

Role of Green Innovation and Sustainable Supply Chain Management in Firm Internationalization

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ABSTRACT

Purpose: Ever increasing sustainability awareness of consumers in the leading economies of the world is now compelling importers of goods from cheap-labor countries to ensure that their suppliers comply with sustainability regulations. This compliance becomes very challenging because of the lack of control on second tier and third tier suppliers in a supply chain. First tier suppliers in this case may drive this effort but need to be motivated enough to do so. In case of environmental sustainability, green innovation (GI) may provide a gradual, and thus more affordable and practical, move towards more eco-friendly ways. As far as the motivation to commit to sustainability and GI is concerned, internationalization and export business expansion may act as one of the most effective motivators for these suppliers. The nature of relationship between these three constructs, i.e., internationalization of firms, sustainability of their supply chains, and the extent of their green innovation requires a better understanding, however. This study attempts at exploring the nature of relationship between these three constructs.

Design/Methodology/Approach: The work employs a novel data set collected from 146 medium and large textile firms operating in Pakistan. The partial least square-Structural Equation Modeling (PLS-SEM) approach is used for data analysis.

Findings: All three constructs of internationalization, green innovation, and sustainable supply chain management are significantly associated and thus complement each other.

Originality/Value: This work uses a novel agency theory perspective to analyze the relationship between internationalization, green innovation, and sustainable supply chain management. In

that sense, the findings indicate that internationalization could be one of the incentives that can be used by the principals to deal with agents' goal conflict and information asymmetry.

Keywords: Internationalization, green innovation, sustainable supply chain management, agency theory

Paper type: Survey based research.

1. Introduction

Ever increasing ecological sensitivity of consumers in leading economies of the world is driving institutional policies of these regions accordingly (Chiarvesio et al, 2015). By using their voting rights, these consumers urge their governments to devise policies and implement measures for more sustainable and eco-friendly practices involved in delivering goods and services to them (Wang, Zhao, and Hou, 2020). These practices may include increased use of green energy, disposal of treated waste, higher levels of reuse and recycling, and reduced dependence on plastics or other hazardous materials (Chen, 2018). As a result of pressure from the consumers, the regulatory institutions make it mandatory for the importers and manufacturers of these goods to ensure sustainable practices at their suppliers' end (Damert et al., 2021). Unfortunately, it is a common observation that the current manufacturing hubs of the world do not have a very strong governance on eco-friendly practices and, therefore, the importers face trouble in ensuring compliance while obtaining goods from the suppliers based in these hubs. And this non-compliance may not be limited to a specific manufacturer or supplier only. The entire upstream supply chain at the manufacturers' end could be involved in non-eco-friendly practices (Cainelli et al, 2012). In a way this is a principal-agent problem explained by the agency theory (Jensen and Meckling, 1976). The theory explains governance issues when there is a goal conflict between the principal and an agent working on behalf of or to serve a purpose for the principal. In the international trade case, retail importers or distributors may push for sustainable manufacturing and sourcing while the manufacturers may have a different goal of maximizing profit by any means possible and, hence, compromising on sustainability and eco-friendliness. This goal conflict creates a problem that may possibly be solved through incentivization of sustainability adoption. But here a few questions arise. For example, what sort of incentives could be effective in these cases? Do the manufacturing firms in cheap labor regions of the world

find selling to foreign firms and earn foreign exchange an incentive good enough to pursue sustainability? In other words:

- i. Does adoption of sustainability make a firm more susceptible to winning international orders? Or, in terms of agency theory, does internationalization work as an incentive for exporting firms to adopt sustainability practices and thus avoid goal conflict?

Sustainability is widely understood to be a combination of financial, environmental, and social dimensions (Elkington, 2004). In this study we are more interested in understanding the dynamics of environmental sustainability. Environmental sustainability may either be achieved quickly through some serious financial investment or gradually, and more economically, through a creative transformation of existing practices into green practices— a phenomenon that may also be termed as green innovation (GI). Green innovation, therefore, serves to improve environmental protection performance of organizations (Chen, 2008) and since innovation could be a gradual process, GI may become a more practical and affordable tool for achieving environmental sustainability in organizations (Zameer et al, 2020). But is this what industry is practicing? This question becomes more intriguing when this adoption is studied not at a firm level but at the supply chain level where all, or at least most, of the firms must be aligned with sustainability policies. A question that needs answering could, therefore, be:

- ii. Do firms in a supply chain adopt environmental sustainability through GI? Or are sustainable supply chains necessarily more ‘green-innovative’?

Existing studies do contain evidence of an association between GI, SSCM, and internationalization but this evidence, at best, is highly fragmented. One of these fragments is the set of studies connecting supplier development and cooperation with sustainability adoption. For example, in their study, Seuring and Müller (2008) found that it is the proactiveness of companies that makes them complement green supply chains through supplier development as one of the strategies. Cainelli et al (2012), also confirm that cooperation with suppliers has been one of the key strategies towards environmental innovation in Italian manufacturing firms. The authors, however, contend that agglomeration economies could be a stumbling block in this path. In a more recent study, Yang and Jiang (2023) investigate the role of buyers’ environmental orientation on their green innovation and the effects of suppliers’ slack on this relationship. They find a positive relationship between environmental orientation and green innovation. The

geographical location of the supplier, however, is not one of the factors under focus and thus internationalization cannot be assumed to have played a role in this relationship.

A different set of studies consider internationalization as one of the most effective factors for environmental sustainability adoption. For example, Chiarvesio et al (2014) discovered that Italian firms, engaged with local suppliers and customers, are highly unlikely to get involved in GI. Thus, indicating that internationalization could be a factor that encourages adoption of green practices. The presence of international stakeholders causing GI in firms has also been validated by Usman et al., (2020). They studied Chinese firms listed on Shanghai and Shenzhen stock exchanges and found that firms with international members in their boards are more bent towards adopting and creating GI. Similar findings conclude that competitiveness (Abu Seman et al., 2019) or entering international markets (Peng, 2020) could lead firms to adopting GI and SSCM practices. More recently, Martínez-Ros & Merino (2023), by analyzing panel data of Spanish firms, also confirm the positive role of environmental innovation on the probability of internationalization of business. How this internationalization also affects the ability of a firm for green innovation, however, is missing.

A different fragment of literature contains studies that attempted to identify the factors that may act as ‘goal conflict’ while principals make efforts for supply chain sustainability. For example, Wang and Yang (2020) studied the textile industry of China to identify the green innovation practice aspects and their sub-aspects with a reference to sustainability performance indicators. They find that when choosing suppliers with green practices, economy appears to be the most important criterion instead of other criteria, including commitment towards staying green. This finding supports the opinion of Cainelli et al (2012) who indicate that agglomeration economies could be an exception when it comes to internationalization being the motivator for adopting GI and SSCM practices of which Chinese firms could be an example.

The closest a scholarly work comes to answering our questions is that of Tsukanova (2023) who investigate the relationship between the constructs of export intensity, number of green practices, and innovation efforts. The work, however, provides evidence of a positive impact of innovation efforts of a firm with the number of green practices it adopts while its export intensity plays a supportive role. How a general tendency towards practicing sustainability affects GI and how internationalization plays a supportive role in this relationship needs further investigation.

In emerging market economies (EMEs), like Pakistan, it is a common observation that, sustainable practices are mostly driven by international clients. Research literature, however, is void of any scholarly evidence to prove this observation in combination with the effects of environmental sustainability and internationalization on GI efforts of these suppliers. There is, hence, a need to further investigate the mutual association between these constructs, especially in the EMEs and this is what we, in this study, are attempting to achieve.

This study contributes in both theoretical and practical domains. Firstly, it helps explain the adoption of GI practices as part of SSCM, in a dyadic supply chain relationship especially when internationalization has a role to play. These insights are valuable for public and private sector stakeholders working to promote and support internationalization. Secondly, this research aims to demonstrate how this sustainability adoption process is viewed from the Agency Theory perspective. The fields of internationalization of businesses and that of global sourcing in supply chains have a lot to learn from each other and this is also what this study attempts to achieve.

2. Theoretical Background

2.1. Agency Theory

Agency Theory or the Principal-Agent theory (Jensen and Meckling, 1976) describes the behavior of firms by considering them as organizations of stakeholders working on the basis of certain contracts. This theory is mostly considered relevant in the field of Corporate Governance where the managers have to take care of the interests of shareholders, but problem of Goal Conflict may occur when these managers, considered as agents, have their own interests that might not be in line with the shareholders who act as principals. The case of global trade is not too different where retailing firms have to get their products manufactured from suppliers based in distant parts of the world making the monitoring of these agents for ensuring policy compliance very difficult if not impossible.

Several researchers have used agency theory to make sense of the dynamics of relationships that exist between suppliers, manufacturers, distributors, and retailers involved in a supply chain (Ciliberti et al, 2011; Delbufalo, 2018; Matinheikki et al, 2022). The work of Matinheikki et al (2022), in this regard, provides legitimacy for the use of agency theory in supply chains. Through a comprehensive literature review, they explain how agency theory helps explain various

governance mechanisms and their influence on different types of relationships that exist in supply chains. In a more specific work, but also within the realm of governance in supply chain relationships, Ciliberti et al (2011) use the agency theory framework to study the potential non-compliance of SMEs as part of a supply chain when required to implement CSR policies. They argue that the information asymmetry in a principal-agent relationship may cause hurdles in this compliance and a 'chain director, as principal, may use a code of conduct to prevent that. The authors in this work touch upon the social sustainability aspect of supply chains by using the agency theory. In a more relatable work, Delbufalo (2018) presents a detailed account of how agency theory may explain and help design sustainable supply chains. According to him, principals have to consider two aspects when designing the governance mechanisms.

- i. they should target the elimination of goal conflict which motivates the agent to cheat. This may be achieved through incentive systems directly linked to sustainability performance. And secondly,
- ii. they should aim at the elimination of information asymmetry which enhances the ability of the agent to cheat. This asymmetry may keep the principal in dark on how business gets operated at agents' end. Therefore, better and more transparent tools for up to date and accurate information about business operations of the agent may enable principal to reduce or eliminate this asymmetry.

Our work in using the agency theory to study governance mechanisms for the implementation of green innovation practices in supply chains not only serves as an extension of this previous work but also presents a more fine-grained picture illustrating the motivators that may prevent goal conflict while ensuring sustainability in supply chains. This may not only eliminate or reduce goal conflict but may also trigger enhanced cooperation by the manufacturers thus suppressing the chances of information asymmetry as well. And this is what this research aims to find out.

2.2. Internationalization

We borrow the definition of internationalization from Welch and Luostarinen (1988; p.36) where it is defined as '*the process of increasing involvement in international operations.*'

Literature on internationalization reveals that the most significant and enlightening development in this field happened in the late 70s and early 80s, with the Uppsala model of Johanson and

Vahlne (1977) and the Eclectic paradigm of Dunning (1980) taking the center stage. The former defined the process of internationalization as a stage-based gradual process, progressing through small experiments in more accessible markets and then expanding from there. While the latter explains it through the infamous OLI model. The ownership, location, and internationalization (OLI) model can help determine the feasibility of entering a foreign market and presents a framework to understand the interaction of different components in a business while internationalizing. Cavusgil (1984) also proposes three stages of internationalization as: the experimental involvement stage, active involvement stage, and committed involvement stage, referring to the increasing level of involvement and commitment of firms in the international markets with time.

Similar propositions can also be seen presented in the literature by using the strategy lens. For example, Porter (1986) plots the factors of Configuration (geographically dispersed vs. geographically concentrated) and Co-ordination (low vs. high meaning either on country focused or coordinating extensively with foreign subsidiaries) on a two-dimensional grid and highlights four different types of strategies on the basis of the intensity of these two factors. Melin (1992) also critically reviews the research literature on internationalization and considers internationalization as a strategic process as endorsed, later, by Kamakura, Ramón-Jerónimo, and Gravel (2012) as well. More recently, Üner et al (2022) propose that internationalization needs a new perspective now and this perspective should be aligned with increasing sustainability awareness. Particularly, SME internationalization is influenced by its context – country, environmental, institutional, political and social (Child, Karmowska, & Shenkar, 2022)

We, therefore, take SME internationalization as a strategic process for expanding operations of a firm beyond the boundaries of the founding country of operation. This process may involve transforming goods and practices in a way that makes the firm more aligned with international norms of eco-friendliness and innovation.

2.3.Green Innovation

Innovation refers to the process of converting either unique raw ideas or laboratory inventions into marketable products/services in a way that they are openly accepted as safe, affordable, and efficient solutions to compelling problems in certain situations (Chen and Chang, 2011).

Innovations have been happening since the inception of humanity, but the last few decades have

seen a change in attitude of critics who now consider it destructive to irresponsibly benefit from the natural resources of this world while creating and implementing, so called creative and innovative, solutions that do not consider their long-term implications for the health of our planet (Foray and Grubler, 1996). Additionally, there is a growing realization that excessive use of non-recyclable materials like plastic, over-dependence on natural resources, like fossil fuels, as a source of energy, and irresponsible cutting of trees, are harmful to the wellbeing of our planet and its inhabitants, regardless of the apparent short-term benefits of such innovations (Foray and Grubler, 1996; Chin, Tat, and Sulaiman, 2015; Cheng et al, 2021).

Evidence suggests that organizations are increasingly concerned about their ‘Green Image’ and supporting organizational identity (Chen, 2008; Chang & Chen, 2013; Takalo et al, 2021). Green Innovation thinking, therefore, emphasizes taking the stakeholder theory perspective when designing and implementing novel solutions to compelling problems (Weng et al 2015). Going a step further, the adoption of GI shouldn’t be limited to a single player, but a general sense of responsibility should exist in all the stakeholders thus making the entire supply chain sustainable.

2.4.Sustainable Supply Chain Management

Brundtland Commission (World Commission on Environment and Development, 1987, p. 8) defines sustainability as: “development that meets the needs of the present without compromising the ability of future generations to meet their needs” Aligned with the Triple Bottom Line (TBL) proposed by Elkington (1998; 2004), three dimensions of sustainability financial, social, and ecological are usually considered. A sustainable supply chain, therefore, is a system of linking the actors involved in the conversion of raw material into consumer goods while taking care of these three dimensions (Seuring & Muller, 2008). Gupta and Palsule-Desai (2011) highlight three conditions for an SCM practice to qualify as SSCM. These include taking the environmental impact as an imperative, considering all stages of the value chain for each product, and considering the entire product life-cycle from a multidisciplinary perspective. While SSCM needs to look at the supply chain activities from the perspective of profit, people, and the planet, Green Supply Chain Management (GSCM) is more focused on the environmental impact of supply chain activities (Chin, Tat, and Sulaiman, 2015). Sustainable supply chain management, thus, involves practices like reducing the carbon footprint by preventing wastage, recycling, reusing, procuring recyclable goods from those suppliers who are conscious of

sustainability and environmental issues, producing goods more responsibly and employing practices more conducive to sustainability (Khan et al, 2021; Eggert and Hartmann, 2023).

3. Hypotheses Development

4.1.Sustainable supply chain management and internationalization

Being more visible to stakeholders, international companies tend to experience higher pressures to incorporate socially responsible behaviors (Koep, Guenther, and Morris 2020).Sustainability pressures create awareness among international participants leading to adoption of sustainable strategies in supply chains (Koep, Guenther, and Morris 2020). A recent study of international firms suggests that sustainability readiness (energy saving, recycling, waste reduction, and resource sharing) is a strong driver of internationally geared performance among SMEs (Denicolai, Zucchella, and Magnani, 2021).

As firms grow internationally, they tend to learn more about the host-country environment and overcome various liabilities such as liability of foreignness. Thus, they see opportunities in gaining knowledge about access to resources (Connelly, Ketchen, and Hult, 2013), which can be done through a local partner. Such an international partnership could result in pressures from stakeholders to be more sustainable; directing international firms towards the adoption of sustainable initiatives (such as environmental, social, and economic).

Firms internationalizing from emerging markets, seeking to become part of larger global value chains, tend to focus on environmental aspects of sustainability (Golgeci, Makhmadshoev, and Demirbag, 2021) due to the large share of trade conducted through global value chain governance.

Regarding the effect of SSCM on internationalization activities, some studies Damert et al., (2020), Gómez-Bolaños, Hurtado-Torres, and Delgado-Márquez, (2020) highlighted the instrumental role of social and environmental aspects in augmenting the internationalization performance of the firm in the context of the effect of SSCM on internationalization activities. Damert et al., (2020) further concluded that the level of internationalization determines a firm's attitude towards implementing social sustainability in supply chain management. Baù et al., (2021) demonstrate that since small family firms maintain interest in their local roots, there is an increased likelihood in aiming at improving social, economic, and environmental goals during

internationalization through global supply chains. Recently, Denicolai, Zucchella, and Magnani, (2021) also showed the impact of sustainability on the internationalization activities of SMEs. Hörisch, et al., (2017) concluded that the legal system of the host country influences promoting corporate sustainability in international firms. Against this backdrop, we draw the following hypothesis:

H1: Supply chain sustainability and internationalization of a firm are positively associated

4.2.Sustainable supply chain management and green innovation

We also argue that SSCM can play a significant role in driving GI in international firms. Takalo and Tooranloo (2021) debate that GI is vital in maintaining environmental sustainability. Cheng (2020) found that the sustainability orientation of an organization has an impact on GI performance. Studies on GI also show that it directly impacts environmental and organizational performance (El-Kassar, and Singh, 2019; Huang and Li, 2017). These performance metrics can be achieved through commitment towards GI actions, such as conserving energy, preventing pollution, and reducing or recycling waste (Takalo and Tooranloo, 2021).

Most prevalent sustainable organizations are believed to be following all three dimensions of SSCM (social, economic, and environmental). GI investments, however, are driven by some of these dimensions; for example, Saunila, Ukko, and Rantala (2018) found all three dimensions of sustainability to be drivers of GI investments and exploitations. The study further concluded that economic and social sustainability were significant drivers of GI.

All in all, SSCM impacts GI, as customers become more eco-conscious, and suppliers consider it worthwhile to alleviate their sustainability concerns and satisfy increasing demands (Wang, Zhao, and Hou, 2020). Furthermore, GI has also been linked with firms' competitive advantage (Zameer et al., 2020; El-Kassar, and Singh, 2019). Several researchers studied GI as mediator between various factors. For example, Zameer et al. (2020) studied GI as mediator between environmental orientation and green competitive advantage. The role of GI is also extended to understanding financial performance in multinational firms (de Azevedo Rezende et al., 2019). Furthermore, GI has also been linked with CEO's foreign market experiences in context of emerging market firms, such as China (Quan, et al., 2021). As organizations become international, they tend to focus on stakeholder's sustainability requirements. To remain

competitive in foreign markets, GI could be considered as a strategic resource for internationalization purpose. Dimensions of SSCM can enhance GI in international firms. Hence, we hypothesize that:

H2a: Supply chain sustainability is positively associated with Green Innovation

4.3. Green innovation and internationalization

Gao, et al (2022) and Usman, Javed, and Yin (2020), advocate the role of GI in the internationalization process of the firm. GI also has the potential to help international firms in crises like COVID-19 (Usman, Javed, and Yin, 2020) and the 2008 financial crisis (Roper, and Tapinos, 2016). It provides firms with solutions to deal with international market uncertainty and also cost advantages. Johanson and Vahlne (2009; 2006) suggest that firms also overcome international market risks and uncertainties through learning opportunities from various stakeholders and business partners. GI is a long-term strategy; it requires that business partners work together in an international context and offer environmental solutions.

In a study on international firms emerging from varied institutional profiles, Leyva-de la Hiz, Hurtado-Torres, and Bermúdez-Edo (2019) found that GI is conditioned by international firms' home-country institutional profiles. For example, firms internationalizing from weak home-country institutions experience liability of origin and to compensate for that, they actively pursue higher GI strategies to seek legitimacy in foreign markets. Additionally, pressures from international stakeholders on firms internationalizing from weak institutional structures enforce firms to proactively act upon environmental concerns.

It is worth noting that institutional pressures are determinants for international firms for achieving environmental innovation ambidexterity thus leading to GI (Chang, and Gotcher, 2020). They further argue that coercive and normative pressures from stakeholders (authorities) force firms to act voluntarily to develop environmental innovation ambidexterity. Hence, it is imperative that international firms respond to stakeholders' pressures and remain competitive through eco-environmental strategies. Based on the literature discussed above we draw the following hypothesis:

H2b: Green innovation is positively associated with internationalization

Inset Figure 1 here

Agency theory also motivates these hypotheses as the principal-agent relationship exists between the importing buyers and exporting suppliers. This relationship needs a formal governance mechanism and agency theory is very well placed to explain this relationship.

5. Methodology

We employed sequential explanatory method, a mixed-method approach, to investigate the role of SSCM in Internationalization, directly and through green innovation. In the first stage, quantitative data was collected with the help of Likert scale-based questionnaire. The collected data was analyzed to test the modeled framework. In the second stage, interviews of leading textile firms were conducted to understand the nature and cause of relationship found in the first stage. Both stages are explained below. We adopted the explanatory sequential approach, as outlined by Chreswell et al. (2007), which commences with quantitative data collection and analysis and is subsequently complemented by qualitative data collection and analysis. This two-phase methodology enables a deeper interpretation of our findings. Our decision to undertake sequential explanatory research stemmed from the need to delve into the contextual factors underlying our model.

5.1. Population and sampling

The focus of the study was textile sector of Pakistan. Three important sub-sectors of textile industry of Pakistan were chosen: ready-made garments, bedwear, yarn. These three sectors are considered to be the leading contributors in the textile exports of Pakistan. The data was collected during Dec 2021 -March 2022, with the help of HEC¹, NRPU² project and IBA-RFPC-85³, Suleman Dawood School of Business (LUMS) research grant OVH122-SDB-UMMAD. Table 1 below exhibits a brief profile of the respondent firms. As reflected in Table 1, the distribution of firms suggests equal representation of all three sectors (Garments 33%, Bedwear 35%, Yarn 32%). Large firms are in majority with 66% of the total sample.

¹ Higher Education Commission

² National Research Program for Universities

³ Institute of Business Administration – Research Funding and Publications Committee

Inset Table 1 here

5.2.Data Collection Instrument

A considerable scholastic work on all the three selected variables of the study could be found in the literature, allowing us to adopt the questionnaire from the established sources. However, to capture the underlying variables truly and precisely, we took the measures from multiple sources and consolidated all of them. (Table 2 explains the constructs, their items, and sources).

Inset Table 2 here

5.3.Analytical Method

The statistical framework uses Partial Least Square Structural Equation Modeling approach. This approach is particularly useful to analyze theoretical relations in non-experimental data. This approach can also handle non-normal distributions. Hence, we have employed PLS-SEM to analyze the modeled relationship of the study.

5.3.1. Qualitative Approach

After determining the nature and extent of the relationship through quantitative analysis, we conducted interviews to explore as to how SSCM influences internationalization directly and indirectly. The purpose of the interview was also to investigate the nature of relationship and transmission mechanism prevailing among the variables. The interviews were conducted from 02 experts, *(both working at the leadership position, General Manager and Director, having more than 20 years of experience in the textiles sector)*. Duration of each interview was 120 minutes. Both the interviews were transcribed, and themes and sub-themes were extracted manually. The overarching purpose of the interview was to get contextual explanation of the relationships

supported in the quantitative analysis. The findings of the interviews have been discussed while explaining the PLS-SEM results.

6. Results

6.1.Measurement Model

Since we employed PLS-SEM, the first step was to ensure reliability and validity of the constructs. For analyzing the reliability and internal consistency of the constructs, we computed CR and CB alpha values, as exhibited in Table 3. According to Hair et al (2016), the values of CR and CB alpha being higher than 0.70, confirm the reliability and internal consistency of the constructs. The results, in Table 3, show that values of CR and CB alpha of all constructs are greater than 0.70, hence confirming that all constructs are reliable.

We examined the twofold validity of the constructs: convergent validity and discriminant validity. The convergent validity has been checked through average variance extracted (AVE) values whereas for discriminant validity, at construct level, has been checked through HTM values. The results in Table 1 show that AVE value of all constructs is greater than 0.50, confirming their convergent validity. Likewise, the value of HTMT less than 0.85 confirming the discriminant validity of all the constructs.

After confirmation of reliability and validity of the constructs, we can proceed to section 6.2 for hypotheses testing.

Inset Table 3 here

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6.2.Hypotheses testing

The results of hypotheses testing are exhibited in Table 5. The first hypothesis study tests the direct impact of supply chain sustainability on a firm's internalization. The results ($\beta=0.31$,

p<0.05), exhibiting a significantly positive impact, support the first hypothesis. The second hypothesis comprises of two sub-hypotheses. First, modelling impact of supply chain sustainability on Green Innovation (H2a) and, second modelling the impact of green innovation on internationalization (H2b). The results, exhibited in Table 5, support both hypotheses, confirming a significant mediating role of green innovation in the association between supply chain sustainability and internationalization. The directly significant mediating effect of green innovation demonstrates that SSCM positively impacts green innovation, which in turn contributes to internationalization performance. It shows that green innovation could be a highly influential tool for promoting the internationalization performance.

The value of R-square (0.632) confirms that significant portion of the variation in internationalization could be explained by supply chain sustainability and green innovation. Likewise, the values of q-square (0.334) show adequate predictive relevance of the model.

Inset Table 5 here

Furthermore, we conducted multi-group analysis (MGA), comparing the large and medium firms (Table 6). Interestingly, the impact of supply chain sustainability on internationalization significantly differs by size of the firms. The coefficient value ($\beta=0.33$) of the impact is higher in case of large firms as compared to medium firms. However, the mediating role of green innovation between supply chain sustainability and internationalization does not differ by size.

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7. Discussion

Consistent with recent calls for research on internationalization, green innovation, and sustainable supply chain (Golgeci, Makhmadshoev, and Demirbag, 2021; Takalo, et al., 2021; Oduro, Maccario, and De Nisco, 2021); this study explored supply chain sustainability issues and their positive influence on internationalization of firms through green innovation. Our findings

indicate that green practices in the manufacturing industry, textile in this case, including green innovation and sustainable supply chain management are directly linked with internationalization. The results of our study have significant implications, particularly for the textile sector. Although it is evident, both from quantitative studies and interviews, that textile firms in Pakistan are aware of the instrumental role of SSCM in improving their international performance, irrespective of any entry mode, a more proactive approach should be adopted for implementing the sustainable supply chain management practices as indicated by interview respondents. Especially, the adoption of international sustainable standards for example, carbon trust standard and green guard need to be ensured irrespective of their demand from the international clients.

We interviewed two (02) experts (*both working in the leadership position, General Manager and Director, having more than 20 years of experience in the textiles sector*) to investigate the nature of the relationship and transmission mechanism prevailing among the variables. The interviewees shared that most of the manufacturing firms in the textile industry of Pakistan work for big international brands; these brands provide their own designs to the Pakistani firms. Due to this, firms have a very limited window for product innovation. Nevertheless, firms have the option of adopting process innovation including novel methods of waste reduction, effluent processing, and the development of economic ways of energy usage; thus, reducing carbon footprint. Adoption of SSCM practices can also help firms innovate their business processes, marginally or radically, making them greener and more cost-effective. Such innovation can significantly help firms compete in the international market. It implies that the adoption of SSCM can simultaneously help respond to external threats and overcome internal process-related weaknesses. These market dynamics, however, induce extra investment and to maximize shareholders' value, these firms only bear an extra cost when there is a return in sight.

Results also show that size of the firm is an important factor to determine how likely a firm is to engage in responsible use of natural resources and sustainable practices driven mainly by internationalization as shown in table 6. It can be explained further by dissecting the 'sustainable supply chain' instrument used for quantitative data collection while looking at individual items. A closer look at the items reveals that most initiatives of firms that were asked about are cash intensive. For example, environmental certifications (EMAS or ISO 14001), energy and water consumption reduction programs, pollution emission reduction and waste recycling programs,

social certifications (SA8000 or OHSAS 18000, BSCI), and Joint efforts with suppliers to improve their sustainability performance all require a high level of commitment, dedication, and financial resources. Hence, based on these findings, firms need to understand that implementation of SSCM may require significant investment in the short term and even in the medium term. However, the long-term gains in the form of improved international performance can outweigh the investment expenditure.

8. Theoretical Implications

Our findings suggest that SSCM and GI are both directly linked with internationalization. From an agency theory perspective this means that internationalization serves as a motivator to eliminate goal conflict and information asymmetry. Prospects of business growth in international markets lower chances of cheating and thus increasing goal alignment. Exporting suppliers or manufacturers are compelled to be more transparent in showing how they manufacture goods, how they treat waste, and where they buy from etc. They can also be more candid about their supplier selection criteria which is a crucial piece of information for SSCM. On the other hand, these findings also indicate that GI adoption in the true sense is not possible without SSCM practices and without empathy for non-profiting stakeholders. In other words, all the major stakeholders involved must have an intention and capability of following sustainable methods. In case of upstream segments of the supply chain these could be suppliers of the focal firm and in case of the downstream segments, these could be distributors, retailers and even consumers. Regulatory bodies of the country of focal firm also play a role in enabling sustainability but this aspect has not been covered in this research.

In comparison with other similar studies that explore the applicability of agency theory on supply chain management (Zu and Kaynak, 2012; Delbufalo, 2018; Gong et al, 2019) we have introduced ‘Internationalization’ as a major factor that may serve as an incentive when setting up governance mechanisms to eliminate goal conflict and information asymmetry thus supplementing the existing understanding and applicability of agency theory.

9. Managerial Implications

The finding that SSCM practices help firms to be more internationally acceptable has useful managerial implications. Overall, this study provides valuable insights to managers for

developing a more effective governance mechanism when dealing with international suppliers where goal conflict, in the words of agency theory, may pose threats to supply chain sustainability. This can be done by using international growth prospects as incentives and possibilities of foreign business loss as penalties for lack of compliance by the international suppliers.

From the suppliers' point of view, especially in a developing country like Pakistan, they must educate themselves on sustainability standards and then seek cooperation from their international buyers for gradually, and thus more economically, transforming their processes greener. This GI focused approach for achieving environmental sustainability will increase their international acceptability and thus will win them more export business without spending on expensive certifications and training.

Strategies that may help these suppliers gradually move towards supply chain sustainability may include green purchasing. Green purchasing is an essential practice for SSCM and it helps firms comply with the international sustainability and eco-standards required by global markets like the EU, and USA. Likewise, we also suggest that firms review their upstream and downstream supply chain processes, for making their supply chain more sustainable. Such mapping helps firms to zoom into their upstream supply chain processes and trace any unsustainable practices/processes and mitigate them immediately. The SC mapping-led SC sustainability not only helps firms to better tap international markets but can also act as a safeguard against scandals like horse-meat scams. Similarly, one of the major impediments for SSCM implementation is supply chain invisibility. As noted by Achilles (2013) and quoted by many studies (Mubarik et al., 2022), *“40% of companies who sourced only in the UK, and almost 20% who sourced globally, had no supply chain information beyond their direct suppliers.”* This information asymmetry, in the words of agency theory, greatly compromises the sustainability of the supply chain management processes and severely impacts a firm's strategic initiatives like internationalization and even compromises its ability to respond to market dynamics. Textile firms are advised to implement SSCM through practices like supply chain mapping, green purchasing, and sustainable strategic sourcing, to compete at the global level. In short, managers can regard SSCM as a strategic tool that can significantly help to tap the global markets.

10. Policy Implications

We conceptualize and examine SSCM in firms with respect to an emerging economy (with specific regards to Pakistan) and our findings imply that government should consider the complementarity between innovation, sustainable use of natural resources, and internationalization when it comes to formulating environmental and business regulations. Policy nudges instead of stiff penalties or exuberant subsidies may prove better for high growth of exporting firms. For instance, policies that help them gain access to new international markets may also prove effective on environmental and sustainability fronts as compared to costly environmental regulations and export refinancing schemes.

11. Conclusions

The overarching objective of the study was to investigate the link between sustainable supply chain management (SSCM), firm internationalization, and green innovation (GI). PLS-SEM results, using data of 146 firms, support all of our hypotheses, revealing significant direct and indirect impacts of SSCM on GI and internationalization performance of a firm. It can be concluded that SSCM is one of the essential drivers of internationalization and firms in a supply chain may use the GI approach to achieve environmental sustainability. Results also show that this GI approach also gets support from internationalization or in other words international exposure and contact with foreign firms. Our study, by using the lens of agency theory, also highlights that goal conflict in these distant buyer-supplier relationships in a supply chain may be prevented through the incentive of increased exports. Cooperation in GI projects may also reduce the level of information asymmetry thus further lowering the chances of covert non-compliances. This study makes two major contributions. It first uniquely complements the internationalization literature by unveiling a major enabler of a firm's international performance. Likewise, study also contributes to literature by shedding light on the role of SSCM and green innovation in firm internationalization. Secondly, the results inform the theory by providing a new basis for governing mechanisms as understood by the agency theory. These findings, thus, add to our understanding that internationalization and foreign business growth could serve as an incentive itself for the principal to offer to the agent for eliminating goal conflict and information asymmetry.

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Figure – 1: Research Model

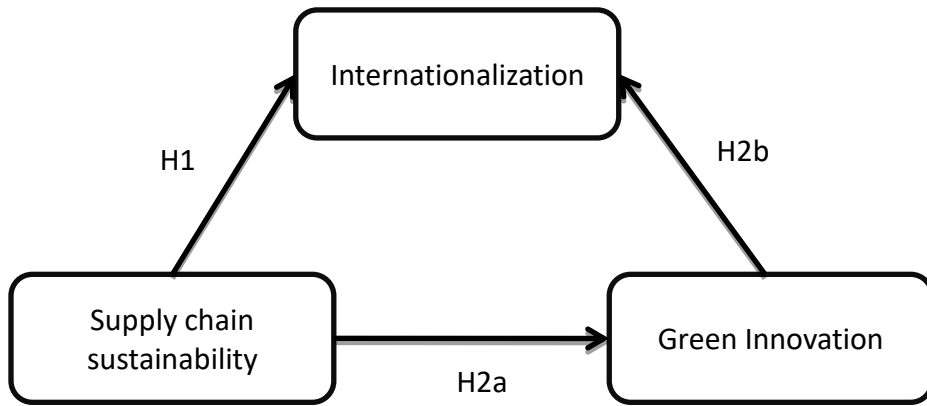


Table 1: Respondents Demography

Industry-wise breakup

Textile Garments	48	33%
Textile Bedwear	51	35%
Cotton Yarn	47	32%

Size

Medium	66	45%
Large	80	55%

Year in exports

between 2 to 05 years	23	16%
06 to 10 years	57	39%
11 years or more	66	45%

Firm Age(years)

1 to 10	30	20%
10 to 20	65	45%
≥ 21	51	35%

Table 2: Constructs and Sources

Construct	Items	Sources
Green Innovation	6	Cuervaetal (2014); Theyel (2000); Piedra-Muñoz et al (2017); Rodriguez and Wiengarten (2017)
Supply Chain Sustainability	10	Gouda and Saranga (2018)
Internationalization	10	Reza et al (2021); Mubarik et al (2020)

Table 3: Reliability, and Convergent Validity (number of observations in this analysis?)

Construct	Code	Loadings	AVE	CR	CB alpha
Green Innovation	GI1	0.68	0.58	0.91	0.78
	GI2	0.77			
	GI3	0.81			
	GI4	0.76			
	GI5	0.75			
	GI6	0.85			
Internationalization	INT1	0.84	0.56	0.92	0.81
	INT2	0.81			
	INT3	0.68			
	INT4	0.77			
	INT5	0.75			
	INT6	0.69			
	INT7	0.72			
	INT8	0.75			
	INT9	0.72			
Supply Chain Sustainability	SCS1	0.77	0.55	0.91	0.88
	SCS2	0.71			
	SCS3	0.76			
	SCS4	0.84			
	SCS5	0.68			
	SCS6	0.76			
	SCS7	0.69			
	SCS9	0.71			

Items int1INT10, and SCS8 have been deleted due to low factor loading

Table 4: Fornell-Larcker Criteria

	VIF	GI	INT	SCS
Green Innovation	1.47	0.76		
Internationalization	2.82	0.46	0.75	
Supply Chain Sustainability (SCS)	2.56	0.51	0.38	0.74

Note: Values in diagonal are square roots of AVE

Table 5: Structural Model Hypotheses Testing

Hypotheses	Relationship(s)	Beta	Std. Error	t- value	Decision	
					p-value	Accept/Reject
H1	Supply Chain Sustainability - Internationalization	0.31**	0.09	3.440	0.000	Accepted
H2a	Supply Chain Sustainability - Green Innovation	0.43**	0.11	3.910	0.000	Accepted
H2b	Green Innovation - Internationalization	0.25**	0.07	3.570	0.000	Accepted

** p < 0.01, * p < 0.05

Note: R² 0.632, Q2 0.334

Table 6: Multi Group Analysis (MGA)

Hypotheses		Large	Medium	 M-S 	p-value
H1	Supply Chain Sustainability- Internationalization	0.33	0.25	0.08	0.043
H2a	Supply Chain Sustainability- Green Innovation	0.41	0.29	0.12	0.032
H2b	Green Innovation - Internationalization	0.23	0.18	0.05	0.081

Appendix: Questionnaire

<i>Green Innovation</i>						
1	Sustainable use of natural resources and environmental technologies	1	2	3	4	5
2	Recycling of waste or waste disposal (End of pipe)	1	2	3	4	5
3	Reuse of energy	1	2	3	4	5
4	Development of ecological products	1	2	3	4	5
5	Reduced use of water	1	2	3	4	5
6	Reduced chemical waste	1	2	3	4	5
		1	2	3	4	5
<i>Supply Chain Sustainability</i>						
Environmental Sustainability (ES)						
1	Environmental certifications (e.g. EMAS or ISO 14001)	1	2	3	4	5
2	Energy and water consumption reduction programs	1	2	3	4	5
3	Pollution emission reduction and waste recycling programs	1	2	3	4	5
Social Sustainability (SS)						
4	Social certifications (e.g. SA8000 or OHSAS 18000)	1	2	3	4	5
5	Formal occupational health and safety management system	1	2	3	4	5
6	Work/life balance policies	1	2	3	4	5
Supplier Sustainability Development (SSD)						
7	Suppliers 'sustainability performance assessment through formal evaluation, monitoring and auditing using established guidelines and procedures	1	2	3	4	5
8	Training/education in sustainability issues for suppliers' personnel	1	2	3	4	5
9	Joint efforts with suppliers to improve their sustainability performance	1	2	3	4	5
<i>Internationalization</i>						
1	I am satisfied with my company's frequent export business	1	2	3	4	5
2	I am overall satisfied with my company's export business	1	2	3	4	5
3	Our company has achieved satisfactory export market share	1	2	3	4	5
4	My company considers export success as an achievement	1	2	3	4	5
5	Level of exports of our firm as compared to competitors	1	2	3	4	5
6	Export growth (past five-years)	1	2	3	4	5
7	Overall level of internationalization	1	2	3	4	5
8	Export intensity (% of sales)	1	2	3	4	5
9	Export position relative to competitors	1	2	3	4	5
10	Repurchase by international clients	1	2	3	4	5