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A systematic literature review

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Relationship between sustainability and risk management in fashion supply chains

A systematic literature review

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Sustainability
and risk
management
in FSCs

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Abstract

Purpose – Fashion supply chain (FSC) research has identified two important issues of sustainability management and risk management. However, investigation of these issues is relatively sparse and has primarily been independent with little combinatory research, despite their important interrelationships. The purpose of this paper is to address that gap by critically reviewing extant literature to synthesise important sustainability risk issues in FSCs and proposing an empirical research agenda.

Design/methodology/approach – This paper uses a structured literature review approach and Denyer and Tranfield's (2009) context, intervention, mechanisms and outcome (CIMO) criteria for critical analysis to enable the development of future empirical research areas.

Findings – While sustainability and risk are discussed independently in the supply chain literature, combinatory discussions are very limited, despite the interdependence of these concepts. There is little substantial research on sustainability risk in global FSCs and therefore, an empirical research agenda is proposed with the four research directions to address the gap and take forward the notion of supply chain sustainability risk management in FSCs: definition; organisation and management; influence on performance; and development of a conceptual framework.

Research limitations/implications – This paper provides a critical literature review and thus lacks empirical study.

Practical implications – This paper highlights important issues in sustainability risk management for FSCs and presents an agenda for future empirical research.

Originality/value – This paper contributes by providing a combinatory synthesis of sustainability and risk management in FSC literature and an agenda for future empirical research.

Keywords Sustainability management, Supply chain management, Risk management, Fashion supply chains, Sustainability risk

Paper type Literature review

Introduction

The fashion industry has been subject to enduring criticism about its negative social and environmental impact over issues including child labour, worker exploitation and pollution (Claudio, 2007; Nagurney and Yu, 2012; Turker and Altuntas, 2014; Freise and Seuring, 2015;



Boström and Micheletti, 2016). Furthermore, the increasing trends of supply chain time compression, responsiveness and agility, and the outsourcing of production to lower labour cost countries, particularly in Asia, has increased the fashion sector's risk to natural and man-made disasters (see, e.g. Christopher and Holweg, 2011; Bradley, 2014; Mehrjoo and Pasek, 2016). Evidence suggests that business disruptions due to sustainability issues revolve around supply chains (Lee and Vachon, 2016), and with their geographic complexity and pressure for cost and lead time reduction, fashion supply chains (FSCs) are particularly susceptible to these (Hofmann *et al.*, 2014; Perry and Towers, 2013; Boström and Micheletti, 2016). Such disruptions can lead to various risks, for example financial risks due to lost sales and environmental penalties and reputational risk due to negative publicity (Lee and Vachon, 2016). It is imperative for FSCs to understand sustainability, integrate it into their strategy and ensure good management for supply chain continuity and viability to avoid disruption or business failure (Caniato *et al.*, 2012).

Risk management is of critical importance due to increased frequency of risks, longer recovery time and the focal firm's responsibility for unethical issues and any actions (or lack of) at any tier in its supply chain (Christopher and Holweg, 2011). Yet, little is known about the relationship between sustainability and risk issues in supply chains in general (Lee and Vachon, 2016), nor in volatile and unpredictable demand situations such as FSCs. It is not clear what sustainability risk is, how companies in volatile and demand-driven markets such as fashion are or should be managing it, how sustainability risk affects operational performance in FSCs and, finally, what could be an appropriate framework or typology for managing supply chain sustainability risk (SCSR). Hence, this paper responds to the call for further work on "sustainability risk" (Giannakis and Papadopoulos, 2015) by critically reviewing the extant literature to understand and synthesise sustainability and risk management in FSCs in order to shape a future research agenda. The demand for this investigation is due to the interrelationships between the two constituent parts, an overlap of concepts and measures, given the fashion industry's significant global reach in both production and demand markets (Nagurney and Yu, 2012), as well as its importance to our current way of life and economy (Giannakis and Papadopoulos, 2015).

This paper is organised as follows. The next section recaps the methods followed to conduct this systematic literature review (SLR). The third section presents the results of the critical review and highlights the important issues found in the literature. The fourth section sheds light on combinatory sustainability and risk management and the final section proposes future empirical research directions and conclusions.

SLR method

The SLR method is an evidence-based approach to identify, select and analyse the most relevant secondary data to provide a deep understanding about what is already known and to highlight gaps to suggest for future research (Colicchia and Strozzi, 2012). Its key principles (i.e. transparency, inclusivity and an explanatory and heuristic nature) allow a more objective overview of search results and reduce issues of bias and error (Denyer and Tranfield, 2009). Figure 1 shows the steps undertaken in this SLR of sustainability and risk in FSCs.

The first phase of a SLR is concerned with defining the scope of the study in conjunction with the objectives. In this study, the authors followed Colicchia and Strozzi's (2012) SLR on supply chain risk management (SCRM) and used Denyer and Tranfield's (2009) context, intervention, mechanisms and outcome (CIMO) elements as an initial framework:

- (1) context: the individuals, relationships, institutional settings or wider systems that are studied;
- (2) intervention: the effects of the event, action or activity are studied;

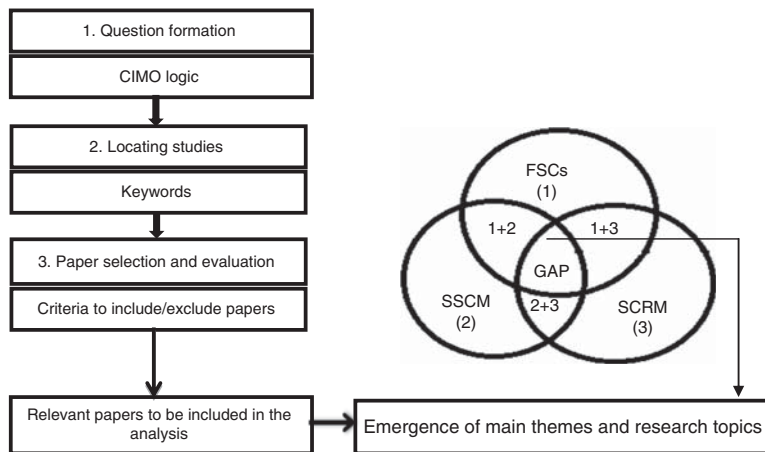


Figure 1.
Research methodology
for systematic
literature review

- (3) mechanisms: the mechanisms that explain the relationship between interventions and outcomes and under which circumstances these mechanisms are activated or not; and
- (4) outcomes: the effects of the intervention including how outcomes are measured and what are the intended and unintended effects.

Applying CIMO logic, the main emergent themes were stakeholder pressure, supply chain complexity, time-based competition and volatile demand (C), practices and tools for sustainable supply chain management (SSCM) and SCRMs (I), organisation of SSCM and SCRMs processes (M) and increased organisational performance, reputational benefits and supply chain compliance (O), as shown in Figure 1, with a resulting combinatory sustainability risk management process gap.

The second phase was concerned with identification of keywords relevant to the objectives and subject areas in order to appropriately position the study. In total, 35 keywords were identified after extensive discussions and multiple brainstorming sessions among the authors. In order to enhance face validity, initial keywords were refined by combining them into a series of search strings using Boolean logic, for example “sustainability AND/OR risk”, and “sustainability AND/OR fashion/garments/clothing”. The strings were continuously refined, resulting in approximately 26 relevant search strings which were used to search secondary data on multiple databases and select the most relevant papers overlapping the three research themes shown in Figure 1.

The third phase was concerned with identifying the most relevant database for search purposes and the time span of publications to be included in the review. We used three databases: Web of Science, ScienceDirect and Emerald Insight, as these collectively index thousands of high quality, peer-reviewed journals provide complete bibliographic data, full-length author abstracts and cited references from the most influential research, thus ensuring comprehensive and high-quality search results which can be easily organised and analysed (Colicchia and Strozzi, 2012). Similarly, by restricting the search to peer-reviewed journals, the quality control of search results can be enhanced due to the rigorous process to which articles published in such journals are subject prior to publication (Colicchia and Strozzi, 2012). Newbert’s (2007) criteria were followed for source inclusion or exclusion:

- papers published in peer-reviewed scientific journals in English;
- including the most relevant from journals in the area of business management, operations management and supply chain management;

- empirical research papers, qualitative or quantitative including theoretical papers;
- papers published in the last 16 years;
- ensuring relevance by selecting articles which contain at least one keyword in their title or abstract;
- eliminating irrelevant articles by excluding papers related to very narrow aspects or contexts;
- ensuring empirical relevance by reading all remaining abstracts; and
- ensuring empirical relevance by reading all remaining articles in their entirety.

This process enabled the authors to develop a final shortlist of 73 papers for critical review. Most academic journal papers on all three topic areas were published from 2000 (Colicchia and Strozzi, 2012; Quarshie *et al.*, 2016). Hence, the time span for this review was selected as January 1, 2000-July 31, 2017. Figures 2-4 show the yearly number of publications related to SSCM, SCRМ and SCSR, with noticeably fewer sources identified for SCSR (Figure 5).

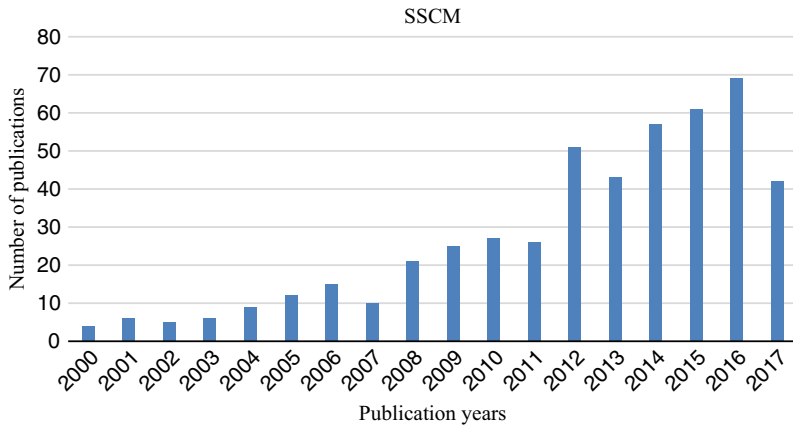


Figure 2. Yearly number of published papers on sustainable supply chain management

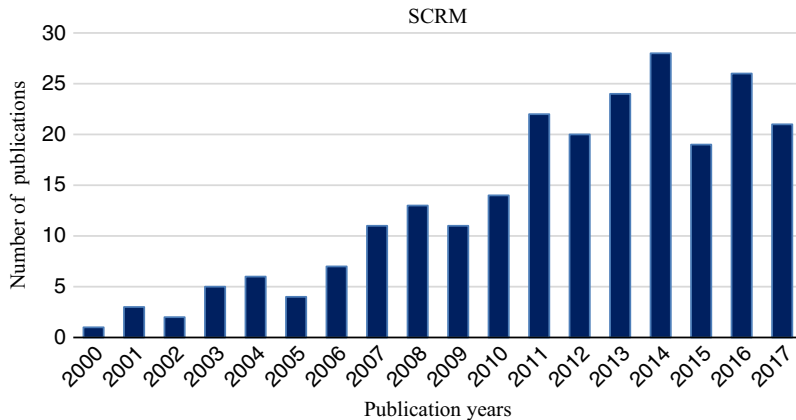
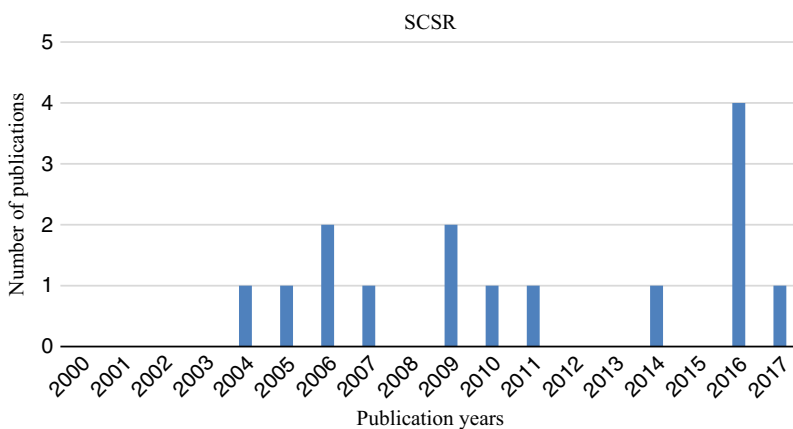


Figure 3. Yearly number of published papers on supply chain risk management



Sustainability and risk management in FSCs

Figure 4. Yearly number of published papers on supply chain sustainability risk

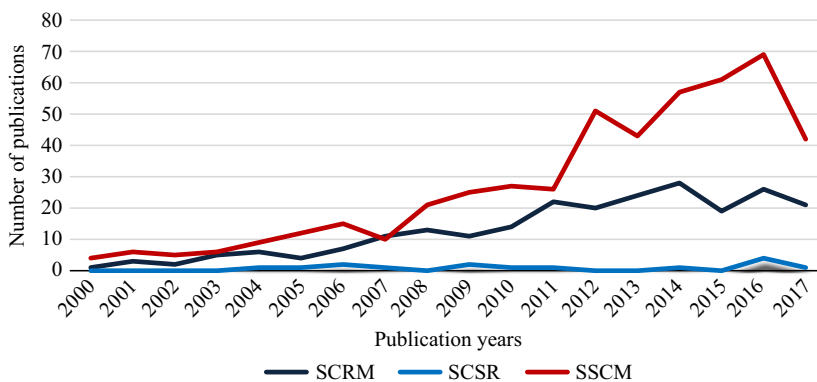


Figure 5. Yearly publication trends for SCRM, SSCM and SCSR

Table I shows key journals in the research domain within the research time span.

Based upon the criteria for the SLR, Table II shows the most important and relevant papers on sustainability risk or SCSR.

Findings

FSCs

FSCs are highly global with garment manufacturing mostly fragmented across small- and medium-sized plants mainly in Asia, and retailing traditionally concentrated in Europe, but increasingly expanding to emerging markets. They have received increasing interest in academic literature across multiple market levels including fast fashion, mid-market and luxury (Barnes and Lea-Greenwood, 2006; Brun and Castelli, 2008; Perry *et al.*, 2015; Chan *et al.*, 2017), due to their dynamic, complex and volatile nature. The fashion industry is characterised by short product life cycles, high demand volatility, low predictability and high impulse buying (Christopher *et al.*, 2004; Masson *et al.*, 2007; Macchion *et al.*, 2015). Although all fashion systems involve an element of seasonality and product obsolescence, fast fashion in particular is characterised by the constant renewal of products and scarcity in order to generate a higher consumer appetite to renew garments (Barnes and Lea-Greenwood, 2006, 2010). Fast fashion retailers such as Zara and H&M have achieved

Main domain	Most important journals in the domain
Fashion supply chains	<i>International Journal of Retail & Distribution Management</i> <i>Journal of Fashion Marketing & Management</i> <i>International Journal of Production Economics</i> <i>International Journal of Physical Distribution & Logistics Management</i> <i>Journal of Operations & Production Management</i> <i>The International Review of Retail, Distribution & Consumer Research</i> <i>European Journal of Operational Research</i>
Sustainable supply chain management	<i>International Journal of Retail & Distribution Management</i> <i>Journal of Business Ethics</i> <i>International Journal of Production Research</i> <i>International Journal of Production Economics</i> <i>Journal of Business Strategy</i> <i>Journal of Fashion Marketing & Management</i> <i>Journal of Operations Management</i> <i>Journal of Cleaner Production</i> <i>Journal of Business Logistics</i> <i>Journal of Supply Chain Management</i> <i>Supply Chain Management: An International Journal</i> <i>International Journal of Physical Distribution & Logistics Management</i> <i>International Journal of Operations & Production Management</i> <i>Journal of Industrial Marketing Management</i> <i>Journal of Retailing & Consumer Services</i> <i>European Journal of Purchasing & Supply Management</i> <i>European Management Journal</i>
Supply chain risk management	<i>International Journal of Retail & Distribution Management</i> <i>Supply Chain Management: An International Journal</i> <i>Journal of Purchasing & Supply Management</i> <i>International Journal of Production Economics</i> <i>Journal of Operations Management</i> <i>International Journal of Production Research</i> <i>The International Journal of Logistics Management</i> <i>International Journal of Physical Distribution & Logistics Management</i> <i>Journal of Operations Management</i>
Supply chain sustainability risk management	<i>Journal of Risk Management & Insurance Review</i> <i>International Journal of Production Economics</i> <i>Supply Chain Management: An International Journal</i> <i>Journal of Purchasing & Supply Management</i> <i>Journal of Logistics Research</i> <i>Journal of Fashion Marketing & Management</i> <i>Business Strategy & the Environment</i>

Table I.
Key journals in
the research domain

phenomenal growth by rapidly translating famous fashion house styles, celebrity trends and street style into new collections at competitive prices which allow consumers to constantly refresh their wardrobes. Garment manufacturing is comparatively low-tech and labour intensive with low barriers to entry (Perry *et al.*, 2015), which explains the mass trend of outsourcing of production to lower labour cost countries, resulting in long and geographically complex supply chains.

Consumer purchase decisions for fashion apparel are largely based upon want rather than need, so the timeliness of shipments and appeal of fashion content are paramount to retail success, all the more so in recent times given increasing consumer expectations of “see-now, buy-now” and the impact of social media on demand (McGregor, 2017). Fashion consumers are increasingly demanding in tastes and preferences, more fickle and unwilling to pay extra (McKinsey, 2016), so FSCs must be proactive in determining trends and being

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Title	Author(s)	Journal/year
Towards a sustainable fashion retail supply chain in Europe: organisation and performance	M.P. De Brito, V. Carbone and C.M. Blanquart	<i>International Journal of Production Economics</i> (2008)
Sustainability risk management	D.R. Anderson and K.E. Anderson	<i>Journal of Risk Management & Insurance Review</i> (2009)
Managing supplier sustainability risks in a dynamically changing environment – sustainable supplier management in the chemical industry	K. Foerstl, C. Reuter, E. Hartmann and C. Blome	<i>Journal of Purchasing & Supply Management</i> (2010)
Environmental sustainability in fashion supply chains: an exploratory case-based research	F. Caniato, M. Caridi, L. Crippa and A. Moretto	<i>International Journal of Production Economics</i> (2012)
Sustainability-related supply chain risks: Conceptualization and management	H. Hofmann, C. Busse, C. Bode and M. Henke	<i>Business Strategy & the Environment</i> (2014)
Social and environmental risk management in supply chains: a survey in the clothing industry	M. Freise and S. Seuring.	<i>Logistics Research</i> (2015)
Supply chain sustainability risk	K. Lee and S. Vachon	<i>Business Value & Sustainability</i> (2016)
Supply chain sustainability: A risk management approach	M. Giannakis and T. Papadopoulos	<i>International Journal of Production Economics</i> (2015)

Table II.
Key papers on
sustainability risk/
supply chain
sustainability risk
management

sufficiently reactive to bring them to market in a timely manner with minimum stock-keeping units in order to maximise margins during the selling window of the trend. Otherwise, retailers may incur extra inventory costs and unsold items may have to be marked down, affecting profit margin (Hartman *et al.*, 2012).

FSC management. Despite their highly complex and global nature, FSCs need to be agile and responsive to demand (Christopher *et al.*, 2004; Masson *et al.*, 2007). To achieve these performance objectives and address challenges resulting from the nature of FSCs, the literature emphasises management structures based upon close interfaces, integration and process alignment, responsive communication channels, flexibility and collaboration (Sull and Turconi, 2008; Chan *et al.*, 2017). Close interfaces and internal integration particularly among buying, sourcing, merchandising and design teams are imperative to enable fast decision making (Barnes and Lea-Greenwood, 2006, 2010) as is external supply chain agility, supplier coordination, organisational flexibility and responsiveness (Chan *et al.*, 2017; Macchion *et al.*, 2015). In the dynamic and global fashion business environment, the ability to integrate processes across the functional boundaries of a firm is considered a key to competitive advantage (Sull and Turconi, 2008; Danese *et al.*, 2013). It is important for firms to share a common goal and work in the same direction to achieve supply chain integration. Accordingly, many companies are developing long-term strategic, co-operative and collaborative relationships with networks of supply chain partners to better manage supply chain issues (Ramanathan and Gunasekaran, 2014; Perry *et al.*, 2015).

Relationships in FSCs are based largely on current market needs and aim to generate the highest margins by capturing demand in a timely manner. Requirements for smaller quantities, larger varieties and more frequent shipments encourage fashion retailers to use a large number of suppliers, therefore traditional long-term alliances and partnering relationships have been diluted (Barnes and Lea-Greenwood, 2006, 2010; Masson *et al.*, 2007; Perry *et al.*, 2015). Although retailers may source from hundreds or thousands of suppliers worldwide to maximise flexibility, a significant proportion of business tends to be channelled through a smaller number of key suppliers. Teller *et al.* (2016) noted the importance of key supplier relationships in SCM as they allow firms to achieve the advantages of responsiveness, agility, speed and ultimately profitability (Doyle *et al.*, 2006). For example, smaller orders with the possibility of in-season replenishment are preferred to

avoid risks of poor forecasting (McGregor, 2017; Hartman *et al.*, 2012; Tokatli *et al.*, 2008; Masson *et al.*, 2007). In recent times, key supplier relationships are also important for retailers to better manage social and environmental sustainability issues, and there has been a consequent shift to supply base rationalisation and greater cooperation and collaboration with key suppliers (Perry and Towers, 2013; Köksal *et al.*, 2017).

The issues above are also captured in a relatively new SCM phenomenon known as co-opetition. Co-opetition refers to a situation of simultaneous cooperation and competition (Walley, 2007), which is based on the idea that processes for value creation and sharing take place within inter-firm interdependence, resulting in a structure where both competition and cooperation are simultaneously present and interconnected. Cooperating and competing at the same time enable firms to gain both common benefits for both parties and private benefits for individual parties (Kim *et al.*, 2013); for example, via joint third-party audits for the assessment of supplier environmental and social criteria (Kovacs and Spens, 2013) or collaborative shipping (Gerdes, 2014).

Another important theme is that of power mechanisms in FSCs. As fashion retailers began to purchase more product in-season to reduce risks of inaccurate forecasting, it was anticipated that requirements for greater variety and mid-season buying would change traditional asymmetrical relationships between powerful retailers and their suppliers to become more balanced (Tokatli *et al.*, 2008). However, retailers managed to avoid a shift in power by successfully shifting risks and costs to existing or new manufacturing suppliers in different countries. Tokatli *et al.* (2008) and Perry *et al.* (2015) noted that suppliers and manufacturers undertook strategic responses to balance power and reduce their own risks. For example, suppliers sought out sub-contractors in the case of too small or too large orders in order to manage their own capacity. Other mechanisms to reduce risk include joint ventures, mergers and collaborative relationships and supplier upgrading into direct retailing, branding and marketing to balance power. However, all these increased activities have increased total risk across the entire fashion supply chain.

SSCM

SSCM has been defined as “the strategic, transparent integration and achievement of an organisation’s social, environmental and economic goals in the systematic coordination of key organisational business processes for improving the long-term economic performance of the individual company and its supply chains” (Gungor and Gupta, 1999, p. 818). The earliest notion of today’s SSCM is linked to Ayres and Kneese (1969), who discussed issues of production, consumption and externalities. Holistic sustainability comprises a triple bottom line perspective (Elkington, 1994), which consists of profit, people and planet, and aims to measure the financial, social and environmental performance of a company over time. Current thinking suggests that social and environmental sustainability should be integrated into SCM research as a whole, rather than in a separate stream of SSCM research (Pagell and Shevchenko, 2014). Moreover, sustainable practices must prioritise environment first, then society and only then financial performance (Markman and Krause, 2016). Whilst a compliance- and cooperation-focussed approach to sustainability is commendable, it is insufficiently proactive for companies to become truly sustainable (Markman and Krause, 2016). It is therefore debatable whether the concept of SSCM is merely an attempt to “paper over the cracks” in industry sectors such as fashion, where business operations involve the depletion of natural resources and lead to negative environmental externalities.

Sustainability issues in fashion. The geographic complexity of FSCs results in higher sustainability risks and pressures from social and environmental aspects, including the high use of chemicals and water in textile production, poor working conditions and human resource exploitation in garment manufacturing, carbon emissions during transportation

and increasing post-consumer textile waste (De Brito *et al.*, 2008; Caniato *et al.*, 2012; Freise and Seuring, 2015; Perry *et al.*, 2015). Sustainability issues are endemic in fast fashion systems in particular, due to the pressure on reducing cost and lead time, which can lead to unsustainable production practices including labour exploitation and environmental pollution from production and distribution activities (Turker and Altuntas, 2014). Due to fashion's global importance in terms of export volumes and number of employees, its environmental impact is significant (Caniato *et al.*, 2012). Environmental regulations and social standards in lower labour cost countries, where production often takes place, are generally lower than the retailer's home market. There are also issues of textile waste, both pre- and post-consumer. Since garments are cheaper, consumers buy more and wear them less and greater amounts of textiles end up in landfill; due to this, fast fashion may also be termed "disposable fashion" (Morgan and Birtwistle, 2009).

Benefits of and barriers to sustainability implementation. The literature suggests that SSCM leads to superior organisational performance. However, sustainability management presents unique challenges for FSC performance due to their characteristics of high resource consumption and short product life cycles. The most cited reasons for integrating sustainability into supply chains include cost and risk reductions and organisational desire or owner commitment to sustainability (Walker and Jones, 2012). Integrating sustainability can reduce the likelihood of market and sustainability risk, such as decreased demand or consumer boycotts that can create a sudden competitive disadvantage, lowers operational risks by avoiding pollution clean-ups and penalties, reduces energy and material costs and enhances relationships with multiple stakeholders (Mollenkopf, 2006; Walker and Jones, 2012). Globalisation, outsourcing, geographically longer and extended supply chains and the lack of visibility and control are some of the factors identified in the sustainability literature that impede companies' efforts to implement SSCM (Carter and Rogers, 2008; Taticchi *et al.*, 2013; Perry *et al.*, 2015).

Stakeholder influence on SSCM. Stakeholders and government policies/legislation also influence organisations to integrate sustainability in order to avoid liability. Regulatory pressure and legislation are the most cited drivers to integrating sustainability into business operations (Walker and Jones, 2012). The most important areas of legislation are regarding quantities and types of chemicals used in products, chemical waste, discharge of factory water, waste disposal, point of origin, emission and landfill tax, personal liability of directors and officers in health and safety (Anderson and Anderson, 2009). There are also increasingly stringent national regulations and laws, as seen in China's recent environmental law upgrades and its specific focus on cleaning up fast fashion manufacturing (China Water Risk, 2016). Although organisations must ensure compliance with legislation to avoid penalties, they may also incur costs in finding or developing alternatives or substitutes for products or materials that are banned by legislation (Carter and Rogers, 2008).

Although there are many sustainability initiatives, sustainability management strategies and frameworks for SSCM, Delai and Takahashi (2011) argued that the lack of global sustainability standards, indicators and regulations makes sustainability integration especially challenging in global supply chain networks. Therefore, new frameworks must be developed and adopted to organise and integrate sustainability into decision and policy-making. The implementation of existing systems cannot guarantee sustainability, but do offer guiding principles (Grant *et al.*, 2015). Consequently, many organisations and industries have developed their own codes of conduct, indicators and practices for sustainability (Perry *et al.*, 2015; Quarshie *et al.*, 2016). Albeit with some criticism over their effectiveness and adoption rates, environmental management systems and International Standards Organization guidelines are recommended for the integration of sustainability into business operations (Grant *et al.*, 2015; Ljungberg, 2007).

SSCM initiatives. SSCM activities span multiple areas of business including production planning, remanufacturing, inventory management, collecting, sorting and remanufacturing of collected goods, scheduling and control and reverse logistics issues (Taticchi *et al.*, 2013; Srivastava, 2007; Zhu and Sarkis, 2004). Designing closed-loop supply chains, extending product life cycles, substituting information for inventory, product modularity, designing for disassembly or designing for the environment are examples of innovative processes which integrate sustainability into business operations (Mollenkopf, 2006; Ljungberg, 2007). However, such efforts will increase supply chain complexity, cost and operational issues, making implementation difficult (Linton *et al.*, 2007; Caniato *et al.*, 2012). Other important questions are whether it is possible to design closed-loop FSCs, or to extend the life cycle of fashion garments, or to reuse fashion garments for alternative purposes.

Sustainable design and cleaner production have also increased in importance as a strategic tool to manage environmental, social and economic impacts of products and supply chain operations. Design has been discussed in the supply chain literature as a main tool to respond to rapidly changing market needs (Parker *et al.*, 2008), reduce product development time, improve product quality, learn and benefit from supplier technology for supply chain responsiveness, reduce cost, risks and lead times (Zsidisin and Smith, 2005; Khan *et al.* 2008). This requires designers to integrate environmental and social considerations into product design along with the traditional bottom line, while also improving product functionality (Fargnoli *et al.*, 2014). Sustainability literature also suggests cross-functional teams, close relationships and inclusion of multiple stakeholders, information sharing and collaboration with supply chain partners and early supplier involvement in design (Zsidisin and Smith, 2005; Sharifi *et al.* 2006; Walker and Jones, 2012). Ljungberg (2007) argued that sustainable product design must result in customer satisfaction in order to achieve success in the marketplace, therefore factors such as fashion and culture should be considered in sustainable product development. Sustainability credentials are not usually a key factor in fashion purchase decision making. Consumers prioritise fashion style and price, whereas eco-garments are often perceived as expensive, not readily available and lacking in fashion content, and consumers often face difficulties in accessing environmental or ethical information about garments (Joergens, 2006; Shaw *et al.*, 2006; Crane, 2016). Accordingly, retailers should identify potential market segments and develop promotional, educational and communication strategies to address the consumers' information needs. Many organisations view sustainability as a positive opportunity to build goodwill among conscious consumers, protect brand reputation and enhance brand image (Tate *et al.*, 2012; Perry *et al.*, 2015) and there is evidence to suggest the existence of consumer demand and willingness to pay more for sustainable goods and services (McKinsey, 2016; Ho and Choi, 2012).

SCRM

SCRM is "the management of supply chain risk through coordination or collaboration among the supply chain partners so as to ensure profitability and continuity" (Tang and Musa, 2011, p. 26). Risk in the context of SCM involves flow disruption, which could occur in goods, information, financial, social or institutional networks (Pfohl *et al.*, 2010). The objectives of SCRM are to support business survival, avoid delays, reduce costs, improve customer service and logistical performance, increase visibility, avoid major disasters and operational disruptions, improve relationships with multiple stakeholders, increase chances of quick recovery and enhance resilience (Faisal *et al.*, 2006; Ritchie and Brindley, 2007; Manuj and Mentzer, 2008; Pujawan and Geraldin, 2009; Pfohl *et al.*, 2010). One reason for the heightened interest in SCRM is the recent increase in high-profile unpredictable disasters over the last decade, such as terrorist attacks, wars, fires,

earthquakes, hurricanes and tsunamis (Blome and Schoenherr, 2011). Due to diverse types of risks and current global business market volatility, modern businesses are not resilient enough. This reduced resilience is due to existing supply chain structures and philosophies, increased frequency of risks and longer recovery times (Christopher and Holweg, 2011). To address this, SCRM research reports the balance of cost efficiency with agility, adaptability and alignment (Lee, 2004), supply chain re-design (Christopher and Holweg, 2011), developing structural flexibility by getting closer to the centre of gravity or reducing supply chain length (Christopher and Holweg, 2011), close relationships, information sharing (Christopher and Lee, 2004), partnerships, cooperation and collaboration with supply chain partners (Christopher *et al.*, 2011), integration of sustainability (Christopher *et al.*, 2011), designing resilient supply chains (Christopher and Peck, 2004; Peck, 2006) and planning for disruptions and contingency (Tummala and Schoenherr, 2011).

Supply chain risk issues in fashion. Supply chain trends, such as outsourcing and off-shore manufacturing, globalisation, improved infrastructure and information technology (Manuj and Mentzer, 2008) have extended supply chains into longer and complex networks. This has increased supply chain vulnerability, fragility and frequent operational disruptions making SCRM an important issue and critical challenge. The global spread of supply chains also compromises agility and responsiveness, which are considered essential to compete in modern demand-driven and volatile markets such as fashion (Masson *et al.*, 2007; Macchion *et al.*, 2015; Chan *et al.*, 2017). Particular industry factors generate further complexity in FSCs, including short product life cycles, supplier base rationalisation, buffers and inventories, increased demand for on-time deliveries, changes in consumer tastes and preferences, technology shifts and changes in supplier priorities (Masson *et al.*, 2007; Pfohl *et al.*, 2010; Caniato *et al.*, 2012; McKinsey, 2016). Supply chain structures and philosophies of lean, JIT, reduced assets and cost, streamlining flows to eliminate buffers and redundancies enabled global supply chains to be operationally efficient but substantially increased risks (Christopher and Holweg, 2011). This is because the business structures and strategies were designed under the assumptions of a stable environment which are not applicable in the modern turbulent, volatile and highly unstable business environment (Lee, 2004; Christopher and Holweg, 2011). Unpredictable and volatile demand, short product life cycles and increased use of highly complex global supply networks create greater exposure to risk in FSCs with three basic types of risks (Christopher *et al.*, 2004; Masson *et al.*, 2007). First, financial risks could arise from product obsolescence, stock-outs and mark downs. Second, chaos risks can arise from second-guessing, overreactions, unnecessary interventions, mistrust between supply chain partners and distorted information. Finally, market risks can arise from failure to identify market signals and not reacting quickly enough to meet them, which highlights the importance of agility, responsiveness and being market sensitive in order to survive and compete in a volatile and unpredictable marketplace. There are also business and brand reputation, visibility, control, disruptions, ethical, environmental and complexity risks in FSCs (Christopher *et al.*, 2004; Masson *et al.*, 2007; Caniato *et al.*, 2012; Perry *et al.*, 2015).

SCRM. Business structures and strategies designed under assumptions of a stable environment are not applicable in modern turbulent, volatile and highly unstable business environments (Lee, 2004). Christopher and Holweg (2011) suggested a move from dynamic to structural flexibility by getting closer to the centre of gravity or reducing supply chain length and designing adaptable supply chains, where performance measurement integrates flexibility, adaptability, responsiveness and agility rather than traditional accounting measures of performance based on financial parameters. Existing SCRM empirical studies do not extend to the holistic network or total supply chain level. Moreover, a major shortcoming of existing studies is a heavy reliance on financial outcomes (Christopher and

Holweg, 2011) or analysis at dyadic level or a limited number of supply chain tiers (Tang, 2006). Furthermore, the current knowledge is insufficient (Hofmann *et al.*, 2014), overly descriptive (Wagner and Bode, 2008) and underdeveloped at complex supply network level (Harland *et al.*, 2003; Masson *et al.* 2007). Although SCRM is a fairly well-developed area, it appears that risk management research in the global supply chain context, especially in a demand-driven, volatile and short product life-cycle context such as fashion is still missing.

Various frameworks for SCRM exist (Norrman and Jansson, 2004; Tang, 2006; Ritchie and Brindley, 2007; Manuj and Mentzer, 2008; Pujawan and Geraldin, 2009; Christopher *et al.*, 2011; Tummala and Schoenherr, 2011). Norrman and Jansson (2004) argued that although different researchers have proposed different stages of risk management process, these are to a large extent similar to each other. The following three main activities are found in the risk management process literature (Norrman and Jansson, 2004; Sinha *et al.*, 2004; Manuj and Mentzer, 2008; Tummala and Schoenherr, 2011):

- (1) Risk identification: identifying risk sources, triggers and drivers, for example, by looking at drivers and sources of risks and the internal and external environment of the organisation.
- (2) Risk prioritisation: risk assessment, evaluation and analysis to find out the most important risks for management. For example, by categorising them into low, medium and high risks, looking at their impact and consequences, high impact and high consequences risks will be prioritised as important risks for the management consideration.
- (3) Risk mitigation: strategies for risk treatment, handling, reduction, monitoring, control and contingency planning.

However, there is no agreed upon risk management process, nor one that has been designed in the context of FSCs, which suggests a need to explore how FSCs are managing or can manage their risks. As Giannakis and Papadopoulos (2015, p. 458) noted the “distinctive nature of sustainability-related risks”, it follows that traditional risk management frameworks may not be sufficient.

SCSR

Recent trends in FSCs confirm the connection between sustainability and risk. Extended global supply chains are more vulnerable, exposing firms to greater risk (Giannakis and Papadopoulos, 2015); for example, Nike’s child labour scandal in Southeast Asia and the Rana Plaza factory collapse in Bangladesh both resulted in serious business and brand image reputation risks (Perry *et al.*, 2015; Quarshie *et al.*, 2016). Giannakis and Papadopoulos (2015) distinguished SCSR from general supply chain risks, as the latter normally involve delay or disruption to supply (Pfohl *et al.*, 2010), whereas sustainability-related risks may well result in negative financial consequences such as fines for environmental pollution or harm to corporate reputation which could result in a loss of sales (Lee and Vachon, 2016), but not necessarily disruption or delay.

Sustainability and risk treated as separate concepts. Risk and sustainability are generally treated as separate concepts in the literature (Turker and Altuntas, 2014; Anderson and Anderson, 2009; Pagell and Wu, 2009) rather than being approached in an integrated manner, as noted by Giannakis and Papadopoulos (2015). Although attempts have been made to design or propose a framework for sustainability risk (Foerstl *et al.*, 2010; Hofmann *et al.*, 2014; Giannakis and Papadopoulos, 2015), they still treat sustainability and risk as two different concepts, and are based on either sustainability models or risk management models. Seuring and Müller (2008) suggested an SSCM framework based upon two dimensions: SSCM for sustainable products and supplier management for risks and performance.

The former focusses on sustainability aspects, the latter on risk aspects. Through analysis of nine fashion company reports, Turker and Altuntas (2014) further developed Seuring and Müller's (2008) SSCM framework. However, their model treated sustainability and risk as separate concepts. Hofmann *et al.*'s (2014) framework is questionable from an implementation perspective, as it demands two different implementation considerations: one from a sustainability perspective (stakeholders) and the other from an ordinary risk perspective (supply chain disruption).

Anderson and Anderson (2009) were the first to provide a unified discussion on SCSR management (Hofmann *et al.*, 2014). They maintained that risk-based information should be an input for sustainability decision making while sustainability-related information should be a part of the risk management process to ensure the long-term sustainability of a project. Taking a similar integrated approach, Giannakis and Papadopoulos (2015) considered supply chain sustainability to be a risk management process. They maintained Hofmann *et al.* (2014) and Anderson and Anderson's (2009) understanding of sustainability risk and developed a risk management framework for sustainability-related risks. As a holistic and combinatory concept, SCSR management is concerned with both environmental and social risks (Anderson and Anderson, 2009; Giannakis and Papadopoulos, 2015).

Conceptualisation of SCSR. Current definitions in the extant literature remain vague and do not address the precise meaning of what sustainability risk is, with most definitions simply renamed versions of sustainability issues which cause financial or reputational losses. Pagell and Wu (2009) argued that most research on SSCM involves regrouping or presenting it in another fashion rather than proposing something new, and this seems to be the case in the area of SCSR too. For example, Anderson and Anderson (2009) renamed sustainability issues as sustainability risk, but did not explain whether sustainability risk is something new or a re-naming of sustainability issues, and Hofmann *et al.* (2014) criticised their aggregation of dissimilar and non-relevant risks into the category of sustainability risk. However, Hofmann *et al.* (2014) overlooked the multiple understandings and meanings of the theoretical concepts of sustainability and risk. Lee and Vachon's (2016, p. 251) definition of SCSR focusses on the reputational losses that may result from upstream supplier practices: "poor sustainability practices in an organization's supply network (upstream) that generates a harmful stakeholder reaction leading to a potential reputation loss for that organization". However, as well as reputational risk for the lead firm that arises from poor sustainability practices in upstream suppliers, there is also a risk of disruption to the supply chain in terms of lead time delay, which could be critical in the case of fast fashion product, and could culminate in real financial risk. For example, during Bangladesh riots in 2010, fashion retailers faced delays to shipments as factories were shut down (Rushton, 2010). Furthermore, in the case of environmental sustainability in particular, poor practices upstream could lead to a financial risk for the lead company in terms of environmental penalties or fines. Hofmann *et al.* (2014) argued that ordinary supply chain risks are triggered by disruptions, whereas a sustainability risk must be based upon critical stakeholders' reactions. This argument contradicts the sustainability characteristics of longevity, continuity and viability noted by Grant *et al.* (2015), which implies that sustainability risk does not have to be based upon critical stakeholders' reactions; rather, ordinary risks can jeopardise continuity, longevity and viability of supply chains. Hofmann *et al.*'s (2014) proposed definition of sustainability risk as "a condition or a potentially occurring event that may provoke harmful stakeholder reactions" (p. 168) is largely based upon a cause and effect understanding of risk, whereas risk is also a subjective phenomenon.

There is also inconsistency in existing definitions regarding the dimensions of sustainability. Giannakis and Papadopoulos (2015, p. 456) referred to the triple bottom line in their conceptualisation of SCSR as "the integrated management of [...] supply chain risks that are related to the natural environment, the society and the viability of the firm".

However, Hofmann *et al.*'s (2014) conceptualisation of sustainability focusses on three elements (social, ecological and ethical), but ignores the economic dimension. Similarly, Freise and Seuring (2015) focussed on clothing supply chains in their investigation of drivers and motivators for SCSR management, but considered social and environmental dimensions rather than taking a triple bottom line approach.

Narrow focus on sourcing and supplier practices. Given the increase in reports of supplier sustainability misconducts in recent years (Hajmohammed and Vachon, 2016) and the mass trend to outsourcing in many consumer goods industries, much of SCSR relates to the behaviour of supply chain partners. According to Christopher *et al.* (2011) sustainability risk refers to increasing vulnerability across the chain due to the negative impacts of global sourcing on economic, social and environmental sustainability. Foerstl *et al.* (2010) were the first to provide a framework for managing supplier-related sustainability risk (Hofmann *et al.*, 2014). But Hofmann *et al.* (2014, p. 163) argued that this SCSR management framework was "not based on an analysis of how these risks materialize as losses" and proposed their own sustainability-related supply chain risks management framework, which seems more suitable for supplier-related issues of sustainability and risk and their impact on company performance, rather than a supply chain wide focus. Furthermore, their selected case companies were not operating in such a volatile and unpredictable demand situation as FSCs. Giannakis and Papadopoulos (2015) took a wider approach and provided examples of environmental, social and financial risks across the chain, not only those relating to upstream suppliers.

Overall, there remains a lack of any SCSR management framework or typology for researchers to conduct further empirical exploration/investigation and for corporations to use as a guiding template to implement or benchmark their efforts. Hence, an investigation of SCSR in context of agile, responsive and demand-driven supply chains is needed to provide a well-grounded conceptualisation and materialisation of SCSR, leading to a proper strategic framework that can enable actors in volatile and unpredictable demand situations, such as FSCs, to manage SCSR in order to survive and compete globally. Next, four research directions are proposed to inform both researchers and practitioners in this important and growing area.

Identifying research directions and conclusion

The purpose of this paper is to investigate the relationship between two important issues in FSCs: sustainability management and risk management. A structured literature review was undertaken with Denyer and Tranfield's (2009) CIMO criteria for critical analysis in order to develop and justify future research areas. This review found that combinatory investigation of these issues is relatively sparse and has primarily been independent, despite their important interrelationships. Consequently, this paper addressed that gap by critically reviewing the extant literature to synthesise important sustainability risk issues in FSCs and by proposing a research agenda for future empirical work.

Focussing on three areas of FSCs, sustainability management and risk management, our SLR identified the most important issues in FSCs to be: introduction of fast fashion as a new phenomenon and a new business model, management structure, relationships, co-opetition and power mechanisms in FSCs. Due to globalisation, outsourcing, off-shore manufacturing and fashion characteristics of demand volatility and unpredictability, impulse buying, short product life cycles, agile and responsive supply chains are required but may result in unsustainable practices which have been exposed by NGOs and the media. Recent scandals have magnified the already persistent issues of sustainability and hence further increased risks in FSCs. However, there appears to be a little novelty in the SSCM literature other than assembling already existing sustainability management guidelines, with the existing

literature providing a limited discussion on a unified concept of sustainability risk. Carter and Easton (2011) identified a lack of conceptual theory development in SSCM literature, and similarly, comprehensive SCSR management processes and strategies are still missing in the supply chain literature.

Our proposed research agenda highlights four important issues to address for the effective and efficient management of sustainability risks in FSCs. First, definitional issues need to be resolved and a common definition, at least in the FSC context, needs to be delineated. Conceptual understanding and an agreed upon definition is vital to develop SCSR management strategies for a particular type of supply chain.

Second, in terms of organisation and management, empirical research should determine why FSCs might not be able to manage their sustainability and/or risks, and what motivates and/or impedes them to integrate sustainability into their operations and manage their risks. This is necessary in order to suggest effective and targeted solutions or strategies, as existing sustainability management and risk management motives, barriers and strategies have not yet been explored in the context of FSCs.

Third, various factors determine organisational performance and sustainability management and risk management impacts organisational performance in different ways. However, it remains unclear how a combinatory concept of sustainability risk impacts on the organisational performance of FSCs. This is essential for the development of a true, combinatory framework to provide guidance for organisations to operate efficiently in a sustainable and less risky environment.

Fourth, extant research has not yet proposed any framework or typology to manage sustainability risk in volatile and unpredictable demand situations, such as FSCs. Existing SSCM frameworks do not fully integrate the triple bottom line concept of sustainability, and treat risk and sustainability as two distinct concepts. For example, Seuring and Müller (2008) suggested a SSCM framework based upon two dimensions with one focussing on sustainability aspects and the other on risk aspects. Turker and Altuntas (2014) further developed Seuring and Müller's (2008) framework, but their model also treated sustainability and risk as separate concepts, and did not adopt a supply chain wide focus. Similarly, various frameworks for SCRM exist (Norrman and Jansson, 2004; Tang, 2006; Ritchie and Brindley, 2007; Manuj and Mentzer, 2008; Pujawan and Geraldin, 2009; Christopher *et al.*, 2011; Tummala and Schoenherr, 2011). However, Norrman and Jansson (2004) argued that although different researchers have proposed different stages of risk management process, these are to a large extent similar to each other. There is no agreed upon risk management process in the literature and no existing risk management processes have been designed in the context of FSCs, suggesting a need to explore how FSCs are managing or can manage their risks. In terms of SCSR, Hofmann *et al.*'s (2014) framework is questionable from an implementation perspective as it demands two different implementation considerations: one from a sustainability perspective (stakeholders) and the other from an ordinary risk perspective (supply chain disruption). Giannakis and Papadopoulos (2015) adopted Ritchie and Brindley's (2007) risk management framework and applied it in the context of "sustainability risk", but also suggested that traditional risk management frameworks may not be sufficient. Therefore, we argue that there is still need for a more grounded framework or typology for SCSR management in FSCs.

In summary, we argue that the existing literature provides a limited discussion on a unified concept of sustainability risk. Furthermore, the absence of a definition, conceptualisation and SCSR management framework for volatile and unpredictable demand situations, such as FSCs justifies an empirical investigation to develop a framework of strategies that can help FSCs to manage their sustainability risks in order to survive and compete globally. Table III summarises the identified research gaps.

Extant literature themes and key papers	Current research gaps	Future research questions
Definition of sustainability risk: Anderson and Anderson (2009) Christopher <i>et al.</i> (2011) Hofmann <i>et al.</i> (2014) Giannakis and Papadopoulos (2015) Lee and Vachon (2016)	The literature still treats sustainability and risk as two different concepts Definitions are vague and do not really explain what SR is about Most definitions are just a re-naming of sustainability issues which cause financial or reputational losses	What is an appropriate definition of SCSR in general and for fashion chains specifically?
How organisations manage or should manage sustainability and risk issues: <i>Sustainability issues:</i> Claudio (2007) De Brito <i>et al.</i> (2008) Carter and Rogers (2008) Carter and Easton (2011) Caniato <i>et al.</i> (2012) Freise and Seuring (2015) Perry <i>et al.</i> (2015) Boström and Micheletti (2016) Köksal <i>et al.</i> (2017) <i>Risk issues:</i> Norrman and Jansson (2004) Faisal <i>et al.</i> (2006) Ritchie and Brindley (2007) Manuj and Mentzer (2008) Blome and Schoenherr (2011) Christopher and Holweg (2011) Tang and Musa (2011) Tummala and Schoenherr (2011) Colicchia and Strozzi (2012) Mehrjoo and Pasek (2016)	Lack of knowledge, especially for fashion supply chains, on how sustainability management and risk management can be integrated into business operations as a unified concept Lack of knowledge on how fashion supply chains could integrate sustainability management and risk management into their operations Lack of knowledge on how fashion supply chains can manage or are managing sustainability and risk issues Lack of knowledge on why fashion supply chains might not be able to manage their sustainability and risk issues, and what motivates and/or impedes them to integrate sustainability management and risk management into their operations as a unified concept	How should and how do organisations in fashion supply chains manage SCSR?
Factors which affect operational performance of supply chains (including fashion supply chains): Christopher <i>et al.</i> (2004) Lee (2004) Zhu and Sarkis (2004) Sharifi <i>et al.</i> (2006), Masson <i>et al.</i> (2007) Brun and Castelli (2008) Tokatli <i>et al.</i> (2008) Khan <i>et al.</i> (2008) Barnes and Lea-Greenwood (2010) Hartman <i>et al.</i> (2012) Taticchi <i>et al.</i> (2013) Danese <i>et al.</i> (2013), Ramanathan and Gunasekaran (2014) Turker and Altuntas (2014) Macchion <i>et al.</i> (2015) Teller <i>et al.</i> (2016) Chan <i>et al.</i> (2017)	Lack of knowledge on how a combinatory concept of SCSR affects the operational performance of FSCs It remains uncertain which factors of a combinatory SCSR management affects the operational performance of fashion supply chains	How SCSR does affects operational performance in fashion supply chains?

Table III.
 A research agenda for supply chain sustainability risk management

(continued)

Extant literature themes and key papers	Current research gaps	Future research questions
Framework/typology development for sustainability risk: Foerstl <i>et al.</i> (2010) Hofmann <i>et al.</i> (2014) Giannakis and Papadopoulos (2015)	They still treat sustainability and risk as two different concepts They are based on sustainability models or risk management models Lack of SCSR management framework or typology for researchers for further exploration/ investigation and for organisations to use as a guiding template to implement or benchmark	What could be an appropriate framework/typology for SCSRM?

Table III.

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