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Mohammad J. Aladaileh

Universidad de Salamanca

E-mail: aladaileh.mohd@usal.es

Eva Lahuerta Otero

Universidad de Salamanca

E-mail: eva.lahuerta@usal.es

Los antecedentes del SSCI: Evidencias de la industria Textil y de la moda en Jordania

Resumen

Este estudio evaluó los factores que contribuyen a la innovación de la cadena de suministro sostenible (SSCI) y desarrolló un marco conceptual y empírico para la innovación sostenible en las cadenas de suministro (SC) de textiles y moda (T&F). La investigación encontró que, si bien las presiones externas no tienen un impacto significativo en el SSCI, tienen un impacto significativo en la orientación estratégica y los factores de capacidad interna. Además, el estudio reveló que la orientación estratégica afecta los factores de capacidad interna. El estudio sugiere que las presiones externas, como el contexto político, los mercados y el desarrollo tecnológico, pueden actuar como catalizadores para el manejo de materias primas, el suministro de materiales y recursos y el impulso de la SI. El estudio también enfatiza la importancia de los esfuerzos de colaboración internos y externos para encontrar nuevas oportunidades de innovación. El estudio concluye que la combinación de presiones externas, orientación estratégica y factores de capacidad interna requiere un modelo completo e integrado para abordar SSCI. Sin embargo, el estudio reconoce que, SI es complejo y desafiante, y se necesita más investigación para desarrollar más y probar el modelo. En términos de contribución a la teoría, este estudio ofrece un modelo completo e integrado, que combina presiones externas, orientación estratégica y factores de capacidad interna para abordar SSCI. El estudio también proporciona un marco para los profesionales en prácticas de desarrollo sostenible, SC, técnicas SI y economía circular para más pruebas, uso y desarrollo. Además, fomenta la necesidad de categorizar los factores SSCI y definir sus relaciones, gestionar el impacto potencial más sustancial y facilitar la traducción de la innovación sostenible en la práctica para las partes interesadas.

Palabras clave: Innovación sostenible en la cadena de suministro, desarrollo sostenible, gestión de la cadena de suministro, capacidad organizativa, marketing de influencia

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The antecedents of SSCI: Evidence from the Textile and fashion industry in Jordan

Abstract

This study evaluated factors contributing to Sustainable Supply Chain Innovation (SSCI) and developed a conceptual and empirical framework for sustainable innovation in textile and fashion (T&F) Supply Chains (SCs). The research found that while external pressures do not significantly impact SSCI, they significantly impact strategic orientation and internal capacity factors. Additionally, the study revealed that strategic orientation impacts internal capacity factors. The study suggests that external pressures such as political context, markets, and technological development can act as catalysts for handling raw materials, supplying materials and resources, and driving SI. The study also emphasizes the importance of internal and external collaborative efforts in finding new opportunities for innovation. The study concludes that combining external pressures, strategic orientation, and internal capacity factors require a comprehensive and integrated model to approach SSCI. However, the study recognizes that SI is complex and challenging, and more research is needed to develop further and test the model. In terms of contribution to theory, this study offers a comprehensive and integrated model, which combines external pressures, strategic orientation, and internal capacity factors to approach SSCI. The study also provides a framework for practitioners in sustainable development practices, SCs, SI techniques, and circular economy for further testing, use, and development. Additionally, it encourages the need to categorize SSCI factors and define their relationships, manage the most substantial potential impact, and facilitate translating Sustainable innovation into practice for stakeholders.

Keywords: Sustainable supply chain innovation, sustainable development, supply chain management, organizational capability, market influence

JEL Classification: M14; Q01; Q55; L67

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THE ANTECEDENTS OF SSCI: EVIDENCE FROM THE TEXTILE AND FASHION INDUSTRY IN JORDAN

Mohammad J. Aladaileh

Departamento de Administración y Economía de la Empresa

Área de Comercialización e Investigación de Mercados

Universidad de Salamanca

Patio de Escuelas, s/n 37008 Salamanca

aladaileh.mohd@usal.es

Eva Lahuerta Otero

Departamento de Administración y Economía de la Empresa

Área de Comercialización e Investigación de Mercados

Universidad de Salamanca

Patio de Escuelas, s/n 37008 Salamanca

eva.lahuerta@usal.es

1. INTRODUCTION

Sustainable innovation (SI) challenges require complete SCs and networks to drive change and innovation. Organizations have begun integrating sustainability into SCs and operations in response to government pressures, market and consumer influence, technological development, and innovation (Nilsson & Göransson, 2021; Tebaldi et al., 2018; Gao et al., 2017; Skalkos, 2022). As a result, organizations and groups have had to rethink their strategic directions, technologies, internal practices, and business models. Sustainable production is a crucial component of sustainability with a focus on SI; SI is a modified or new practice in production techniques and organizational systems to reduce environmental damage and achieve more remarkable economic and social performance (Neutzling et al., 2018; Tebaldi et al., 2018; Brun & Ciccullo, 2022; Akintokunbo et al., 2022). SI helps organizations undertake sustainability issues in manufacturing; however, organizations do not find this easy when implementing SSCI due to many challenges and barriers to innovation (Gupta et 2020). Consequently, developing a practical strategic orientation is necessary to establish a clear path toward organizational capabilities and practices.

Thus, this study examines how external pressure factors (political context, market influence, technological development, and innovation) impact strategic orientation and internal capacity factors (organizational capabilities and practices) in achieving SSCI in T&F SCs in Jordan. Studies that link SSCI drivers and their relationship to strategic orientation and internal capacity factors are still needed (Tebaldi et al., 2018; Nilsson & Göransson, 2021; Sehnem et al., 2022; Skalkos, 2022). This study better understands the relationships and suggests approaches and strategies deal with them and influence innovation goals in a sustainable SC. More specifically, the study proposes a conceptual framework that assumes the impact of external pressures on strategic orientation and the organization's internal factors in the SC as drivers to achieving SSCI. This study provides practical information on applying this model in a developing economy. We conducted this study in T&F SCs in Jordan, where this sector is growing faster, and economic analysts expect even more significant growth in the future. The establishment of the Qualifying Industrial Zones (QIZs), the Free Trade Agreement between Jordan and the United States, the Greater Arab Free Trade Agreement, the Euro-Mediterranean Agreement, and the simplification of rules of origin have contributed to this growth (JSF.org, 2021). QIZ's gross outcome also depends mainly on textile manufacturing as it became one of the top 5 exporting sectors in Jordan in the 1990s and contributed 7.74% of the total Gross Value Added

(GVA) of the industrial sector in 2021 (JSF.org, 2021). The high performance of this sector has made Jordan a worldwide competitor in the T&F industry. This empirical study will provide information to management to help the industry manage SSCI investigation pathways.

Based on the above, the study investigates how external pressure factors (political context, market influence, technology development, and innovation) impact strategic orientation and internal capacity (organizational capabilities and practices) to achieve the SSCI. Environmental issues' significance in today's SCs steers researchers and practitioners to root theory and practices on SSCI (Assis et al., 2022; Yuan et al., 2022). Therefore, the motives of this paper focus on developing and empirically testing a conceptual model from data from the T&F industry. It is necessary to focus on the internal and external factors that affect the innovation of sustainability of SCs in the leading textile industry in Jordan, which has already begun to take an interest in sustainability innovations within its SCs.

Finally, SSCI is crucial to achieving sustainability in the T&F industry. External pressure factors such as political context, market influence, technological development, and innovation significantly impact organizations' strategic orientation and internal capacity factors in achieving SSCI. This study aims to examine these relationships and provide practical approaches and strategies for organizations in Jordan's T&F industry to manage and implement SSCI. The proposed conceptual framework can be applied in a developing economy and provide valuable insights for managers and policymakers to improve sustainability in the T&F SC. This study contributes to the existing literature by examining the relationships between external pressure factors and internal capacity factors in achieving SSCI in a specific industry and economy.

Section 2 of this paper introduces the theoretical background and research model, section 3 clarifies the methodology, section 4 displays the results of the empirical study, and finally, section 5 delivers the discussion and conclusion.

2. THEORETICAL BACKGROUND AND RESEARCH MODEL

Sustainability is a driver of organizational innovation in SCs, and organizations in industrial SCs embrace innovation in response to external, political, market, and technology pressures (Laukkanen & Patala, 2014; Bai et al., 2017; Bai et al., 2019; Gupta & Barua, 2017; Aggrey et al., 2022). Furthermore, innovation helps respond to negative influences, especially from a

social and environmental perspective (Koberg & Longoni, 2019; Greenland et al., 2018; Solaimani & Van der Veen, 2022). SI helps reduce social and environmental impact; according to Greenland et al. (2018), it helps improve the social image, reduce operational costs and profits, and increase market share. On the environmental side, SI helps improve raw materials and returns and reduces costs. Kiefer et al. (2019) argue that companies do not consider social and ecological factors as part of their products and innovations, which results in the transfer of risks to customers and the loss of their business.

The SCs of T&F companies in Jordan require more effective policy frameworks to guide and direct their innovation processes (Al-Maaytah, 2018; Diab et al., 2015), as current strategies cannot address and overcome external pressures when trying to innovate (Diab et al., 2015). Successful innovation depends on the organization's ability to understand the political context in which the organization(s) operate, market conditions and impact, technological development, and innovation (Gliedt et al., 2018; Ripanti & Tjahjono, 2019; Blomsma & Brennan, 2017; Engelseth et al., 2021). Companies need to identify and recognize these pressures to chart their strategic orientation, reflected in their organizational capabilities and internal and external practices.

Most studies in SCs focus on barriers to environmental innovation; however, they do not consider the context of organizations. Many SCs focus on defensive measures against market pressures, technological development, or market influence (Gupta & Barua, 2017; Cecere et al., 2018; Arranz et al., 2019; Hueske et al., 2017). Moreover, most organizations within SCs need to take social and environmental factors seriously and build specific strategies to overcome external pressures. Textile manufacturers contribute to ecological degradation (Li et al., 2019; Shen et al., 2017; Thorisdottir & Lara, 2020; Salma et al., 2021). However, the industry needs to receive sufficient attention from researchers in developing strategies to respond to political context, market influence, technological development, and innovation, or even responding to the pressures of SI.

Numerous T&F SCs in Jordan need a more robust strategic orientation that includes specific action plans to help them face SI pressures and challenges. This study provides a systematic framework for response and assists managers in prioritizing strategic direction and internal factors such as organizational capabilities and practices.

This research is justified by the lack of studies that comprehensively identify the factors for achieving SC sustainability innovation for textile manufacturing organizations in the Qualifying Industrial Zones (QIZs) in Jordan. Ready-made garment manufacturers contribute 7% of Jordan's GDP (dos.gov.jo), but they are primarily responsible for sustainability issues and the environment due to emissions and pollution. Jordan ranks 23rd globally on the Environmental Pollution Index (www.jordantime.com) with the highest global level of environmental pollution, according to Nimbeo.com. Jordan faces an increased risk of air pollution and the inaccessibility of drinking water, increased chances of dissatisfaction with the disposal of garbage and dirt, and other risks due to noise, industrial waste, and transportation. Concentrating on this sector by focusing on factors to achieve SSCI is one way to advance the sustainable development agenda in the Jordanian economy.

2.1. Sustainable Supply Chain Innovation

According to Bocken et al. (2014), innovation includes new and significantly improved products (goods or services); it may consist of new marketing methods or new organizational techniques in business practices and can be widely applied and disseminated in business practice. Innovation may include product or process innovation (Barth et al., 2017; Gold et al., 2010; Salma et al., 2021; Aggrey et al., 2022), organizational and managerial innovations (Porter & Ketels, 2003; Schiederig et al., 2012; Neutzling et al., 2018), and business model innovations (Nair et al., 2016; Kusi-Sarpong et al., 2019). Some view innovation as entrepreneurial activities that lead to new products and processes (Adams et al. (2015), new organizational forms (Govindan and Hasanagic (2018), the opening of new markets (Geissdoerfer et al., 2018), new sources of supply (Tebaldi et al., 2018; Adams et al., 2016). SSCI is an emerging field both in research and practice. There is a clear need for theory building to guide further research and the development of actionable models by practitioners for testing, use, and development. Gao et al. (2017) confirm that innovation that leads to a balanced performance of the SC's economic, social, and environmental dimensions is considered SSCI. Tebaldi et al. (2018) indicate that SI highlights stakeholders' internal, environmental, and broader integration as critical success factors for achieving SI.

Several researchers indicated that sustainability-oriented innovations go through three stages: operational improvement, organizational transformation, and finally, radical systemic innovation (Tebaldi et al., 2018; Geissdoerfer et al., 2018; Kusi-Sarpong et al., 2019). This

revolutionary innovation aims to transform existing societal relationships, interactions between industry, consumer behavior, life patterns, institutional orientations, and even business goals (Adams et al., 2015). Additionally, several researchers have pointed out that SSCI should focus on technological, social, and organizational innovations if a qualitative leap in sustainability is to be achieved (Azevedo, 2014; Lim & Sonko, 2019; Govindan & Hasanagic, 2018; Engelseth et al., 2021; Wong & Ngai, 2022).

Based on the above, SSCI is about innovations made in the SC context and explicitly covers all three pillars of sustainable development (economic, social, and environmental). All three dimensions have positive, innovative performance. The economic dimension is still prevalent in most SI research, and most practitioners consider it the basis of competitive economics (Kusi-Sarpong et al., 2019; Geissdoerfer et al., 2018). In contrast, innovation is evolving to include social and environmental considerations due to the increasing demand for resources and the growing pressures to decouple economic growth from natural resources (Whetten, 1989; Tebaldi et al., 2018). The literature on SI is still within the company's context. Few studies have discussed it at the level of the SC, knowing that SCs that have developed a methodology for innovative cooperation across the SC have achieved successful innovative solutions (Govindan et al., 2016; Nair et al., 2016; Tebaldi et al., 2018; Salma et al., 2021; Assis et al., 2022). Overall, it is essential to consider the context and external pressures organizations face when implementing SSCI to address and overcome these challenges effectively.

2.2. Model development and hypothesis

Several studies (e.g., Gao et al., 2017; Klewitz & Hansen, 2014; Govindan & Hasanagic, 2018; Liu et al., 2022) have highlighted the development of new models to facilitate SIs in the SC. This paper aims to build a model to assess the importance of internal and external factors in achieving SSCI. Based on the literature review, we classified factors that lead to SSCI into two categories: external factors, which include a political context (Voss & Voss, 2000; Beske et al., 2014; Hsu et al. (2016), market influence (Rodriguez & Da Cunha, 2018; Davila et al., 2006; Verghese and Lewis (2007), technological development and innovation (Su et al., 2016; Wang et al., 2018; Su et al., 2016), and these factors are later referred to as external pressures. The second category, internal factors, includes organizational capabilities (Dewick & Foster, 2018; Gualandris & Kalchschmidt, 2014; Yang et al., 2015; Brun & Ciccullo, 2022; Tebaldi et al., 2018) and internal and external practices (Sarkis et al., 2011; Schiederig et al., 2012; Klewitz

& Hansen, 2014), and later referred to as internal capacity factors of the SC. Many studies (e.g., Karakaya et al., 2014; Rodriguez & Da Cunha, 2018; Whalen, 2012; Dev & Shankar, 2016; Nari et al., 2016) have identified several factors for achieving SSCI, such as collaboration, culture, timing, power balance, sharing of costs and revenues, in addition to training and learning, and finally, governance. In this study, the proposed model integrates these factors within the internal capacity factors under organizational capabilities and practices. The focus is on the different areas of innovation in practice to give a holistic view of the essential factors and develop improved guidelines for achieving SI in the SC.

Researchers recognize macroeconomic and policy factors as the most significant barriers that make SI difficult (Lee et al., 2014; Tebaldi et al., 2018; Skalkos, 2022; Gupta et al., 2020). There is a significant focus on industry and regulatory barriers such as market influence, technological development, and innovation (Gao et al., 2017). Responding to external pressures requires the SC to have a strategic orientation that aligns with the nature of these pressures (Gao et al., 2017; Tebaldi et al., 2018). Strategic orientation represents the organization's goals driven by top management and directs the internal and external organizational capabilities and practices within the SC (Rodriguez & Da Cunha, 2018; Neutzling et al., 2018). Adopting and practicing new ideas requires appropriate organizational capabilities (Rodriguez & Da Cunha, 2018; Dewick & Foster, 2018). Therefore, strategic SC orientation helps support innovation and enhance environmental reputation, disseminating sustainable SC initiative programs.

An integrated approach, dynamic partnerships, and strong leadership are necessary to effectively respond to external pressures and integrate sustainability goals into organizational capabilities and practices at the SC level (Russell et al., 2018; Bendavid & Cassivi, 2012). These external pressures are the main drivers of corporate decisions to integrate sustainability goals into organizational capabilities and practices at the SC level. Additionally, a strategic orientation toward sustainability supports organizational capabilities, systemic behavior, and culture toward strengthening relationships between partners, the flow of goods and information, and sustainability issues (Dewick & Foster, 2018; Tebaldi et al., 2018).

Innovation for sustainability must take into account organizational capabilities such as culture, behaviors, and standards (Fawcett et al., 2017) and consider organizational capabilities as a mediating factor in the relationship between external pressures and SI (Zailani et al., 2015; Razak et al., 2016; Sehnem et al., 2022). To achieve common sustainability goals, there must

be significant interactive activities between partners in the SC (Dev & Shankar, 2016). Implementing green and ethical practices leads to higher innovation (Nair et al., 2016; Fawcett et al., 2017). Overall, it is essential to consider the role of organizational capabilities and partnerships in achieving SI in the SC.

Among the factors that also require a strategic response are the big data from markets and predictive analytics applications on market impact, technology development, and innovation (Rodriguez & Da Cunha, 2018; Neutzling et al., 2018). For example, technological development and the digitization of organizations in most industries contribute to rethinking operations, business models, and product portfolios (Su et al., 2016; Nair et al., 2016). Customer pressure on organizations to engage in sustainable practices drives strategic SC directions (Dewick & Foster, 2018; Gualandris & Kalchschmidt, 2014). Also, the demands of consumers and NGOs for environmentally friendly offerings are putting tremendous pressure on companies to embrace SI (Neutzling et al., 2018). However, the market impact of SSCI could be more noticeable because of its complexity, and the market may need to recognize the need for innovation or SI that takes market impact as a radical innovation (Verghese & Lewis, 2007; Miller & Buys, 2013). It is concluded that political context and actions must impose sustainability measures on the company or the SC in response to market impact (Adams et al., 2015; Ripanti & Tjahjono, 2019).

We constructed a conceptual model based on the importance of factors and their impact on SSCI (see Figure 1). The model guides a transition to a sustainable circular model within the context of a SC, considering the social, environmental, and economic dimensions. It also assumes that strategic orientation, internal capacities, and capabilities are central mediators of sustainable transitions and support the shift from linear to circular sustainable SCs. This model views SSCI's influencing factors as non-separate and considers a system in which different activities are carried out.

The SSCI journey begins with understanding changes in the external environment, such as the political context, market influence, technological development, and innovations. These factors are sources of inspiration for strategic thinking, dealing with raw materials, supplies of materials, and other necessary resources. External changes also push companies to reinvent products, product and service portfolios, and business models, driving market demands and technological breakthroughs toward spurring innovation and creating new opportunities.

Finally, strategic orientation underpins organizational capabilities and practices that facilitate actions and investments to achieve SI.

Based on the above discussion and the assumed conceptual model, researchers can formulate the following hypotheses:

H1: External pressure factors will directly impact achieving SSCI.

H2: External pressure factors will directly impact the SC's strategic orientation.

H3: External pressure factors will directly impact the SC's internal capacity factors (organizational capabilities and practices).

H4: Strategic orientation will directly impact the SC's internal capacity factors.

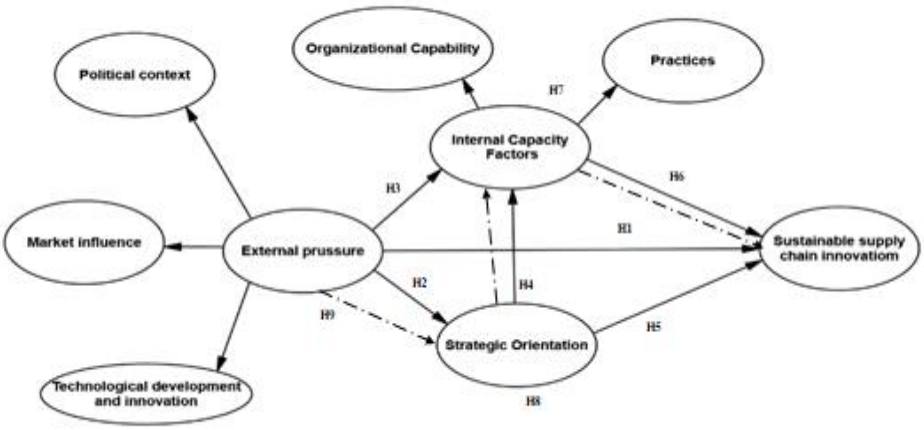
H5: Strategic orientation will directly impact achieving SSCI.

H6: Internal capacity factors will directly impact achieving SSCI.

H7: Internal capacity factors (organizational capabilities and practices) will mediate the relationship between external pressures and SSCI.

H8: Strategic orientation will mediate the relationship between external pressures and SSCI.

Figure 1. The proposed conceptual model



3. METHODOLOGY

This study is based on previous theoretical literature that has explored SSCI factors using qualitative methods (e.g., Nilsson & Göransson, 2021; Tebaldi et al., 2018; Gao et al., 2017; Skalkos, 2022. The literature reviewed suggests that these factors can significantly impact the SI of the SC in specific industries, which in turn can impact the environment, society, and economy. However, many previous studies call for further empirical research to obtain more accurate results. The current study aims to address this gap by empirically measuring the impact of the factors identified in the literature on the SI of the SC in a specific industry known to impact the environment, society, and economy significantly.

3.1. Sampling, Sample properties and data collection

The researcher used a survey instrument to collect data from operationalizing and validating constructs using reliable measures from the literature (See Appendix 1). The researcher also engaged a group of 7 industry experts and textile manufacturing SC and management researchers in SCs to evaluate the content and validity of the study, as well as to ensure that the scope of formulations was appropriate. Additionally, a pilot study was conducted on 41 Jordanian T&F managers to verify the consistency, convergent and discriminant validity, composite reliability, and loading coefficients of the questionnaire elements. Although the data were not normally distributed, the indicators of consistency, validity, and reliability were achieved in the pilot study, despite the low fitness indicators due to the small sample size. The questionnaire was then distributed to a larger sample and analysed, as demonstrated in the fourth section. The questionnaire was disseminated in Arabic and English to ensure access for all groups. The sample was obtained through the Jordanian Ministry of Labor lists containing details of 54 big textile manufacturing companies. The data quality rules were applied in the initial screening, selecting people with deep knowledge of SC management activities and experience relevant to sustainability, including managers in administrative and executive positions in each company. Table 1 shows the demographic characteristics of the sample.

The complexity of the T&F SC in Jordan is further highlighted by the fact that it is managed by multiple parties, each with specific roles and responsibilities. For example, managers are responsible for monitoring and controlling the SC's activities locally and globally. This requires a high level of coordination and communication between different parties to ensure that the SC runs smoothly and efficiently. The surveyed managers are critical actors in the T&F SC in

Jordan, as they are responsible for maintaining relationships with other parts of the SC. For example, purchasing managers have relationships with suppliers and are responsible for ensuring that raw materials are sourced and delivered on time and at the correct cost. Additionally, they work closely with logistics and transportation managers to ensure that the raw materials are delivered to the manufacturing facility on time.

Similarly, sales and marketing managers have relationships with wholesalers, retailers, and customers. They work closely with logistics and transportation managers to ensure that the products are delivered to the customers on time and in the right quantities.

Transportation and logistics managers play a crucial role in the SC as they are responsible for the movement of goods from one location to another. They work closely with purchasing, sales, and marketing managers to ensure that the products are delivered to the right place at the right time. In conclusion, the surveyed managers are involved in SC activities and play a crucial role in controlling the context of T&F SC. They maintain relationships with other parts of the SC and work closely with each other to ensure that the SC runs smoothly. Their role is to ensure that the needs of all parties are met and that the SC is efficient, cost-effective, and secure. By surveying these managers, the research will provide insight into the control of the SC and the challenges faced by these managers, which can help improve the overall performance of the T&F sector in Jordan.

In this study, 437 usable responses were obtained from the survey, with a response rate of 97.1%. Six responses were excluded due to unsatisfactory responses (straight-lining) and missing data (more than 5% for each indicator) following the recommendation of Hair et al. (2017). The kurtosis and skewness analysis showed that the data for each construct were normally distributed. The responses were split into an early sample and a late selection according to the procedures of Armstrong and Overton (1977) to assess non-response bias. There were no significant differences (5% significance level, $p > .05$) between the two groups, indicating that non-response bias was not a concern. Additionally, the exploratory factor analysis revealed that no single factor represented most of the variance between the measures; the first factor was the political context, representing 43.733% of the variance. Collinearity assessment showed that all factor-level VIF values were within the acceptable range (less than 3.00) as they were between 1.374 and 2.670, according to Hair et al. (2017).

Table 1. Respondents' profile information

Experience	Up to 10 years	***141***
	10 – 15 years	***232***
	More than 15 years	***58***
Job position	General Manager/Deputy general manager	***12***
	SC Manager	***33***
	Production/Operation/Planning and Control Manager	***64***
	Environment, health and Safety Manager	***36***
	Chief Operating Officer	***21***
	Purchasing Manager	***37***
	Project Manager	***26***
	Logistics Manager	***39***
	Plant Manager	***49***
	Sales / Marketing Manager	***27***
	Engineering Manager	***33***
	Industrial Waste Manager	***16***
	Human resource & interpersonal skills Manager	***38***
		431

3.2. Structural equation modelling procedures

In this study, we employed confirmatory factor analysis (CFA) and structural equation modeling (SEM) to analyze the constructs and structural model. AMOS was chosen as the software due to its ability to handle second-order constructs and complex mediation relationships (Anderson & Gerbing, 1988; Bentler, 1983; Hair et al., 2017). CFA was used to examine the constructs' interrelationships and provide a deeper understanding of the correlation and inter-correlation between the measurement variables. Additionally, it was used to evaluate each construct's convergent and discriminant validity to confirm the reliability and validity of the indicators in the individual structure (Sureshchander et al., 2002). We followed the procedures outlined by Anderson and Gerbing (1988) to determine which items should be eliminated from the measurement model, considering criteria such as weak loading, cross-loading, and residues.

3.3. Validation of Measurement constructs

The internal and external variables that affect the innovation of SC sustainability are numerous and complex, with many factors reported in the literature. However, in this study, the variables were simplified to seven to focus on the most critical factors that impact SSCI. Simplifying variables is necessary to focus on the most critical factors and make the research more manageable. By focusing on a smaller set of variables, the study can provide a more in-depth analysis of the factors that significantly impact SSCI. Additionally, by simplifying the variables, the study can provide more actionable recommendations for organizations looking to improve their SC sustainability.

Many factors can be classified as internal factors, such as collaboration, organizational culture, and training. These factors are considered internal capability factors and need to be addressed in the research because they are considered less critical than other factors in determining SSCI. Similarly, external factors such as market, politics, and technological innovation are considered more critical than other external factors in determining SSCI.

3.3.1. First: Independent variables

External pressure factors

The external pressure factors in this study were designed as a second-order hierarchical latent variable with three first-order constructs. These factors were measured using a scale tested by previous researchers, including political context (Steiner et al., 2019; Lee et al., 2014; Rodriguez & Da Cunha, 2018; Beske et al., 2014; Hsu et al., 2016), market influence (Rodriguez & Da Cunha, 2018; Zaloni et al., 2015; Gao et al., 2017; Dewick & Foster, 2018), and technological development and innovation (Nair et al., 2016; Geissdoerfer et al., 2018; Su et al., 2016; Wang et al., 2018; Su et al., 2016). The response scale ranged from 1 ("strongly disagree") to 5 ("strongly agree").

Indicators of the political context included transparency and public reporting of social and environmental violations, political orientations towards green and environmental issues, decoupling economic growth, meeting customer needs from natural resources, and reusing and recovering resources. Market influence indicators included stakeholder pressures towards making environmental decisions, engaging in sustainable practices, carrying out

environmentally friendly actions, using sustainable models applicable in different markets, and operations in line with greening and providing environmentally friendly products. Indicators of technological development and innovation included benefiting from the high potential of sustainability, big data applications and predictive analytics in sustainability, technological breakthroughs, new needs and opportunities for SIs, digitization, and its impact on creating business models and product portfolios.

3.3.2. Second: Dependent variables

1. Strategic orientation.

Strategic orientation was measured in this study using five items from the literature. These items were assessed using a 5-point scale that ranged from 1 ("strongly disagree") to 5 ("strongly agree"). The indicators included in the measurement focused on planning at the SC and stakeholder level to manage resource scarcity (Lim & Sonko, 2019; Adams et al., 2015), driving the transformation from unidirectional linear SCs to a circular economy (Gao et al., 2017; Zhu et al., 2015), disseminating sustainable SC programs and priorities for environmental reputation and innovation (Dai et al., 2015; Tebaldi et al., 2018), assessing knowledge and implementing actionable environmental models to transition to a sustainable society (Dai et al., 2015; Gao et al., 2017; Tebaldi et al., 2018), and finally, considering competitiveness trends and social and environmental concerns (Tebaldi et al., 2018; Adams et al., 2015; Gao et al., 2017). These indicators were used to evaluate the strategic orientation of organizations concerning SSCI.

2. Internal capacity factors

Internal capacity factors were measured using a second-order latent hierarchical scale that comprised two first-order components: organizational capabilities and practices. The Organizational Capabilities Scale (Dewick & Foster, 2018; Gualandris & Kalchschmidt, 2014; Yang et al., 2015) examined the integration of people, perspectives, knowledge, mindsets, and frameworks to link technology, product, and management innovations to achieving sustainability. Additionally, it evaluated the translation of strategic orientation for sustainability, training, organizational culture, values, and behaviors for all SC members. The Practice Measurement Scale (Sarkis et al., 2011; Schiederig et al., 2012; Klewitz & Hansen, 2014) evaluated the translation of SI into practice and assessed innovative procedures in supply, manufacturing, and distribution.

According to Teec at al (1997), Chen, M. J., & Hambrick, D. C. (1995), and Helfat et al (2007) Organizational capabilities refer to the knowledge, skills, and resources an organization possesses to achieve its goals. They are the underlying strengths of an organization that enable it to perform well and compete effectively. On the other hand, organizational practices refer to the specific actions that an organization undertakes to achieve its goals. They are the observable ways in which an organization conducts its business. The difference between capabilities and actions lies in the ownership of the activity. Capabilities refer to the internal resources, knowledge, and skills a firm can leverage to achieve sustainability goals. Actions, on the other hand, refer to the specific initiatives and projects that a firm undertakes to achieve sustainability goals.

Furthermore, internal operational and management practices were evaluated regarding economic, social, and environmental outcomes. Finally, the scale examined the SC's flows of goods, information, sustainability issues, and green and ethical practices. The response scale ranged from 1 ("strongly disagree") to 5 ("strongly agree").

3. Sustainable Supply Chain innovation

SSCI is a critical concept in today's business environment, as organizations aim to reduce their environmental impact and improve their social and economic performance. To measure SSCI, this study used four items from the literature, which were measured using a 5-point scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). These scale items include Products with high potential and value to customers (Gao et al., 2017; Silva et al., 2019; Karakaya et al., 2014; Tebaldi et al., 2018; Jensen & Govindan, 2014). Focus on social dimensions (Bocken et al., 2014; Barth et al., 2017; Parthibaraj et al., 2018). Communication with the broader societal context (Gao et al., 2017; Govindan et al., 2016; Ripanti & Tjahjono, 2019). Societal acknowledgment of innovative, green, and environmentally sustainable practices (Adams et al., 2015; Ripanti & Tjahjono, 2019; Blomsma & Brennan, 2017; Tebaldi et al., 2018). These items were chosen to provide a comprehensive understanding of SSCI and how it is implemented in organizations. Using a 5-point scale allows for more precise measurement of SSCI and comparisons between organizations.

4. RESULTS

4.1. The measurements model

In this study, we modeled all measurement scale constructs as reflective constructs. External pressure factors were modeled as a second-order reflective-reflective construct with three first-order constructs: political context, market influence, and technological development and innovation. We also modeled the internal capacity factors as a second-order reflective construct with two first-order reflective constructs: organizational capabilities and practices. Furthermore, we modeled the constructs (strategic orientation and SSCI) as first-order reflective constructs.

The measurement scale and construct items are shown in the table in Appendix. 1. We used confirmatory factor analysis to evaluate the reliability and validity of the constructs through indicator and construct reliability tests (Fornell & Larcker, 1981; Hair et al., 2017; Anderson & Gerbing, 1988). We also calculated the convergent and discriminant validity to indicate the construct validity for the measurement scale (Hair et al., 2017; Chin, 1998). We removed the (MI3) item to increase the Average Variance Extracted (AVE). As a result, the factor loading for all items in the measurement scale exceeded the 0.60 threshold, leading to satisfactory reliability for all constructs.

We manually calculated the composite reliability and AVE according to (Hair et al., 2017; Bentler, 1983), and all constructs achieved composite reliability of (0.74) or higher and Cronbach Alpha (0.732) or higher, indicating the internal consistency of the measurement scale. We also found that the AVE values exceeded the 0.50 threshold, which means the convergent validity of all constructs. Following Fornell and Larcker (1981), we checked the discriminant validity of the constructs by comparing the square root of the AVE of each construct with the correlation coefficients between all the constructs (see Table 2); we found that the SQRT (AVE) values exceeded the values of the all-correlation coefficients, concluded that the constructs show satisfactory discriminant validity. We also found that all the correlation coefficients are less than the 0.85 thresholds (Hair et al., 2017), confirming the specific discriminant's validity.

4.2. The structural model

According to Kline (2016), Structural equation modeling (SEM) is typically analyzed using two-tailed tests. SEM is a multivariate statistical technique for examining relationships between multiple variables. Two-tailed tests are used in SEM because they allow for testing positive and negative relationships between variables. To evaluate the structural model, we used SEM to emphasize the theoretical foundation for the conceptual model (see Figure 2). Following Anderson and Gerbing's (1988) and Bentler's (1983) procedures, several model fit indices were evaluated, namely: the $\chi 2$ measure (CMIN/DF = 789.723/273 = 2.893), Normed Fit Index (NFI = 0.898), Goodness of Fit Index (GFI = 0.879), Comparative Fit Index (CFI = 0.93), Incremental Fit Index (IFI = 0.931), Root Mean Square Residuals (RMR = 0.035), and Root Mean Square Error of Approximation (RMSEA = 0.066). These indices demonstrated the fitness of the proposed conceptual model for the textile environment.

Table 2. Constructs Discriminant validity indicators

Construct	1	2	3	4	5	6	7
Political Context	**0.692**						
Market Influence	0.3	**0.806**					
Technological Development and Innovation	0.3	0.25	**0.768**				
Strategic Orientation	0.24	0.43	0.24	**0.754**			
Organizational Capability	0.12	0.23	0.35	0.42	**0.786**		
Practices	0.37	0.36	0.274	0.32	0.34	**0.078**	
SSCI	0.26	0.33	0.221	0.38	0.37	0.44	**0.768**

Testing hypotheses (direct and indirect impact) was conducted using SEM (see Figure 1). The first hypothesis (H1) tests the direct impact of external pressure on SSCI. The results indicated no statistically significant direct impact of external pressure on SSCI ($\beta = 0.136$, S.E. = 0.100, t-value = 1.816, P-value = 0.069, $P > 0.01$, $P > 0.05$). H2 tests the direct impact of external pressure on strategic orientation; results revealed statistical significance ($\beta = 0.808$, S.E. = 0.096, t-value =9.64, P-value = 0.000, $P < 0.01$). The same applies to the direct impact of external pressure factors on internal capacity factors, as the findings showed the acceptance of H3 ($\beta = 0.314$, S.E. = 0.078, t-value = 4.580, P-value = 0.000, $P < 0.01$). Strategic orientation was also found to have a significant impact on internal capacity factors (H4) ($\beta = 0.648$, S.E. = 0.048, t-value = 7.740, P-value = 0.000, $P < 0.01$). H5 examines the impact of strategic orientation on SSCI. The results revealed a significant statistical direct impact ($\beta = 0.314$, S.E. = 0.141, t-value = 2.596, P-value = 0.009, $P < 0.01$). Similarly, H6 examines the

impact of internal capabilities on SSCI, and the results revealed a statistically significant impact as well (β = 0.462, S.E. = 0.155, t-value = 3.482, P-value = 0.000, P < 0.01). These results provide evidence for the proposed conceptual model and the impact of external pressure, strategic orientation, and internal capabilities on SSCI in the textile industry in Jordan.

Table 3. Path analysis and direct impact

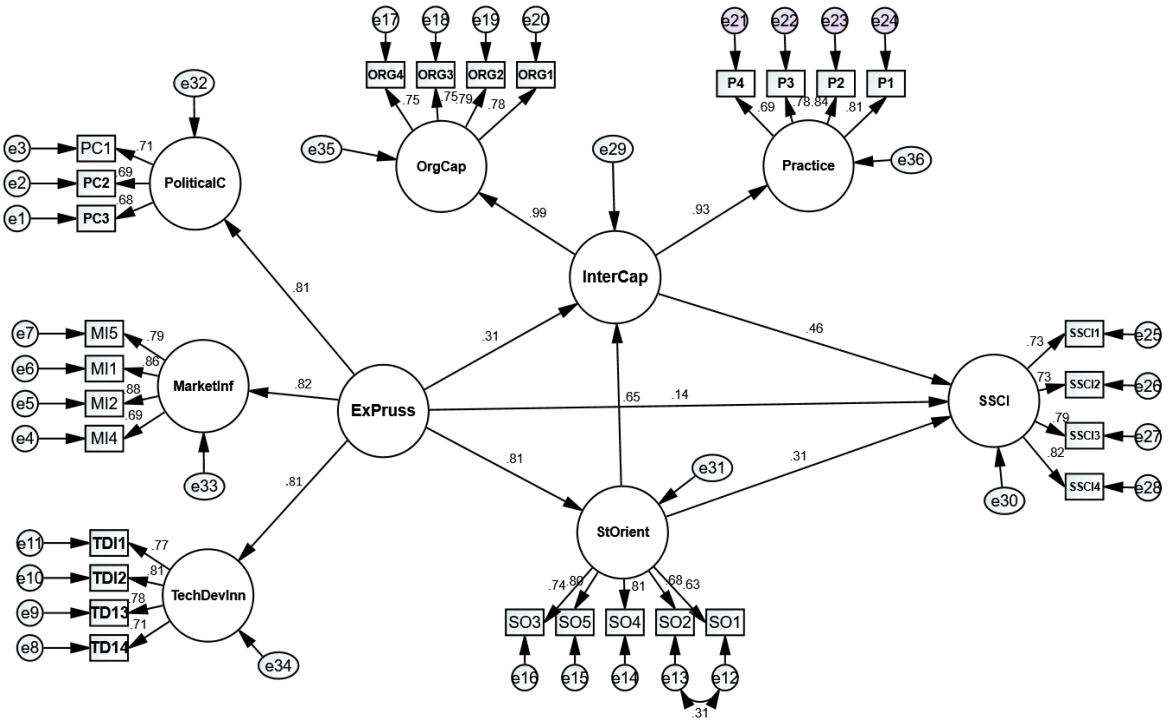
Hypothesis	Independent Variable	Dependent Variable	β	S.E.	t-value	P	Result
H1	*External pressure factors*	*SSCI*	0.136	0.1	1.816	0.069	*Not supported*
H2	*External pressure factors*	*Strategic orientation*	0.808	0.096	9.64	***	*Supported*
H3	*External pressure factors*	*Internal capacity factors*	0.314	0.078	4.58	***	*Supported*
H4	*Strategic orientation*	*Internal capacity factors*	0.648	0.084	7.74	***	*Supported*
H5	*Strategic orientation*	*SSCI*	0.314	0.141	2.596	0.009	*Supported*
H6	*Internal capacity factors*	*SSCI*	0.462	0.155	3.482	***	*Supported*

Notes: ** Significant at the p≤ 0.01 level (two-tailed); * Significant at the p≤ 0.001 level (two-tailed).**

4.3. Mediation analysis

We hypothesized that internal capacity factors and strategic orientation mediate the impact of external pressure factors on SSCI. Following Hair et al. (2017), we conducted a bootstrapping test for mediation analysis (See Table 4). To assess the indirect impact of external pressure factors on SSCI, Table 4 indicated that all mediator variables statistically mediated this impact. H7 tests the mediation impact of internal capacity on SSCI (β = 0.142, P-value = 0.004, P< 0.01), while H8 test the mediation impact of strategic orientation on SSCI (β = 0. 251, P-value = 0.042, P< 0.05). Finally, H9 tests the mediation impact of both internal capacity and strategic orientation on SSCI (β = 0. 242, P-value = 0.005, P< 0.01), noting that all hypotheses were tested at a significance level of ** significant at the p≤ 0.01 levels (two-tailed); *** significant at the p≤ 0.001 levels (two-tailed). Our results confirm that political context, market influence, technological development, and innovation can contribute indirectly to SSCI. This result is also evidenced by the impact of external factors on the strategic orientation and internal capacity factors (H1, H2).

Figure 2. The Structural Model



(ExPruss: External Pressure factors, **political**: Political Context, **Marketing**: Market Influence, **TechDevInn**: Technological Development and Innovation, **Intercap:** Internal Capacity Factors, **OrgCap:** Organizational Capability, **StOrient:** Strategic Orientation, **SSCI:** SSCI**).**

Table 4. Path analysis and indirect impact

Independent Variable	Mediator	Dependent Variable	Estimate	Lower	Upper	P
External Pressure	Internal Factors	SSCI	0.142	0.056	0.401	0.004
External Pressure	Strategic Orientation	SSCI	0.251	0.069	0.625	0.042
External Pressure	Strategic Orientation and internal factors	SSCI	0.242	0.110	0.576	0.005

Notes: ** Significant at the p≤ 0.01 levels (two-tailed); * Significant at the p≤ 0.001 levels (two-tailed).**

5. DISCUSSION AND CONCLUSION

This study evaluates various factors contributing to SSCI and develops a conceptual and empirical framework for SI in textile SCs. It is noted that more than developing additional innovations based on existing knowledge and technology or improving existing processes is required. Instead, radical innovations and taking advantage of the high potential for sustainability are needed. However, companies often focus on value creation and short-term financial performance, even in the context of SCs, which can lead to sustainability imbalances (Nilsson & Göransson, 2021; Laura et al., 2022). Therefore, building a theory to guide further research is essential to suggest actionable models and frameworks for practitioners in sustainable development practices, SC and SI techniques, and circular economy for further

testing, use, and development. The study also recognizes that political contexts, macroeconomic factors, and resource scarcity make SI challenging at the SC level. Thus, it encourages the need to categorize SSCI factors and define their relationships; furthermore, managing the most substantial potential impact and facilitating the translation of SI into practice for stakeholders (Ayuso et al, 2011).

The results revealed that external pressures do not significantly impact SSCI (H1), which calls for changes in the SC's strategic and internal capabilities. However, testing H2 supports that external pressure factors significantly impact strategic orientation. While external pressures define organizations' overall direction and goals in a business context, strategic orientation towards environmental innovation, along with the support of top management, contributes to the dissemination of SC initiative programs. External pressure factors also significantly impact internal capacity factors (H3). The results also revealed the impact of strategic orientation on internal capacity factors (H4). Internally, internal and external SC practices enhance relationships between partners and ensure the flow of goods, information, and sustainability issues. Practices are interactive activities between partners to achieve a common goal; green, ethical practices lead to sustainable, innovative performance. The success of SI requires a combination of top-down initiatives and vice versa, integrating sustainability objectives at the organizational and SC levels because the main driver of the company's direction comes from external pressures. Technology and the impact of big data and predictive analytics on market impact drive strategic companies' approaches to engage in sustainable practices and green offerings.

Thus, external pressures such as political context, markets, and technological development are catalysts for innovation in handling raw materials, supply of materials and resources, and drivers of SI. It also will open up internal and external collaborative efforts to find new opportunities for collaboration. On the other hand, they are adopting and practicing new ideas that require appropriate organizational capabilities, which becomes critical to implementing strategic orientation and ideas and their transformation into innovations (Adaileh et al., 2020; Nilsson & Göransson, 2021; Gao et al., 2017; Yuan et al., 2022; Assis et al., 2022). The results obtained in hypothesis testing H5 and H6 support these arguments. Because of the inherent complexity of sustainable development, the nature of SSCI realization factors, and the challenging pressures to address, treating factors as discrete constructs will not adequately target all SI issues. The current study depicts a comprehensive and integrated model that

combines external pressures, strategic orientation, and internal capacity factors (H7, H8, H9) to approach SSCI. Without strategic orientation, organizational capabilities and practices, political context, market factors, and technological development/innovation will not adapt as drivers and catalysts for SSCI. Therefore, innovation ecosystems in society should be studied as overarching entities rather than as separate units. In the literature review, researchers found no similar models, and this study provides researchers and practitioners with a general framework for further empirical studies and methodological development.

5.1. Theorical implications

In this paper, we propose a set of theoretical implications. We tested the direct effects of exogenous constructs, such as political and market factors, on driving SSCI and other endogenous constructs.

Market influence is a crucial external pressure factor that affects the sustainable SC performance of Jordan's T&F SC. This is because the T&F industry highly depend on consumer demand and market trends. It can be difficult for suppliers to justify implementing sustainable practices, as they may need to be able to sell their products at competitive prices. Additionally, suppliers may be less motivated to invest in sustainable practices if consumers are not willing to pay a premium for sustainable products. Furthermore, market influence can also affect the sustainable SC performance of the T&F industry in Jordan through the pressure exerted by retailers and brands. Retailers and brands may prioritize cost and efficiency over sustainability, which can pressure suppliers to cut corners and reduce their environmental and social impact. Additionally, retailers and brands may have different sustainability goals than suppliers, leading to conflicts and challenges in achieving sustainable SC performance.

Simultaneously, this study tested the mediating impact of strategic orientation and organizational capabilities and practices. Concurrently, these factors explain the influence of elements and the environmental role in improving or driving SSCI in the Jordanian T&F industry (Ciccullo, 2022; Sehnem et al., 2022). Promoting environmentally oriented organizational capabilities foster environmental innovation that responds to external pressures (Gupta et al., 2020; Liu et al., 2022; Wong & Ngai, 2022; Ayuso et al., 2011). This study bridges the research gap in an important sector of the Jordanian economy, but it is one of the sectors that most contribute to polluting the environment.

5.2. Practical implication

This study provides various implications for managers and practitioners in the T&F industry. The study results confirmed the positive effect of external pressure factors on SSCI (Sustainability SC Integration) in the textile industry in Jordan. Therefore, this study recommends that managers in this industry conduct an environmental scanning for the external environment and identify external factors influencing the SC. In addition, managers should work to increase employee awareness of ecological issues and the importance of promoting environmentally oriented products and processes in the SC. The study results also confirmed the direct and positive effects of external pressure factors on the strategic orientation of the SC. Managers should focus on developing strategic plans that can trigger responses according to changes in the external environment to improve the SC response to potential risks. Therefore, managers should pay more attention to external pressures, especially during global crises that negatively affect SC performance, such as the Covid-19 pandemic. The study's results revealed a direct and positive relationship between external pressure factors and internal capacity factors of the SC. Therefore, it requires SC management to improve organizational capabilities by improving the SC's response to environmental changes and external factors that affect its performance. Study results confirmed that strategic orientation and internal capacity factors positively and directly affect SSCI. So, this study recommends that managers in the textile industry pay attention to environmental innovation, especially SSCI, when developing strategic plans. Managers can enhance the exchange of knowledge and skills among workers to strengthen the organizational capabilities of these companies, allowing for an increase in the flow of innovation in the SC, leading to an improvement in the SSCI level.

5.3. Conclusion, limitations and future research

In conclusion, this study aimed to investigate the effect of external pressure factors on SSCI within the T&F SCs. The study's results confirmed the positive impact of external pressure factors on SSCI and highlighted the importance of environmental innovation and strategic orientation in the textile industry. However, it is essential to note that these results are specific to the T&F industry and cannot be generalized to other contexts. Future research should focus on other essential sectors with significant environmental and social impact, such as the pharmaceutical, food and beverage, mining, and steel industries. Additionally, future studies

should consider using quantitative and qualitative research methods, such as interviews, and qualitative analysis methods, such as Analytical Hierarchy Process (AHP). Furthermore, research should address various industrial sectors within different cultures (developed, developing countries, and emerging economies) despite the overlap of SCs globally, as the potential sustainable effects may differ from one context to another. This study also did not consider categorical characteristics such as size and age, which significantly impact innovation. Environmental innovation is affected by organization size, age, and market experience, and future studies should address the influence of these factors on SSCI. Additionally, we suggest using analysis methods such as multigroup analysis and moderation effect to assess the model's fitness across multiple contexts and industries.

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Appendix 1. Items used in the survey

Construct/Item		Factor Loading
Political Context (α= 0.732, CR=0.74, AVE=0.48)		
PC1	Our industry's clear interest is devoted to transparency and public reporting of social and environmental violations.	0.71
PC2	Green, environmental issues dominate most policy orientations towards the industry	0.69
PC3	In QIZs, interest is growing toward decoupling economic growth from natural resources and reusing and restoring resources while meeting the needs of customers and society	0.68
Market influence (α= 0.877, CR=0.88, AVE=0.65)		
MI1	External pressures and stakeholders (customers, competitors, governments, NGOs) motivate us to make environmental and green decisions.	0.86
MI2	Clients put pressure on us to engage in sustainable practices.	0.88
MI3*	Clients push us to create sustainable models applicable in different markets.	0.48
MI4	More than ever, consumers and NGOs are asking us to do environmentally friendly business.	0.69
MI5	Major clients drive us to think of operations in line with greening and offering eco-friendly products.	0.79
Technological Development and Innovation (α= 0.847, CR=0.85, AVE=0.59)		
TDI1	Industrial knowledge in the apparel sector dictates employing industrial technology that takes advantage of the high potential for sustainability.	0.77
TDI2	We understand the uses and applications of big data and predictive analytics in sustainability.	0.81
TDI3	Technological breakthroughs motivate us to open up to internal and external collaborative efforts to find new needs and opportunities for SIs.	0.78
TDI4	The evolution of digitization is prompting us to rethink our operations, business models, and product portfolios.	0.71
Strategic Orientation (α= 0.855, CR=0.87, AVE=0.57)		
SO1	We Address resource scarcity in planning at the SC levels and with related parties (suppliers, manufacturers, consumers, and logistics).	0.63
SO2	Our SC maintains innovation at the SC level to drive the transformation from a linear, one-way SC to a circular economy.	0.68
SO3	Environmental reputation and innovation are among the priorities of our sustainable SC deployment programs and strategic directions.	0.81
SO4	Strategic plans with our SC members contain developing, testing, and evaluating knowledge and actionable models that can contribute to the necessary transition of SC towards a sustainable society.	0.89
SO5	Our strategic direction in the SC is towards competitiveness while also focusing on social and environmental considerations.	0.74
Organizational Capability (α= 0.848, CR=0.85, AVE=0.59)		
ORG1	We enable an integrative SI practice that include people, perspectives, knowledge, and mindsets.	0.78
ORG2	We use integrated frameworks in sustainability that link technology, product, and management innovations to achieve sustainability.	0.79
ORG3	Our general directions, top management directives, and the organization's goals fall within the context of sustainability.	0.75
ORG4	Training programs enhance our organizational culture towards sustainability and consider the collective values and behaviours of all SC members.	0.75
Practices (α= 0.859, CR=0.86, AVE=0.61)		
P1	Actors in our SC collaboratively translate SI into practice.	0.81
P2	All our SC members evaluate the key innovative actions needed to achieve supply, manufacturing, and distribution sustainability.	0.84
P3	Our internal company practices consider new or significantly improved products, production processes, management practices, or business models to achieve economic, social, and environmental outcomes. "Social and environmental outcomes. "	0.78
P4	Relationships with our partners focus on the flow of goods, information, sustainability issues, and green and ethical practices.	0.69
SSCI (α= 0.850, CR=0.85, AVE=0.59)		
SSCI1	We consistently produce and provide products with high potential and value to our customers.	0.73
SSCI2	Our products affect social dimensions (. e.g., increasing equality, reaching different social segments)	0.73
SSCI3	We operate with an integrated approach, dynamic partnerships, and strong leadership that better position the organization to connect with the broader societal context.	0.79
SSCI4	The local community widely acknowledges Our innovative, green, and environmentally sustainable practices.	0.82