktail') effects of mixtures of substances despite evidence that these may be even more problematic (Kortenkamp et al., 2009). Third, the applicable regulatory frameworks are not globally coordinated, and span from weak laws and negligent control in some, often upstream, countries, to comparatively ambitious chemical regulations closer to procuring organisations' home countries (Eriksson et al., 2010). For example, even though the EU REACH regulation has a quite strong transnational outreach, chemicals legislation in textile producing developing countries are commonly far less ambitious (Eriksson et al., 2010). Fourth, the ever and often rapidly changing nature of fashion impedes capacity to develop solid knowledge on both substances and effective legislation over time; for example, when substances like dyes are substituted from one season to another.

* Corresponding author. Tel.: +46 86084747.
E-mail address: natasja.borjeson@sh.se (N. Börjeson).

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At the same time, expectations are increasing on textile procuring organisations to assume responsibility for their supply chains. Today, many organisations are squeezed between a complex web of risks and suppliers on the one hand, and increasingly strong pressure from stakeholders for responsible supply chain management on the other (Andersen and Skjoett-Larsen, 2009; De Bakker and Nijhof, 2002; Guercini and Runfola, 2009; Kogg, 2009; Seuring and Müller, 2008). Embarking on such a route, however, gives rise to a multitude of challenges relating to e.g. the institutional and policy context, control and auditing procedures, as well as collaboration and communication with suppliers and other stakeholders (Boström et al., 2011; Locke et al., 2009). Knowledge is central for these challenges but is often limited due to a variety of factors (Boström et al., 2011, 2012a; Scruggs and Ortolano, 2011; Siebenhüner and Marlen, 2007). Despite a growing literature on knowledge management in supply chains (Marra et al., 2012), the knowledge-related aspects of responsible supply chain management of chemicals have so far not received sufficient attention, neither regarding challenges upstream and in-house, nor when it comes to the potential impact of varying characteristics, commitments and capabilities between organisations.

This article thus explores how retailers and professional users of textiles, i.e. *textile procurers*, experience and deal with knowledge-related challenges associated with responsible supply chain management (RSCM) of chemicals. It assesses how knowledge-related activities relate to variations in expressed commitments for RSCM, organisations' capabilities to pursue RSCM, and the structural characteristics of procuring organisations; i.e. whether they are private or public, small or large, and whether textiles are their core or peripheral activity. The paper is organised as follows: First, it describes the theoretical context of RSCM and related knowledge challenges (Section 2). Following an account of methods (Section 3), the paper summarises and analyses findings from interviews with actors in the field (Section 4). Conclusions and a discussion of possible avenues for improving the generation and use of knowledge on chemicals in the textile sector, as well as identify further research requirements, are presented in Section 5.

2. Theoretical context

Modern business has gone through a considerable shift as production has become outsourced and supply chains global. A well-cited and illustrative quote defines the **supply chain** as something that "encompasses all activities associated with the flow and transformation of goods from raw materials stage (extraction), through to the end user, as well as the associated information flows" (Handfield and Nichols, 1999). The construct of **supply chain management** thus considers the supply chain as one integrated entity. This broad view includes the fact that several networks of organisations – including the final procurer – are often involved in the process of production, through both up- and downstream linkages (Mentzer et al., 2001). All firms participate in supply chains, all the way from the raw materials up to the final consumer, even though the closeness of relationships along the supply chain varies (Lambert and Cooper, 2000). Organisations therefore no longer compete with each other as independent units but rather through their supply chains (Lambert and Cooper, 2000). This puts new management demands on procuring organisations since it is not sufficient to manage solely their own organisation (Seuring et al., 2008). Supply chain management literature considers e.g. that procuring organisations wanting to be successful need to intervene in the management of the network of all upstream firms that provide inputs (directly and indirectly) (Handfield and Nichols, 1999).

In this article, we apply the concept of **responsible supply chain management** (RSCM). RSCM-studies are concerned with how different management practices relate to the promotion of sustainability and how performance objectives such as health and environmental concerns are perceived and addressed. Drivers and motivations behind these aspirations, as well as key factors in supply chains that are complex, including costs, and collaboration efforts and communication difficulties, are also studied (e.g. Locke et al., 2009; Seuring and Müller, 2008). The movements of information that flow up and down the chain are frequently mentioned in this literature (e.g. Scruggs and Ortolano, 2011), but the broader concept of knowledge, which this article centres on, is not as prevalent in the analysis of responsibility and sustainability in supply chains.

Clearly, there is no single agreed upon definition and theory of knowledge (see e.g. Godfrey-Smith, 2003). It can, however, be argued that knowledge constitutes a fundamentally different and wider concept than information. Whereas information can be seen as collected and shared descriptive data (e.g. about chemicals properties as such or prevalence of substances in a material), knowledge is often depicted as what is known and acted upon by individuals, organisations etc. and includes a set of implicit and explicit types and processes of knowledge connected with 'knowing what', 'knowing how' and 'knowing why' etc. (e.g. McInerney, 2002; Snowden, 2002). In the present case, knowledge thus refers to e.g. capacity to understand and interpret data and other information on substances, and what implications that might have for RSCM. Consequently, in line with basic assumptions made in the field of **knowledge management** (e.g. McInerney, 2002; Nonako and Toyama, 2003), it can be argued that developing, sharing, and effectively using organisational knowledge are processes of central importance for reaching ambitions of responsible supply chain management. However, despite a growing body of recent studies exploring interrelations between knowledge management and supply chain management, Marra et al. (2012) conclude in a recent review that knowledge management in complex supply chains is in need of more research.

RSCM-studies acknowledge that responsibility to manage environmental and health issues needs to be shared and is dependent on cooperation and close interactions along the supply chain, even though the role of the procuring organisation as the main driver of sustainability efforts is emphasized (e.g. Boström et al., 2012a; De Bakker and Nijhof, 2002; Locke et al., 2009). The division of knowledge responsibility along a supply chain is indeed central in the case of chemicals in textiles, given the four challenges listed in the introduction. In our context, we interpret responsible supply chain management to mean "a management strategy where the procuring organisation assumes the main responsibility of striving towards implementation of health and environmental objectives along the supply chains as well as the connected information flows". Following this definition we focus on: (i) responsibility for the chemicals in textiles used and dispersed by suppliers and sub-suppliers; and we consequently (ii) view the procurer as the actor responsible for managing the information and knowledge flows up and down the supply chain, i.e. the "knowledge-driver".

Hence, several factors may influence how individual textile procurers experience and deal with knowledge-related challenges associated with responsible supply chain management (RSCM) of chemicals. In this study we focus on exploring the importance and interrelation of **organisational characteristics** (e.g. ownership and size) as well as expressed **commitment** and **capabilities**, which have been argued to be of key importance for RSCM (Locke et al., 2009). Previous studies have found that organisations need not only commitment to engage in responsible supply chain management, but also the capabilities to make these chains work (Hall, 2000). Consequently, it can be assumed that a procurer's