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Buyer supplier relationship and supply chain sustainability: empirical study of Indian automobile industry

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ABSTRACT

Over the last decade, most manufacturing organizations have been experiencing pressure to incorporate sustainability practices in their supply chains. The key reasons behind this pressure may be stated as increased consumer awareness towards environmental issues, stricter environmental laws and regulations, and increased competition. This paper seeks to identify the factors affecting sustainability adoption in the Indian automobile supply chain and investigate the inter-relationships existing among them. The factors have been identified on the basis of a comprehensive literature review and expert opinion. Data were collected through a survey of 157 Indian automobile companies; a carefully prepared questionnaire was used as research instrument. Partial least square (PLS) approach was used to investigate the relationships among various factors leading to sustainability performance. Results indicate that external influence and expected sustainability benefits positively affect top management's commitment towards adoption of sustainable practices. Further, it was found that a better buyer–supplier relationship positively impacted the triple bottom line of sustainability which comprises economic, social, and environmental performance measures. The buyer–supplier relationship was assessed after breaking it down to three constructs - supplier selection, supplier development and supplier performance review. This study is unique and carries a high originality value as it offers a better understanding of: 1) each construct (supplier selection, supplier development and supplier performance review) of the buyer–supplier relationship; and 2) every construct's effect on each dimension (economic, social and environmental) of supply chain sustainability of the Indian automobile industry. Such a comprehensive and detailed study involving the observation of each construct of the buyer–supplier relationship, and analysis of the effect that each construct has on the three dimensions of sustainability has not been carried out before. This way, the study makes a significant contribution to the existing body of literature. The present study has several practical implications which would enable managers to adopt sustainable practices in their supply chain.

1. Introduction

Today, organizations the world over face incessant pressure from consumers, peers and governments to incorporate sustainable practices in their supply chains in order to reduce their carbon footprints and minimize damage to environment and society (Mathiyazhagan et al., 2014; Diabat et al., 2014). Stakeholders demanding goods and services from responsible sources compel companies to develop their goods and service processes, and partnerships on sustainability aspects (Flynn et al., 2015). "Supply chain sustainability is a holistic perspective of supply chain processes and technologies that go beyond the focus of delivery, inventory and traditional views of cost" (Asefeso, 2015). This emerging philosophy is based on the principle that socially responsible products and practices are not only good for the environment, but are important for long-term profitability (Carter and Rogers, 2008; Carter and Jenning, 2002). In practice, supply chain sustainability can include projects to reduce energy cost, any form of waste and application of green technologies. A larger shift involves a deeper level of collaboration with internal and external supply chain partners to reexamine delivery methods, products, packaging and measurement systems (Asefeso, 2015; Seuring and Muller, 2008).

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Some companies consider sustainability adoption an opportunity for creating a marketing and competitive advantage (Clemens and Douglus, 2006). According to Hawken (OECD, 1996) quoted by Bradbury & Clair (1999): "Sustainability is an economic state where the demands placed upon the environment by people and commerce can be met without reducing the capacity of the environment to provide for future generations. It can also be expressed in the simple terms of an economic golden rule for the restorative economy: Leave the world better than you found it, take no more than you need, try not to harm life or the environment, make amends if you do". Thus, sustainability adoption may be understood as the adoption of practices that induce an economic state where needs of the present generation can be met without depleting natural resources to an extent such that needs of future generations might remain unfulfilled. These sustainable practices, when followed consistently and over long periods of time, lead to sustainable development (Elkington, 1994). Thus, a sustainable supply chain is one which, in terms of an extended conceptualization of performance (including natural and social dimensions) as well as conventional terms of profit and loss, performs well. Such conceptualization of performance is usually termed 'the triple bottom line' (Gopal and Thakkar, 2014; Elkington, 1994).

In the past few years, authors have proposed several mechanisms for developing a sustainable supply chain (Flynn et al., 2015; Jabbour, 2015; Govindan et al., 2014a,b; Ashby et al., 2012; Bommel, 2010; Gold et al., 2010; Carter and Rogers, 2008; Klassen and Vachon, 2003). In order to develop a sustainable supply chain, it is necessary to strike a balance among the three aspects (economic, social and environmental performance measures) of the triple bottom line of sustainability (Elkington, 1994; Seuring and Muller, 2008).

Although several empirical studies are available on sustainability, most of them primarily focus on environmental practices (Govindan et al., 2015; Chen et al., 2015; De Giovannia and Vinzi, 2012). On the other hand, there are significant number of empirical studies that concentrates only on the social dimension of sustainability (Bai et al., 2015; Hutchins and Sutherland, 2008; Beske et al., 2008). Further, there are studies that investigate only the economic aspect of sustainability (Avami, 2013; Bottani and Rizzi, 2008; Türkay et al., 2004; Rao and Holt, 2005; Gunasekaran et al., 2001). However, in order to have a holistic and comprehensive understanding of the mechanisms involved in a sustainable supply chain, studies should be carried out that consider all dimensions of sustainability (Jakhar, 2015; Silvestre, 2015). The importance of such a view in the assessment of sustainability performance is emphasized by the following: "Sustainability performance can be defined as the performance of a company in all dimensions and for all drivers of corporate sustainability" (Schaltegger and Wagner, 2006, p.2). It goes beyond the limits of any one organization and emphasizes on the performance of the supply chain in entirety (Fiksel et al., 1999).

In today's context, it is very difficult to achieve sustainability in a supply chain without supplier support (Jabbour et al., 2014). Several firms have acknowledged the importance of working in collaboration with supply chain partners to achieve sustainability in supply chain (Gunasekaran et al., 2014; Ashby et al., 2012; Gold et al., 2010). There are studies that have investigated the role of buyer–supplier relationship (BSR) in developing a sustainable supply chain (Hsu et al., 2013; Meena and Sarmah, 2012; Bommel, 2010; Carter and Rogers, 2008). However, very few studies in extant literature observe the influence of BSR on sustainability of a supply chain in context of developing nations like India (Jabbour et al., 2014; Seuring and Gold, 2013).

According to Abdulrahman et al. (2014), comparatively less research attention has been given to the association between sustainable supply chain and BSR, especially in context of emerging economies. India is a member of the BRICS (Brazil, Russia, India, China, South Africa) nations, which also form part of the G20 countries. According to the International Monetary Fund, India is expected to be the fastest growing economy among the G20 countries with a growth rate of 7–7.5% in the financial year 2015–16 (IMF, 2015). According to a world investment report by UNCTAD in 2015, India has been ranked 9th amongst nations receiving highest FDI (Nazareth, 2015). In terms of sustainability efforts, India's commitment to environmental issues on a legislative level is evident by recent amendments (made in 2014) to the Environment Protection Act (1986). These statistics make studies in an Indian context more relevant.

Although several studies discuss the topic of developing a sustainable supply chain (Bai et al., 2015; Kannegiesser et al., 2015; Govindan et al., 2014a,b; Jabbour et al., 2014; Hsu et al., 2013; Mitra and Datta, 2014; Ashby et al., 2012), very few studies examine the role of BSR activities on the tipple bottom line of sustainability. The authors feel the need for a conceptual model that addresses this issue, particularly in an Indian context. The present paper attempts to fill this gap in extant literature by proposing a conceptual model to develop a sustainable supply chain in the Indian automobile industry. The major reasons behind selecting the Indian automobile industry for study is that it is one of the fastest growing sectors in India and has more than 7 percent contribution in the GDP of India (Raj and Bhaskar, 2015). According to the Automotive Mission Plan (2006–2016), Ministry of Heavy Industries and Public Enterprises, Department of Government of India, the industry's contribution to Indian GDP is expected to rise to 10 percent by 2016. Further, the Indian automobile industry is expected to employ 25 million people by 2016 (Raj and Bhaskar, 2015).

Different factors/constructs affecting sustainability adoption in supply chain have been identified in this study on the basis of a review of existing literature and discussion with experts. The factors thus identified are as follows: external pressure and support, benefits of sustainability adoption, top management commitment, buyer–supplier relationships (supplier selection, supplier development, supplier performance review), and sustainable supply chain (economic, social and environmental dimensions). This paper also attempts to answer the following research questions (RQ):

RQ1. How do external pressure, support, and expected benefits of sustainability adoption affect the commitment of top managements of supply chain companies?

RQ2. How does top management commitment of supply chain companies affect the buyer supplier relationship (supplier selection, supplier development, and supplier performance review)?

RQ3. How does buyer–supplier relationship (supplier selection, supplier development, and supplier performance review) affect sustainability (social, economic, and environmental performance dimensions) of the supply chain?

The rest of the paper is organized as follows: Section 2 presents the conceptual model and related hypotheses. Research methodology and data collection are discussed in Section 3. Results are presented in Section 4. Section 5 analyses the structural model. Discussions are presented in Section 6. Section 7 comprises conclusion and managerial implications.

2. Proposed conceptual model and hypotheses

This section proposes a research framework and lays down a set of hypotheses. Based on an in-depth literature review and opinion of experts (academics, practitioners and supply chain consultants), it was found that external influence, benefits of sustainability adoption, top management commitment and buyer–supplier relationship (supplier selection, supplier development and

performance review) were the main antecedents to affect sustainable practice adoption in supply chain.

2.1. Developing top management commitment

The proposed conceptual model and related hypotheses are shown in Fig. 1; arrows depict relationships among the considered constructs. The integration of sustainability with corporate objectives is one of the primary tasks for supply chain partners when adopting sustainable practices (Seuring and Muller, 2008). A sustainable supply chain offers companies a chance to gain competitive advantages and address environmental, economic, and social issues (Buyukozkan and Cifci, 2010). Resource-based theory (RBT) also known as 'resource based view of the firm' describes and predicts how sustainable competitive advantage can be gained by organizations by acquiring and controlling resources. When capabilities and resources lead to abnormal profits, they are believed to be associated with competitive advantage (Barratt and Oke, 2007). Such resources comprise tangible (e.g. equipment) and intangible (e.g. information or process knowledge) assets vital for production and delivery of goods and services (Olavarrieta and Ellinger, 1997). Previous research on supply chain management has used RBT; Eisenhardt and Schoonhoven (1996) suggested that supply chain linkages represented a type of BSR, the investigation of which involved the use of RBT.

Having said that, most companies adopt sustainable practices due to external influence or pressure from various agencies such as human right organizations (Bommel, 2010; Peters et al., 2011), NGOs (Seuring and Muller, 2008), competitors (Diabat et al., 2014), society (Carter and Rogers, 2008), customers and government (Holt and Ghobadian, 2009).

Clemens and Douglus (2006) studied the possibilities of improving sustainability across the US steel industry supply chain by coercion. Their results showed that coercion had a positive impact on sustainable practice adoption among supply chain partners. González-Benito and González-Benito (2006) discussed the role of stakeholder pressure in adoption of environmental practices. According to Lai and Wong (2012), regulatory pressure played a positive role in adoption of environmental practices in Chinese manufacturing firms. Meixell and Luoma (2015) suggested that pressure from stakeholders may result in sustainable practice adoption and establishment of sustainability goals. Gillet-Monjarret (2015) found that pressure from media agencies also pushed companies towards sustainability adoption.

Apart from external pressure, support from various groups (customers, NGOs, media, trade associations, etc.) also influences the commitment of top management of supplier companies to adopt sustainable practices (Carter and Rogers, 2008). Thus, supply chain partners may extend their support by providing finance, employee training, and sharing technology and knowledge (Seuring and Muller, 2008; Simpson and Power, 2005).

Further, the various benefits of sustainable practice adoption influence the commitment of top management to adopt sustainable practices in their supply chain (Young and Kielkiewicz-Young, 2001; Buyukozkan and Cifci, 2010). These benefits include: new market opportunities, customer satisfaction, premium pricing, etc (Clemens and Douglus, 2006; Vachon and Klassen, 2008; Bowen et al., 2001; Ytterhus et al., 1999). A sustainable supply chain also provides various financial, operational, and quality benefits to companies (Bowen et al., 2001; Ytterhus et al., 1999).

According to resource based theory, the company having most of its resources in the supply chain has a higher influence across the supply chain. It is logical to assume that a firm with higher influence would be in a better position to initiate the sustainability adoption process in the supply chain by strengthening BSR and sharing resources.

Significant work has been done to develop stakeholder theory (Co and Barro, 2009; Wagner Mainardes et al., 2011) from normative, descriptive, and instrumental perspectives (Donaldson and Preston, 1995) since Hannan and Freeman (1984) published his seminal book, Strategic Management: A Stakeholder Approach. Researchers have attempted to classify stakeholders to understand general stakeholder environment (Mitchell et al., 1997) and stakeholders' influence on firms. Several scholars have suggested that an organization could adopt different approaches such as proaction, accommodation, defense, and reaction (Wagner Mainardes et al., 2011) to accommodate each primary stakeholder group. It is clear from the above discussion that stakeholders (such as government, NGOs, suppliers and customers) are in a position to influence the decisions of top management on important issues. All stakeholders are important for an organization, and firms need to consider and accommodate their views. Thus, we hypothesize:

H1: *External influence positively affects top management commitment towards sustainable practice adoption.*
H2: *Expected benefits of sustainable practice adoption positively affect top management commitment towards sustainable practice adoption.*

2.2. Top management commitment and BSR

Seuring and Muller (2008) and Carter and Rogers (2008) were amongst the first to investigate the concept of sustainable supply chain. They emphasized on the importance of building a long-term BSR in adoption of sustainable practices. For successful incorporation of sustainable practices in operations, it is important that

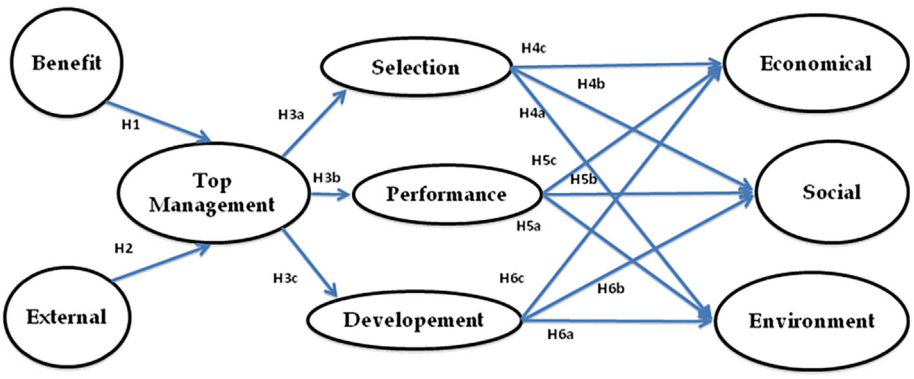

Fig. 1. Proposed conceptual model and associated hypotheses.

cooperation, coordination, and integration between buyers and suppliers exist (Jabbour and Jabbour, 2009; Govindarajulu and Daily et al., 2004; Buyukozkan and Cifci, 2010). Both upstream and downstream collaborations with supply chain partners directly affect adoption of environmental sustainability practices (Vachon and Mao, 2008; Klassen and Vachon, 2003; Simpson and Power, 2005). Companies may use relationship strategies to motivate their supply chain partners to adopt sustainable operations, and foster trust and commitment in the long-term (Cheung and Rowlinson, 2011; Clemens and Douglus, 2006). Ageron et al. (2011) argued that companies should provide necessary help and support to suppliers for incorporating sustainable practices in operations. Therefore, to successfully implement sustainable practices across the supply chain, a long-term relationship with partners is required (Klassen and Vachon, 2003). Moreover, a long-term BSR increases sustainability benefits such as improved market share, and greater revenue and trust (Ytterhus et al., 1999; Zhu et al., 2008b; Kumar and Rahman, 2013). Top management commitment to sustainability objectives has been investigated by Daily and Huang (2001) and Govindarajulu and Daily (2004). According to their research, Top management commitment towards sustainability leads to motivate the various stakeholders of an organization. A sustainable BSR includes three tasks – supplier selection, supplier development, and supplier performance review. The following hypotheses are constructed based on the literature review above:

H3a: *Top management commitment is directly related to the incorporation of supplier selection for improving sustainability performance.*
H3b: *Top management commitment is directly related to the incorporation of supplier development for improving sustainability performance.*
H3c: *Top management commitment is directly related to the incorporation of performance review of suppliers for improving the sustainability of supply chain.*

Developing good relationships with suppliers is a long process (Miemczyk et al., 2012; Ford, 1980). In order to build a sustainable supply chain, firms need to select the right suppliers (Hutchins and Sutherland, 2008; Cilibereti et al., 2008; Rao and Holt, 2005; Tsoulfas and Pappis, 2006). Rao and Holt (2005) proposed the concept of greening each stage of the supply chain to develop an integrated green supply chain. To reduce environmental damage, Koplin et al. (2007) discussed four levels of the supplier management system: normative requirements, early detectors, supply process, and supplier monitoring and development. According to Hutchins and Sutherland (2008), selection of the right supplier positively affected social sustainability outcomes. Further, companies could use the various resources of the supplier to improve social sustainability. Tsoulfas and Pappis (2006) found that manufacturers shared the responsibility of sustainable practice adoption with suppliers, consumers, and other partners in the supply chain. Therefore, selection of good suppliers becomes an important activity in improving sustainability performance of the supply chain.

To achieve a long-term BSR, the expectations of both parties must be fulfilled (Meena and Sarmah, 2012). From the sustainability perspective, a buyer firm may look for improved sustainability performance from the supplier, while the supplier firm may look for more business from the buyer (Zutshi and Sohal, 2004; Rocha et al., 2007). A study by Koplin et al. (2007) on Volkswagen showed that supplier selection on sustainability standards was one of the important activities pursued by firms. Sustainability standards and certifications are voluntary, usually third party-assessed, norms and standards relating to environmental, social, ethical and food safety issues, adopted by companies to demonstrate the performance of their organizations or products in specific areas (Giovannucci et al., 2014). Michelsen (2007) established that selection of appropriate supplier(s) increased the chances of better sustainability outcomes. Similarly, Vachon and Klassen (2006), Shen et al. (2013) discovered that right supplier selection was crucial to developing a sustainable supply chain. Thus, we hypothesize:

H4a: *Incorporation of supplier selection activities in sustainability standards improves environmental performance of supply chain.*
H4b: *Incorporation of supplier selection activities in sustainability standards improves social performance of supply chain.*
H4c: *Incorporation of supplier selection activities in sustainability standards improves economic performance of supply chain.*

After selecting the right supplier(s), it is necessary to extend required help and support to them. Various strategies such as conducting supplier conferences, on-site visits and training programmes, and building teams comprising representatives from both buyer and supplier firms are necessary for supplier development (Simpson and Power, 2005; Zutshi and Sohal, 2004; Bommel, 2010). Information sharing and mutual commitment towards building strong BSR are also helpful in developing suppliers and improving supply chain performance (Simpson and Power, 2005; Rao and Holt, 2005; Peters et al., 2011; Rocha et al., 2007). Companies also need to monitor their supply chain partners on parameters such as coordination and collaboration in different activities like purchasing, manufacturing and marketing (Miemczyk et al., 2012; Vachon and Klassen, 2006). Bommel (2010) emphasized on the importance of continuous monitoring of suppliers' efforts towards implementation of sustainable business practices. Fortes (2009) asserted that supplier certification, supplier base reduction, and pressurizing suppliers towards adopting sustainable practices were good strategies for supplier development. Cilibereti et al. (2008) discussed the concept of clear contracts for supplier development. It can be said on the basis of the discussion above that continual supplier development efforts influence the triple bottom line of sustainability. Therefore, the following hypotheses are constructed:

H5a: *Incorporation of supplier development activities in sustainability standards improves environmental performance of supply chain.*
H5b: *Incorporation of supplier development activities in sustainability standards improves social performance of supply chain.*
H5c: *Incorporation of supplier development activities in sustainability standards improves economic performance of supply chain.*

Supplier assessment is necessary to determine the supplier's readiness to adopt sustainable practices (Keatinga et al., 2008). According to Hamprecht et al. (2005), developing sustainability quality standards and assessing suppliers on those standards is essential to improve the performance of the sustainable supply chain. Simpson and Power (2005) suggested continuous reviews of supplier performance outcomes on each sustainability dimension. Klassen and Vachon (2003) analyzed two types of activities (sustainability evaluation and collaboration) for improving sustainability performance of the supply chain. Focal companies are effectively pressurizing supply chain partners towards sustainable practice adoption by integrating environmental and sustainability targets in their purchase policies (Ytterhus et al., 1999). Vachon (2007) showed that collaboration with suppliers towards environmental issues was associated with decreased individual

investment in sustainable practices. The following hypotheses are constructed based on the literature review above:

H6a: *Incorporation of performance review activities in sustainability standards improves environmental performance of supply chain.*
H6b: *Incorporation of performance review activities in sustainability standards improves social performance of supply chain.*
H6c: *Incorporation of performance review activities in sustainability standards improves economic performance of supply chain.*

3. Research instrument and data collection

The research methodology used in this paper is discussed in Fig. 2. We identified total nine factors/constructs based on expert opinion and pertinent literature review. The panel of experts included academics, and middle and top-level managers of the Indian automobile industry. The key reason behind choosing the Indian automobile industry for this study is the presence of many global automobile manufacturers such as Suzuki, Yamaha, Honda, Ford, Toyota, etc. As a result, these companies face tough competition from one another in terms of cost, quality, delivery, and operational flexibility. The authors opine that these companies may consider sustainability as a means to achieve a competitive advantage and face stiff competition.

The constructs considered in the study are unobservable (latent) variables [benefits (BENF), external influence (EXT), top management commitment (TC), supplier selection (SS), supplier development (SD), performance review (PR), economical sustainability (ECS), social sustainability (SSC), and environmental sustainability (EVS)]. The constructs are indirectly observed by indicators or manifest variables. The list of constructs and their observable items are given in Appendix I. The use of multiple items or questions for each construct increases the precision of estimate as compared to when using a single item. To develop a multiple item scale for each construct, we followed most of the steps (except fourth and fifth) recommended by Churchill (1979).

The questionnaire used in this study can be divided into four parts: The first part consists of general questions regarding the demographic profile of respondents. The second part includes questions related to expected benefits, external influence, and top management commitment. The third part comprises questions related to BSR, and the last part contains questions related to sustainability in supply chain. Respondents were asked to indicate the degree to which they agreed with the statements on a seven-point Likert scale (Meena and Sarmah, 2012). An example of a question from the benefits construct is shown below:

"Relative benefits offered by the sustainable supply chain over conventional supply chain"

Please rate your response on a scale of 1–7, *where* "1" – *strongly disagree and* "7" – *strongly disagree.*

Various approaches were used to motivate respondents and increase the response rate. The questionnaire included a declaration that ensured respondents of confidentiality of their identities. The survey was conducted on the companies listed in Automotive Component Manufacturers Association (ACMA, 2013) and the Society of Indian Automobile Manufacturers (SIAM, 2013). Data were collected through postal and online surveys. Further, researchers personally visited several companies and conducted structured interviews using the questionnaires prepared for the survey. Each company was treated as a single unit of analysis. This means that our sample of 141 responses comprised 141 companies.

The questionnaires were sent to middle and top-level managers of 738 companies by e-mail and surface mail. Both types of mail included a cover letter that explained the objective of the study, and a questionnaire. The mails (email and surface mail) were sent in February 2013 and after one month, a reminder was sent along with another cover letter and questionnaire. A follow up e-mail was sent in the first week of May 2013. Telephonic and personal reminders were also sent regularly to increase the response rate. Of the 738 questionnaires distributed, 157 responses were received (giving a

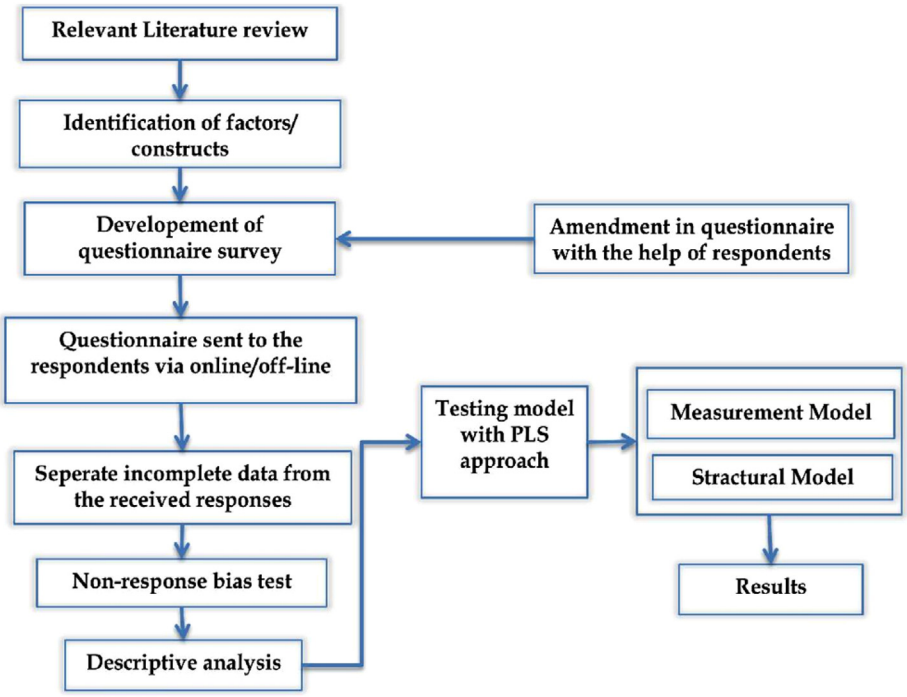

Fig. 2. Flowchart of research methodology.

Table 1
Responses received during data collection.

Industry Category/Responses		Total
First Round	Delivered	738
	Received	21
Second Round (First reminder)	Delivered	717
	Received	31
Third Round (Second reminder)	Delivered	686
	Received	46
Fourth Round (Follow up)	Delivered	640
	Received	59
Total	Delivered	738
	Received	**157**

response rate of 21.27 percent). Of these, 16 responses were eliminated due to errors in completing the questionnaire. Therefore, the effective sample size for the study was 141. These responses were received in four rounds as shown in Table 1. The number of responses received in the first, second, third and fourth rounds were 21, 31, 46, and 59 respectively.

The demographic analysis of respondents revealed that 68.79 percent of the respondents held middle-level management positions [such as Assistant Production Manager, Assistant Manager (Quality Control), Assistant Manager (Purchases)]; 7.8 percent held top-level management positions (such as President, VP, Executive Director); and 13.47 percent held senior-level managerial positions [such as Production Manager, Manager (Quality Control), Manager (Purchases)]. 53 percent of the respondents had 5–10 years of experience, 9.2 percent respondents had more than 10 years of experience, and 16.31 percent respondents had less than 5 years of experience. This clearly demonstrates that the respondents were widely experienced and held significant positions.

Non-response bias test was conducted to check for any biasness in collected data based on response time by comparing early (21) and late responses (21) (Armstrong and Overton, 1977). ANOVA F-test was used to compare any differences with respect to response time. Analyses reveal that there was no significant difference between the two groups and confirm that there is no concern of non-response biasness in this study.

Common method bias test as described by Podsakoff et al. (2003) and Williams et al. (2003) was also conducted in the study. They proposed adding a common factor in the model that included all indicators of principal constructs. One construct in our PLS model was added whose indicators are the indicators of the entire principal construct. The substantive factor loading of the indicators on the method factor and principal factor has been compared. In our study, average variance explained by the method factor is only 0.036 while that shown by the principal construct is 0.68, giving a ratio of nearly 1:19. Based on these results, common method biasness does not seem to be a concern in our study (Meena and Sarmah, 2012).

3.1. Data analysis

Extant literature mentions two techniques to assess a structural model — LISERAL based structural equation modeling (SEM) which is also called covariance based SEM, and partial least square (PLS) method, which is a variance-based technique (Wold, 1985). PLS technique has been applied by researchers in different areas of management — marketing, human resource management, consumer psychology, and corporate social responsibility (Fornell et al., 1990; Pavlou and Fygenson, 2006; Hulland, 1999; Sosik et al., 2009; Meena and Sarmah, 2012; Jabbour et al., 2014). As a rule of thumb, the minimum sample size required for PLS is 100 (Chin, 1998; Barclay et al., 1995), which makes this technique appropriate for our study. SmartPLS, Version 2.0 M3 (an open-source software package) was utilized for analysis (Ringle et al., 2005).

3.2. Unidimensionality check of the blocks

First, the unidimensionality of all constructs was checked before starting path model analysis. This is required when manifest variables are connected to latent variables in a reflective way (Tenenhaus et al., 2005). The unidimensionality of a block can be tested using different methods such as principal component analysis of the block, Cronbach's-α, and Dillon-Goldstein's-α. If the first eigenvalue of the correlation matrix of a block is more than one and the second eigenvalue is less than one or at least far from the first one, then the block can be considered as unidimensional (Malhotra and Dash, 2009). Similarly, if the values of Cronbach's-α and Dillon-Goldstein's-α are greater than 0.7, then also a block is considered unidimensional. The results are shown in Table 2.

Results indicate that the values of Cronbach's- α and Dillon-Goldstein's- α are greater than 0.7 for each block. Likewise, the first eigenvalue is greater than one and the second eigenvalue is less than one. Therefore, the unidimensionality of all the blocks is acceptable.

4. Measurement model and results

The measurement model presents the relationships between each block of the indicators and their latent variable. Results of the measurement model are presented in Table 3. The strength of the measurement model for constructs with reflective measures was examined by looking at individual item reliability, internal consistency, and discriminant validity. Reliability, consistency, and validity tests performed are explained in the following sub-sections.

4.1. Internal consistency

Internal consistency was checked using composite reliability (CR) and Cronbach's- α. The reliability of each item or manifest variable in PLS is examined by computing the loading of the

Table 2
Unidimensionality check of the blocks.

Latent Variable	No. of indicators	Cronbach's-α	Dillon-Goldstein's-α	First eigenvalue	Second eigenvalue
Benefits	4	0.8070	0.8720	2.537	0.572
Development	5	0.8371	0.8847	3.031	0.573
Economical	4	0.7189	0.8419	1.922	0.609
Environmental	3	0.7837	0.8545	2.394	0.714
External	4	0.8038	0.8717	2.521	0.641
Performance	3	0.8058	0.8850	2.163	0.496
Selection	3	0.7783	0.8722	2.103	0.695
Social	3	0.7115	0.8273	1.847	0.633
Top Management	5	0.8563	0.8962	3.177	0.708

Table 3
Outer model results.

Latent variable	Manifest variable	Outer weight	Loading	Communality	AVE	CR	Cronbach's alpha
Benefits	BEN1	0.3931	0.8200	0.7770	0.6305	0.8720	0.8071
	BEN2	0.3118	0.8200	0.8330			
	BEN3	0.2413	0.7820	0.8240			
	BEN4	0.3099	0.7530	0.7490			
External	EXT1	0.2918	0.7990	0.8150	0.6297	0.8717	0.8039
	EXT2	0.3049	0.7720	0.7790			
	EXT3	0.3302	0.8300	0.8280			
	EXT4	0.3333	0.7720	0.7510			
Top Management Commitment	TC1	0.2723	0.8010	0.7970	0.6335	0.8962	0.8564
	TC2	0.2342	0.8050	0.8240			
	TC3	0.2036	0.7870	0.8180			
	TC4	0.2528	0.7880	0.7770			
	TC5	0.2927	0.7980	0.7690			
Selection	SS1	0.3723	0.8800	0.9150	0.6955	0.8721	0.7784
	SS2	0.4040	0.8660	0.8990			
	SS3	0.4299	0.7500	0.6760			
Performance	PR1	0.4377	0.8930	0.8830	0.7200	0.8850	0.8059
	PR2	0.4018	0.8520	0.8430			
	PR3	0.3342	0.7980	0.8200			
Development	SD1	0.2499	0.7500	0.7490	0.6058	0.8847	0.8371
	SD2	0.2285	0.7630	0.7760			
	SD3	0.2901	0.8140	0.8030			
	SD4	0.2458	0.7500	0.7490			
	SD5	0.2679	0.8120	0.8130			
Economical	ECS1	0.3950	0.7810	0.7950	0.6397	0.8419	0.7189
	ECS2	0.4046	0.8210	0.8370			
	ECS3	0.4507	0.7980	0.7690			
Social	SSC1	0.4093	0.7990	0.8130	0.6332	0.8381	0.7115
	SSC2	0.4599	0.8180	0.7890			
	SSC3	0.4046	0.7690	0.7510			
Environmental	EVS1	0.3009	0.7810	0.8020	0.6037	0.8590	0.7837
	EVS2	0.2695	0.7630	0.7970			
	EVS3	0.3796	0.7830	0.7290			
	EVS4	0.3443	0.7810	0.7630			

manifest variables on their latent variable (block). Many studies show that a Cronbach's- α value of 0.7, and a loading of more than 0.7 (loading of manifest variables on their latent variable) are acceptable for reliability. In this paper, all manifest variables have a loading of more than 0.7 with their respective latent variables. Results in Table 3 depict that values of Cronbach's- α and composite reliability (CR) are more than 0.7.

Communality was used to measure the capability of manifest variables to describe latent variables (Fornell and Cha, 1994). The value of communality for each manifest variable should be equal to or more than 0.60. Results show that the value of communality for all manifest variables is more than 0.60. The composite reliability (CR) and Cronbach's- α are measures for construct reliability and the values of these indicators should be greater than 0.7 (Fornell and Cha, 1994). Table 3 exhibits that the values of Cronbach's- α and CR are more than 0.7 for all constructs. Therefore, all constructs can be considered reliable.

4.2. Convergent validity

Convergent validity refers to the degree to which measures of constructs that theoretically should be related are in fact related. Convergent validity of the constructs can be examined using average variance extracted measure (AVE) (Fornell and Larcker, 1981). AVE is the average value of the squared loadings of each item on a construct. AVE is used to quantify the amount of variance captured by the items of a construct as against the amount of variance caused by the measurement error. The value of AVE should be greater than or equal to 0.5 to justify the construct's convergent validity (Fornell and Larcker, 1981). Table 3 reveals that AVE values for all constructs are more than the recommended 0.5, which ensures convergent validity.

4.3. Discriminant validity

Discriminant validity indicates the extent to which a given construct is different from other constructs (Götz et al., 2010). A construct should share more variance with its own measures rather than with the measures of other constructs (Hulland, 1999). Discriminant validity can be estimated by comparing the square root of the AVE (diagonal values) with the correlation among latent variables to ensure that the square root of AVE is more than the correlation among latent variables (Chin, 1998). As shown in Table 4, all constructs were more strongly correlated with their own measures and not with measures of other constructs. Results suggest good convergent and discriminant validity. The above analysis clearly indicates that the measurement model is reliable and valid.

5. Structural model

In PLS analysis, there are two criteria for evaluating the model. The first criterion is the coefficient of determination R^2 and the second criterion is the significance level (Chin, 1998). According to Falk and Miller (1992), the value of R^2 should be greater than 0.1. Results of analysis of the structural model are provided in Fig. 3. This paper considers three output variables – social, economic, and environmental sustainability of a supply chain. All three constructs have R^2 values of 0.568, 0.665, and 0.660 respectively. This indicates that the proposed model explained high variance. The R^2 values of other constructs – top management commitment, supplier selection, supplier performance, and supplier development were 0.529, 0.268, 0.432, and 0.322, respectively. The variance explained by these constructs is also within acceptable range.

In PLS, the goodness of fit (GoF) assesses the overall fitness of the model, and is utilized to judge its applicability for model

Table 4
Correlation between latent variables.

Constructs	BENF	SD	ECS	EVS	EXT	PR	SS	SSC	TC
BENF	**0.7941**								
SD	0.6053	**0.7783**							
ECS	0.7008	0.7052	**0.7998**						
EVS	0.7205	0.7353	0.7689	**0.7770**					
EXT	0.7586	0.6222	0.5853	0.6306	**0.7936**				
PR	0.7542	0.7208	0.7612	0.7257	0.7792	**0.8486**			
SS	0.6179	0.7335	0.7165	0.7297	0.6009	0.6814	**0.8340**		
SSC	0.6344	0.6605	0.6349	0.6801	0.6813	0.7252	0.5928	**0.7957**	
TC	0.6206	0.5673	0.5458	0.571	0.7183	0.657	0.518	0.6284	**0.7959**

prediction. The GoF of a model can be expressed mathematically as: $GoF = \sqrt[2]{\overline{Comunality} * \overline{R^2}}$, where, $\overline{Comunality}$ = weighted average of different communality (=AVE in PLS) and =average R^2 of all the constructs (Tenenhaus et al., 2005). The value of GoF varies from 0 to 1, where a greater value indicates better predictive ability. In this paper, GoF value is 0.637, which indicates significant model fit.

Path analysis provides a statistical tool to test and confirm the structural model to assess the hypotheses that represent relationships among the considered variables (Kline, 2005). The main goal of path analysis is to make an approximation of the degree of association among the variables to investigate the existence and extent of causal relationships (Asher, 1983). Path analysis also evaluates the relative importance of different direct and indirect causal paths leading to dependent variables. Fig. 3 represents the path analysis conducted in this study.

The structural model was tested by examining the path coefficients and their significance levels in PLS. All items were standardized to zero mean and one variance. The PLS bootstrapping approach was used considering 200 cases and 500 random samplings to compute the value of path coefficients and item loadings (Chin, 1998). The item loadings and path coefficients were re-estimated for each variable and accordingly, t-statistics were calculated for all constructs. The results obtained from PLS bootstrapping are shown in Table 5. There are total 14 hypotheses investigated in this paper. The reason behind such a large number of hypotheses is classification of BSR into three categories—supplier selection, supplier development, and supplier performance review. Similarly, sustainability was also considered from three perspectives—economic, social and environmental, as proposed by Elkington (1994).

Table 5 indicates that hypotheses H_2, H_{3a}, H_{3b}, H_{3c}, H_{5b}, and H_{6a} are supported at a significance level of 0.0001, while hypotheses H4a and H5a are supported at a significance level of 0.001. Further, hypotheses H1, H6b, H4c, and H5c are supported at a significance level of 0.01. However, the collected data do not support hypotheses H_{4b} and H_{6c}.

Thus, path analysis suggests that expected benefits (BENF) and external pressure (EXT) positively affect the commitment of the top-level management towards adoption of sustainable practices in the supply chain. Results show that top-level commitment is positively and directly related to development of BSR (supplier selection, supplier development, and supplier performance review). Further, inclusion of supplier selection activities in sustainability standards improves the environmental and economic performance of the supply chain. Also, consideration of supplier development activities in sustainability standards positively affects the social and environmental performance of the supply chain. Finally, incorporation of supplier performance review in sustainability standards improves the environmental, social and economic performance of the supply chain. Thus, hypotheses H_{4b} and H_{6c} are not supported by collected data and need further investigation.

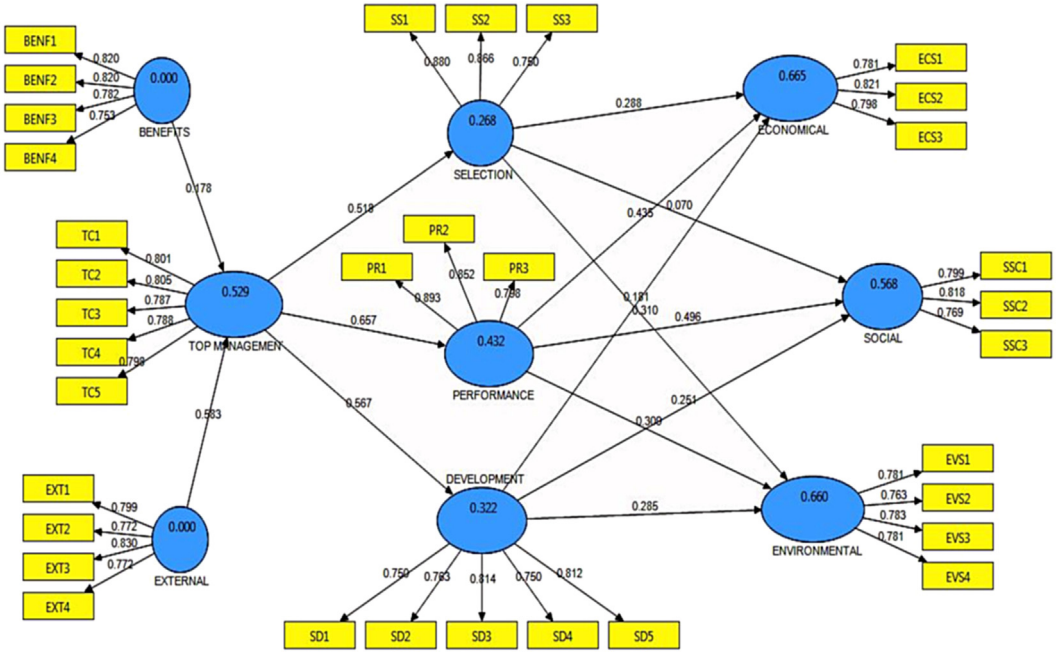

Fig. 3. Results of structural model.

Table 5
Path coefficients and related hypotheses decisions.

Hypothesis	Path	Path coefficient	T statistics	P value	Decision
H_1	Benefits – Top Management	0.1782	2.2759	0.0244*	Supported
H_2	External – Top Management	0.5831	6.3475	0.0001***	Supported
H_{3a}	Top Management – Selection	0.5180	5.7748	0.0001***	Supported
H_{3b}	Top Management – Performance	0.6570	11.5876	0.0001***	Supported
H_{3c}	Top Management – Development	0.5673	7.5143	0.0001***	Supported
H_{4a}	Selection – Environmental	0.3100	3.5282	0.0006**	Supported
H_{5a}	Performance – Environmental	0.3088	3.6757	0.0003**	Supported
H_{6a}	Development – Environmental	0.2853	3.0851	0.0024***	Supported
H_{4b}	Selection – Social	0.0704	0.7958	0.4275	Not-supported
H_{5b}	Performance – Social	0.4961	4.2111	0.0001***	Supported
H_{6b}	Development – Social	0.2513	2.5378	0.0122*	Supported
H_{4c}	Selection – Economical	0.2876	2.4438	0.0158*	Supported
H_{5c}	Performance – Economical	0.4350	3.2329	0.0015*	Supported
H_{6c}	Development – Economical	0.1807	1.5373	0.1265	Not-supported

*$P \leq 0.05$ which means that our hypotheses are accepted/rejected at 0.95 confidence level.
**$P \leq 0.01$ which means that our hypotheses are accepted/rejected at 0.99 confidence level.
***$P \leq 0.001$ which means that our hypotheses are accepted/rejected at 0.999 confidence level.

6. Discussion

Based on the fact that sustainable supply chain is an important subject (Jabbour et al., 2014; Jabbour, 2015; Govindan et al., 2014a,b), our study explores a new model to determine whether BSR strategies (supplier selection, supplier development and supplier performance review) focusing on the adoption of sustainable practices influence the sustainability performance of the supply chain. All the direct relationships proposed in our conceptual model were statistically tested and validated. Thus, results of our study are supported by existing literature. Further, findings emphasize that sustainability performance of a supply chain can be improved by developing a strong buyer–supplier relationship (Seuring and Muller, 2008; Jabbour et al., 2014; Flynn et al., 2015). Commitment of top management of supply chain partners towards adoption of sustainable practices seems very vital to developing sustainability focused BSR (Bai et al., 2015; Kannegiesser et al., 2015). However, no positive relationship was found between supplier selection and social performance of supply chain (H_{4b}), and supplier development and economic performance of supply chain (H_{6c}). Barring these two hypotheses, all results of our study are in line with erstwhile research (Zutshi and Sohal, 2004; Lin, 2007).

Rejected hypothesis revealed some important and interesting insights relevant for future researchers. Our study stipulated that supplier selection is not positively contributing to the social sustainability of supply chain. Key reasons behind this rejection could be turning of items such as, rights to employees, fair trade & practices, under social sustainability into hygiene factor (bare minimum criterion) for supplier selection under existing regulations in various countries. Henceforth, supplier selection does not exhibit significant influence over social sustainability of the supply chain as an overall construct in structural model. Additionally, social welfare as one item of social sustainability has significant effect on supplier selection but it does not represent the construct as a whole. Therefore other MCDM techniques can also prove useful during the supplier selection process (Kumar et al., 2016). It is also evident through findings that supplier development is not helping in improvement of the economical sustainability of the supply chain which could be attributed to significant investment of resources in form of money, training of suppliers, sharing and development of technology, and conducting workshop & seminar. Numerous studies have insisted that short run sustainability adoption is a costly process, whereas long run sustainability adoption actually pays (Seuring and Muller, 2008; Kumar et al., 2016). Therefore instead of arguing on supplier development for sustainability adoption as having negative effect on the economical sustainability, author calls for future studies of longitudinal nature to reveal clarity on the current issue.

To our knowledge, a conceptual model of this nature that considers Indian automobile companies and automotive component manufacturers has not been tested before. Further, it was found that expected benefits of sustainability adoption and external influence had a positive effect on the commitment of top management of supply chain partners towards the adoption of sustainable practices. Thus, it can be said that supply chain partners committed towards sustainability tend to put in efforts to develop BSR.

In general, our model showed an accepted level of statistical adjustment (GoF), depicting that the conceptually developed relationships were also relevant to an organizational context. Our research contributes to existing body of literature by developing and testing the proposed conceptual model having multiple relationships among constructs (Sheu and Talley, 2011; Jabbour et al., 2014) in context of a developing country like India, using a sample of companies from the Indian automobile industry.

A major contribution of this paper to extant literature is that it observes each construct (supplier selection, supplier development and supplier performance review) of the buyer–supplier relationship, and analyses the effect that each construct has on the three dimensions of sustainability (economic, social and environmental). Results show that each BSR activity differently affects the dimensions of sustainability; the impact of one BSR activity on a dimension of sustainability may not necessarily be similar to the influence of another BSR activity on the same or another dimension of sustainability. It can be said that although investment in sustainability may not give significant returns in the short run, it is important in the long run (Govindan et al., 2014a,b; Carter and Rogers, 2008). Findings from this study may be useful to managers pursuing sustainability initiatives in their respective supply chains.

7. Conclusion and managerial implications

The objective of our study was to determine whether supplier selection (SS), supplier development (SD) and performance review (PR) influenced the environmental (EVS), social (SSC) and economic (ECS) dimensions of the sustainable supply chain. Such a testing of these relationships while simultaneously using, examining and confirming a conceptual model which uses direct, indirect and mediated relationships in an Indian context has not been carried out hitherto.

Results of our study revealed that barring two, all hypotheses proposed were valid. Thus, external influence (EXT) and expected benefits (BENF) of sustainability adoption emerged as important antecedents of top management commitment (TC) towards

incorporating sustainability into supply chain operations, which in turn influenced the incorporation of BSR practices such as supplier selection (SS), supplier development (SD) and supplier performance review (PR) which further influenced the economic, social and environmental sustainability performance of the supply chain. These results confirm several arguments made by literature in this field by presenting empirical evidence from Indian automobile companies and highlight the importance of BSR in sustainable supply chain research. Thus, the contributions of this manuscript to the literature are: (a) external pressure and expected benefits of sustainability adoption are important antecedents for developing top management commitment towards sustainability (Bouzon and Govindan, 2015; Gunasekaran et al., 2014; Mathiyazhagan et al., 2014; Zhu et al., 2016); (b) top management commitment is directly related to the incorporation of BSR development practices such as supplier selection, supplier development and supplier performance review (Gunasekaran et al., 2015; Hartmann and Germain, 2015; Hartmann et al., 2015; Mohanty and Prakash, 2014); (c) supplier selection positively influences the economic, social and environmental sustainability performance of supply chain (Meena and Sarmah, 2012; Mitra and Datta, 2014). Supplier development positively influences environmental and social sustainability of the supply chain (Meena and Sarmah, 2012; Mitra and Datta, 2014) and supplier development is not positively related to economic sustainability of the supply chain (Govindan et al., 2014a,b; Silvestre, 2015); and (d) supplier performance review is directly related to economic and environmental sustainability of the supply chain (Shen et al., 2013; Zhu et al., 2016).

For practitioners interested in improving the green performance of their firms, our study provides some implications that they might wish to consider. First, it may be appropriate to create awareness among supply chain partners about the expected benefits of sustainability adoption, and pressurize them to commit to sustainability practices. Only after having committed supply chain partners should there be an investment in BSR. Special attention may be given to BSR through strategies such as supplier selection, supplier development and supplier performance review.

For industrial policymakers, it is suggested that technical/conceptual/financial support be provided to supply chain companies to motivate them to develop relationships with other supply chain partners. However, this support should be continual so that strong sustainability oriented BSR may be developed to improve sustainability performance of the supply chain. The concept of supplier development (SD) should attract efforts from policymakers towards developing capabilities of smaller firms. Policymakers could formulate policies to reduce the economic burden of buyer firms which might result in increased economic sustainability of the supply chain.

Appendix 1

Benefits (BENF)		
BENF1	Improve corporate Image/Reputation	Eltayeb et al., 2011; Vermeulen and Seuring, 2009; Zhu et al., 2008a,b
BENF2	Product Differentiation	Kogg, 2003
BENF3	Premium Pricing	Eltayeb et al., 2011; Ageron et al., 2011; Ytterhus et al., 1999
BENF4	Provide New Market	Holt and Ghobadian, 2009; Clemens and Douglus, 2006
External influence (EXT)		
EXT1	Fear of loss of business	Nakano and Hirao, 2011; Fortes, 2009; Elkington, 1994
EXT2	Penalty	Lee, 2008; Seuring and Muller, 2008; Clemens and Douglus, 2006; Elkington, 1994
EXT3	Reputation loss	Zutshi and Sohal, 2004; Zhu and Sarkis, 2007; Eltayeba et al., 2011; Zhu et al., 2008b;
EXT4	Focal company sharing expertise	Ageron et al., 2011; Holt and Ghobadian, 2009; Zhu et al., 2008a
Top management commitment (TC)		
(TC1)	Allocation of fund	Eltayeba et al., 2011; Carter and Rogers 2008; Rao and Holt, 2005; Ytterhus et al., 1999
(TC2)	Allocation of resources	Rocha et al., 2007 Ageron et al., 2011; Ni et al., 2010; Zutshi and Sohal, 2004
(TC3)	Looking for developing relationship	Peters et al., 2011; Bommel, 2010; Rocha et al., 2007; Zhu et al., 2007a; Rao and Holt, 2005
(TC4)	Integrating sustainability in corporate strategy	Peters et al., 2011; Vachon and Klassen, 2008
(TC5)	Developing team to ensure sustainability integration	Rocha et al., 2007
Supplier selection (SS)		
(SS1)	Developing selection standards	Ciliberti et al., 2008; Keatinga et al., 2008; Vachon, 2007; Koplin et al., 2007
(SS2)	Allocation of order with respect to performance	Nakano and Hirao, 2011; Bommel, 2010; Zhu et al., 2008a; Keatinga et al., 2008
(SS5)	Feasibility of developing relationship	Ageron et al., 2011; Peters et al., 2011; Holt and Ghobadian, 2009
Supplier development (SD)		
(RS1)	Technology sharing	Vachon and Klassen, 2008; Vachon, 2007; Koplin et al., 2007; Zhu et al., 2007b
(RS2)	Resource allocation	Ageron et al., 2011; Daugherty, 2011; Ni et al., 2010; Brito et al., 2008; Rocha et al., 2007; Zutshi and Sohal, 2004
(RS3)	Information sharing	Nakano and Hirao, 2011; Bommel, 2010; Seuring and Muller, 2008
(RS4)	Knowledge sharing	Peters et al., 2011; Vermeulen and Seuring, 2009; Vachon and Klassen, 2008; Zhu et al., 2008b; Vachon, 2007
(RS5)	Joint teams	Bommel, 2010; Keatinga et al., 2008; Zhu et al., 2008a
Performance review of supplier (PR)		
(PR1)	Suppliers evaluation and assessment	Gopalakrishnan et al., 2012; Ciliberti et al., 2008; Keatinga et al., 2008
(PR2)	Rating and classification	Michelsen, 2007; Green et al., 1998
(PR3)	Deciding on relationship continuation	Ageron et al., 2011; Bommel, 2010; Keatinga et al., 2008; Michelsen, 2007
Environmental Supply Chain (EVS)		
(EVS1)	Reverse logistics	Hsu et al., 2013; Diabat et al., 2014; Eltayeb et al., 2011; Wu and Pagell, 2011
(EVS2)	Energy efficiency	Wu and Pagell, 2011; Ciliberti et al., 2008; Vachon and Mao, 2008
(EVS3)	Pollution & emission minimization	Hsu et al., 2013; Ashby et al., 2012; Kudla and Klaas-Wissing, 2012
(EVS4)	Waste minimization	Ni et al., 2010; Rao and Holt, 2005; Zhu et al., 2007a
Social supply chain (SSC)		
(SSC1)	Rights to employees	Marshall et al., 2014; Kudla and Klaas-Wissing, 2012
(SSC2)	Fair trade and transparency	Peters et al., 2011; Bommel, 2010; Ni et al., 2010; Rocha et al., 2007
(SSC3)	Social welfare	Eltayeb et al., 2011; Rocha et al., 2007; Young and Kielkiewicz-Young, 2001
Economical Supply Chain (ECS)		
(ECS1)	Asset utilization	Gopalakrishnan et al., 2012; Carbone and Moatti, 2011; Buyukozkan and Cifci, 2010
(ECS2)	Cost reduction	Gopalakrishnan et al., 2012; Holt and Ghobadian, 2009; Rao and Holt, 2005; Zutshi and Sohal, 2004
(ECS3)	Late delivery	Zhu and Sarkis, 2004

References

Abdulrahman, M.D., Gunasekaran, A., Subramanian, N., 2014. Critical barriers in implementing reverse logistics in the Chinese manufacturing sectors. Int. J. Prod. Econ. 147, 460–471.

ACMA, 2013. ACMA Membership, pp. 83–87. Annual report.

Ageron, B., Gunasekaran, A., Spalanzani, A., 2011. Sustainable supply management: an empirical study. Int. J. Prod. Econ. 140 (1), 168–182.

Armstrong, S., Overton, T.S., 1977. Estimating non-response bias in mail surveys. J. Mark. Res. 14, 396–402.

Asefeso, A., 2015. Sustainable Urban Supply Chain Management. AA Global Sourcing Ltd.

Ashby, A., Leat, M., Hudson-Smith, M., 2012. Making connections: a review of supply chain management and sustainability literature. Supply Chain Manag. Int. J. 17 (5), 497–516.

Asher, H., 1983. Casual Modeling, second ed. Sage, Beverly Hills, CA.

Avami, A., 2013. Assessment of optimal biofuel supply chain planning in Iran: technical, economic, and agricultural perspectives. Renew. Sustain. Energy Rev. 26, 761–768.

Bai, C., Sarkis, J., Dou, Y., 2015. Corporate sustainability development in China: review and analysis. Ind. Manag. Data Syst. 115 (1), 5–40.

Barclay, D., Higgins, C., Thompson, R., 1995. The partial least squares (PLS) approach to causal modelling: personal computer adoption and use as an illustration. Technol. Stud. 2 (2), 285–309.

Barratt, M., Oke, A., 2007. Antecedents of supply chain visibility in retail supply chains: a resource-based theory perspective. J. Oper. Manag. 25 (6), 1217–1233.

Beske, P., Koplin, J., Seuring, S., 2008. The use of environmental and social standards by German first-tier suppliers of the Volkswagen AG. Corp. Soc. Responsib. Environ. Manag. 15 (2), 63–75.

Bommel, W.V., 2010. A conceptual framework for analyzing sustainability strategies in industrial supply networks from an innovation perspective. J. Clean. Prod. 19 (8), 895–904.

Bottani, E., Rizzi, A., 2008. Economical assessment of the impact of RFID technology and EPC system on the fast-moving consumer goods supply chain. Int. J. Prod. Econ. 112 (2), 548–569.

Bouzon, M., Govindan, K., 2015. Reverse logistics as a sustainable supply chain practice for the fashion industry: an analysis of drivers and the Brazilian case. In: Sustainable Fashion Supply Chain Management. Springer International Publishing, pp. 85–104.

Bowen, F.E., Cousins, P.D., Lamming, R.C., Faruk, A.C., 2001. The role of supply management capabilities in green supply. Prod. Oper. Manag. 10 (2), 174–189.

Bradbury, H., Clair, J.A., 1999. Promoting sustainable organizations with Sweden's natural step. Acad. Manag. Exec. 13 (4), 63–74.

Brito, M.P.D., Carbone, V., Blanquart, C., 2008. Towards a sustainable fashion retail supply chain in Europe: organization and performance. Int. J. Prod. Econ. 114 (2), 534–555.

Buyukozkan, G., Cifci, G., 2010. Analysis of the sustainable supply chain structure with incomplete preferences. In: Proceeding of the World Congress on Engineering, WCE, June 30–July 2, 2010, London, UK.

Carbone, V., Moatti, V., 2011. Towards greener supply chains: an institutional perspective. Int. J. Logist. Res. Appl. 14 (3), 179–197.

Carter, C.R., Jenning, M.M., 2002. Social responsibility and supply chain relationships. Transp. Res. Part E Logist. Transp. Rev. 38 (1), 37–52.

Carter, C.R., Rogers, D.S., 2008. A framework of sustainable supply chain management: moving towards new theory. Int. J. Phys. Distrib. Logist. Manag. 38 (5), 360–387.

Chen, Y.J., Wu, Y.C.J., Wu, T., 2015. Moderating effect of environmental supply chain collaboration: evidence from Taiwan. Int. J. Phys. Distrib. Logist. Manag. 45 (9/10).

Cheung, Y.K.F., Rowlinson, S., 2011. Supply chain sustainability: a relationship management approach. Int. J. Manag. Proj. Bus. 4 (3), 480–497.

Chin, W.W., 1998. The partial least squares approach to structural equation modelling. In: Marcoulides, G.A. (Ed.), Modern Methods for Business Research. Lawrence Erlbaum.

Churchill Jr., G.A., 1979. A paradigm for developing better measures of marketing constructs. J. Mark. Res. 16 (1), 64–73.

Cilibereti, F., Pontrandolfoa, P., Scozzi, B., 2008. Logistics social responsibility: standard adoption and practices in Italian companies. Int. J. Prod. Econ. 113 (1), 88–106.

Clemens, B., Douglus, T.J., 2006. Does coercion drive firm to adopt 'voluntary' green initiatives? Relationship among coercion, superior firm resources and voluntary green initiatives. J. Bus. Res. 59 (4), 483–491.

Co, H.C., Barro, F., 2009. Stakeholder theory and dynamics in supply chain collaboration. Int. J. Oper. Prod. Manag. 29 (6), 591–611.

Daily, B.F., Huang, S.C., 2001. Achieving sustainability through attention to human resource factors in environmental management. Int. J. Oper. Prod. Manag. 21 (12), 1539–1552.

Daugherty, P.J., 2011. Review of logistics and supply chain relationship literature and suggested research agenda. Int. J. Phys. Distrib. Logist. Manag. 41 (1), 16–31.

De Giovanni, P., Vinzi, V.E., 2012. Covariance versus component-based estimations of performance in green supply chain management. Int. J. Prod. Econ. 135 (2), 907–916.

Diabat, A., Kannan, D., Mathiyazhagan, K., 2014. Analysis of enablers for implementation of sustainable supply chain management–a textile case. J. Clean. Prod. 83, 391–403.

Donaldson, T., Preston, L.E., 1995. The stakeholder theory of the corporation: concepts, evidence, and implications. Acad. Manag. Rev. 20 (1), 65–91.

Eisenhardt, K.M., Schoonhoven, C.B., 1996. Resource-based view of strategic alliance formation: strategic and social effects in entrepreneurial firms. Organ. Sci. 7 (2), 136–150.

Elkington, J., 1994. Towards the sustainable corporation: Win-Win-Win business strategies for sustainable development. Calif. Manag. Rev. 36, 90–100 (winter).

Eltayeb, T.K., Zailani, S., Ramayah, T., 2011. Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: investigating the outcomes. Resour. Conserv. Recycl. 55 (5), 495.

Falk, R.F., Miller, N.B., 1992. A Primer for Soft Modeling. University of Akron Press.

Fiksel, J., McDaniel, J., Mendenhall, C., 1999, November. Measuring progress towards sustainability principles, process, and best practices. In: Greening of Industry Network Conference Best Practice Proceedings. http://www.economics.com/images/Sustainability Measurement_GIN.pdf (accessed June 2015).

Flynn, B., Huang, X., Zhao, X., 2015. Supply chain management in emerging markets: critical research issues. J. Supply Chain Manag. 51 (1), 3–4.

Fornell, C., Cha, J., 1994. Partial least squares. Adv. Methods Mark. Res. 407, 52–78.

Fornell, C., Larcker, D.F., 1981. Structural equation models with unobservable variables and measurement error: algebra and statistics. J. Mark. Res. 18 (3), 382–388.

Fornell, C., Lorange, P., Roos, J., 1990. The cooperative venture formation process: a latent variable structural modelling approach. Manag. Sci. 36 (1), 1246–1255.

Fortes, J., 2009. Green supply chain management: a literature review. Otago Manag. Grad. Rev. 7, 51–62.

Gillet-Monjarret, C., 2015. Assurance of sustainability information: a study of media pressure. Account. Eur. 1–19 (ahead-of-print).

Giovannucci, D., Von Hagen, O., Wozniak, J., 2014. Corporate Social Responsibility and the Role of Voluntary Sustainability Standards. Voluntary Standard Systems. Springer, Berlin Heidelberg, pp. 359–384.

Gold, S., Seuring, S., Beske, P., 2010. Sustainable supply chain management and inter organizational resources: a literature review. Corp. Soc. Responsib. Environ. Manag. 17 (4), 230–245.

González-Benito, J., González-Benito, Ó., 2006. The role of stakeholder pressure and managerial values in the implementation of environmental logistics practices. Int. J. Prod. Res. 44 (7), 1353–1373.

Gopal, P.R.C., Thakkar, J., 2014. Development of composite sustainable supply chain performance index for the automobile industry. Int. J. Sustain. Eng. 1–20 (ahead-of-print).

Gopalakrishnan, K., Yusuf, Y.Y., Musa, A., Abubakar, T., Ambursa, H.M., 2012. Sustainable supply chain management: a case study of British Aerospace (BAe) Systems. Int. J. Prod. Econ. 140 (1), 193–203.

Götz, O., Liehr-Gobbers, K., Krafft, M., 2010. Evaluation of structural equation models using the partial least squares (PLS) approach. In: Handbook of Partial Least Squares. Springer Berlin Heidelberg, pp. 691–711.

Govindan, K., Kaliyan, M., Kannan, D., Haq, A.N., 2014a. Barriers analysis for green supply chain management implementation in Indian industries using analytic hierarchy process. Int. J. Prod. Econ. 147, 555–568.

Govindan, K., Sarkis, J., Jabbour, C.J.C., Zhu, Q., Geng, Y., 2014b. Eco-efficiency based green supply chain management: current status and opportunities. Eur. J. Oper. Res. 2 (233), 293–298.

Govindan, K., Soleimani, H., Kannan, D., 2015. Reverse logistics and closed-loop supply chain: a comprehensive review to explore the future. Eur. J. Oper. Res. 240 (3), 603–626.

Govindarajulu, N., Daily, B.F., 2004. Motivating employees for environmental improvement. Ind. Manag. Data Syst. 104 (4), 364–372.

Green, K., Morton, B., New, S., 1998. Green purchasing and supply policies: do they improve companies' environmental performance? Supply Chain Manag. 3 (2), 89–95.

Gunasekaran, A., Patel, C., Tirtiroglu, E., 2001. Performance measures and metrics in a supply chain environment. Int. J. Oper. Prod. Manag. 21 (1/2), 71–87.

Gunasekaran, A., Jabbour, C.J.C., Jabbour, A.B.L.D.S., 2014. Managing organizations for sustainable development in emerging countries: an introduction. Int. J. Sustain. Dev. World Ecol. 21 (3), 195–197.

Gunasekaran, A., Subramanian, N., Rahman, S., 2015. Green supply chain collaboration and incentives: current trends and future directions. Transp. Res. Part E Logist. Transp. Rev. 74, 1–10.

Hamprecht, J., Corsten, D., Noll, M., Meier, E., 2005. Controlling the sustainability of food supply chain. Supply Chain Manag. Int. J. 10 (1), 7–10.

Hannan, M.T., Freeman, J., 1984. Structural inertia and organizational change. Am. Sociol. Rev. 149–164.

Hartmann, J., Germain, R., 2015. Understanding the relationships of integration capabilities, ecological product design, and manufacturing performance. J. Clean. Prod. 92, 196–205.

Hartmann, J., Germain, R., Grobecker, A., 2015. Antecedents of environmentally conscious operations in transitioning economies: insights from Russia. Int. J. Oper. Prod. Manag. 35 (6).

Holt, D., Ghobadian, A., 2009. An empirical study of green supply chain management practices amongst UK manufacturers. J. Manuf. Technol. Manag. 20 (7), 933–956.

Hsu, C.W., Kuo, T.C., Chen, S.H., Hu, A.H., 2013. Using DEMATEL to develop a carbon management model of supplier selection in green supply chain management. J. Clean. Prod. 56, 164–172.

Hulland, J., 1999. "Use of partial least square (PLS) in strategic management research: a review of four recent studies. Strateg. Manag. J. 20 (2), 195–204.

Hutchins, M.J., Sutherland, J.W., 2008. An exploration of measures of social sustainability and their application to supply chain decisions. J. Clean. Prod. 16 (15), 1688–1698.
Jabbour, A.B.L., 2015. Understanding the genesis of green supply chain management: lessons from leading Brazilian companies. J. Clean. Prod. 87, 385–390.
Jabbour, A.B.L., Jabbour, C.J., 2009. Are supplier selection criteria going green? Case studies of companies in Brazil. Ind. Manag. Data Syst. 109 (4), 477–495.
Jabbour, A.B.L., Jabbour, C.J.C., Latan, H., Teixeira, A.A., de Oliveira, J.H.C., 2014. Quality management, environmental management maturity, green supply chain practices and green performance of Brazilian companies with ISO 14001 certification: direct and indirect effects. Transp. Res. Part E Logist. Transp. Rev. 67, 39–51.
Jakhar, S.K., 2015. Performance evaluation and a flow allocation decision model for a sustainable supply chain of an apparel industry. J. Clean. Prod. 87, 391–413.
Kannegiesser, M., Günther, H.-O., Autenrieb, N., 2015. The time-to-sustainability optimization strategy for sustainable supply network design. J. Clean. Prod. 108 (Part A), 451–463.
Keatinga, B., Quazib, A., Krizc, A., Coltmana, T., 2008. In pursuit of a sustainable supply chain: insights from Westpac Banking Corporation. Supply Chain Manag. Int. J. 13 (3), 175–179.
Klassen, R., Vachon, S., 2003. Collaboration and evaluation in the supply chain: the impact on plant-level environmental investment. Prod. Oper. Manag. 12 (3), 336–352.
Kline, R.B., 2005. Principles and Practice of Structural Equation Modeling, second ed. ed. The Guilford Press, New York.
Kogg, B., 2003. Greening the cotton textile supply chain: a case study of the transition towards organic production without a powerful focal company. Greener Manag. Int. 43, 53–64.
Koplin, J., Seuring, S., Mesterharm, M., 2007. Incorporating sustainability into supply management in the automotive industry-the case of the Volkswagen AG. J. Clean. Prod. 15 (11–12), 1053–1062.
Kudla, N.L., Klaas-Wissing, T., 2012. Sustainability in shipper-logistics service provider relationships: a tentative taxonomy based on agency theory and stimulus-response analysis. J. Purch. Supply Manag. 18 (4), 218–231.
Kumar, D., Rahman, Z., Chan, F.T.S., 2016. A fuzzy AHP and fuzzy multi-objective linear programming model for order allocation in a sustainable supply chain: a case study. Int. J. Comp. Integr. Manuf. 1–17. http://dx.doi.org/10.1080/0951192X.2016.1145813.
Kumar, D., Rahman, Z., 2013. Modelling relationship marketing strategies for sustainability adoption. Int. J. Intercult. Inf. Manag. 3 (4), 277–291.
Lai, K.H., Wong, C.W., 2012. Green logistics management and performance: some empirical evidence from Chinese manufacturing exporters. Omega 40 (3), 267–282.
Lee, S., 2008. Drivers for the participation of small and medium sized suppliers in green supply chain initiatives. Supply Chain Manag. Int. J. 13 (3), 185–198.
Lin, C.Y., 2007. Adoption of green supply practices in Taiwan's logistics industry. J. Int. Manag. Stud. 2 (2), 91–98.
Malhotra, N.K., Dash, S., 2009. Marketing Research an Applied Orientation. Pearson Education, New Delhi.
Marshall, D., McCarthy, L., Heavey, C., McGrath, P., 2014. Environmental and social supply chain management sustainability practices: construct development and measurement. Prod. Plan. Control 1–18 (ahead-of-print).
Mathiyazhagan, K., Govindan, K., Noorul Haq, A., 2014. Pressure analysis for green supply chain management implementation in Indian industries using analytic hierarchy process. Int. J. Prod. Res. 52 (1), 188–202.
Meena, P.L., Sarmah, S.P., 2012. Development of a supplier satisfaction index model. Ind. Manag. Data Syst. 112 (8), 1236–1254.
Meixell, M.J., Luoma, P., 2015. Stakeholder pressure in sustainable supply chain management: a systematic review. Int. J. Phys. Distrib. Logist. Manag. 45 (1/2), 69–89.
Michelsen, O., 2007. Investigation of relationships in a supply chain in order to improve environmental performance. Clean. Technol. Environ. Policy 9 (2), 115–123.
Miemczyk, J., Johnsen, T.E., Macquet, M., 2012. Sustainable purchasing and supply management: a structured literature review of definitions and measures at the dyad, chain and network levels. Supply Chain Manag. Int. J. 17 (5), 478–496.
Mitchell, R.K., Agle, B.R., Wood, D.J., 1997. Toward a theory of stakeholder identification and salience: defining the principle of who and what really counts. Acad. Manag. Rev. 22 (4), 853–886.
Mitra, S., Datta, P.P., 2014. Adoption of green supply chain management practices and their impact on performance: an exploratory study of Indian manufacturing firms. Int. J. Prod. Res. 52 (7), 2085–2107.
Mohanty, R.P., Prakash, A., 2014. Green supply chain management practices in India: an empirical study. Prod. Plan. Control 25 (16), 1322–1337.
Nakano, K., Hirao, M., 2011. Collaborative activity with business partners for improvement of product environmental performance using LCA. J. Clean. Prod. 19 (11), 1189–1197.
Nazareth, P., 2015. India among Top 10 Countries to Attract High FDIs: UNCTAD. MoneyControl (accessed on 23.07.15). http://www.moneycontrol.com/news/economy/india-among-top-10-countries-to-attract-high-fdis-unctad_1642321.html?utm_source=ref_article.
Ni, D., Li, K.W., Tang, X., 2010. Social responsibility allocation in two-echelon supply chains: insights from wholesale price contracts. Eur. J. Oper. Res. 207 (3), 1269–1279.
OECD, 1996. The Knowledge - Based Economy. OECD: Paris. https://www.oecd.org/sti/sci-tech/1913021.pdf.
Olavarrieta, S., Ellinger, A.E., 1997. Resource-based theory and strategic logistics research. Int. J. Phys. Distrib. Logist. Manag. 27 (9/10), 559–587.
Pavlou, P.A., Fygenson, M., 2006. Understanding and predicting electronic commerce adoption: an extension of the theory of planned behavior. MIS Q. 115–143.
Peters, N.J., Hofdtetter, J.S., Hoffmann, V.H., 2011. Institutional entrepreneurship capabilities for inter-organizational sustainable supply chain strategies. Int. J. Logist. Manag. 22 (1), 52–86.
Podsakoff, P.M., MacKenzie, S.B., Lee, J., Podsakoff, N.P., 2003. Common method variance in behavioral research: a critical review of the literature and recommended remedies. J. Appl. Psychol. 88 (5), 879–903.
Raj, A., Bhaskar, U., 2015. Govt's Make in India Pitch Points to Auto Sector Turnaround. Livemint (accessed on 23.07.15.). http://www.livemint.com/Industry/RreKVJzrKFwVHU9XVg5uZJ/Govts-Make-in-India-pitch-points-to-auto-sector-turnaround.html.
Rao, P., Holt, D., 2005. Do green supply chain lead to competitiveness and economic performance? Int. J. Oper. Prod. Manag. 25 (9), 898–916.
Ringle, C.M., Wende, S., Will, A., 2005. SmartPLS 2.0 (Beta).
Rocha, M., Searcy, C., Karapetrovic, S., 2007. Integrating sustainable development into existing management systems. Total Qual. Manag. Bus. Excell. 9 (2), 33–41.
Schaltegger, S., Wagner, M., 2006. Integrative management of sustainability performance, measurement and reporting. Int. J. Account. Auditing Perform. Eval. 3 (1), 1–19.
Seuring, S., Gold, S., 2013. Sustainability management beyond corporate boundaries: from stakeholders to performance. J. Clean. Prod. 56, 1–6.
Seuring, S., Muller, M., 2008. From a literature review to a conceptual framework for sustainable supply chain management. J. Clean. Prod. 16 (15), 1699–1710.
Shen, L., Olfat, L., Govindan, K., Khodaverdi, R., Diabat, A., 2013. A fuzzy multi criteria approach for evaluating green supplier's performance in green supply chain with linguistic preferences. Resour. Conserv. Recycl. 74, 170–179.
Sheu, J.B., Talley, W.K., 2011. Green supply chain management: trends, challenges, and solutions. Transp. Res. Part E Logist. Transp. Rev. 47 (6), 791–792.
SIAM (2013) http://www.siamindia.com/Event/view-eventhead.aspx?id=286 (accessed on 11.01.14.).
Silvestre, B.S., 2015. Sustainable supply chain management in emerging economies: environmental turbulence, institutional voids and sustainability trajectories. Int. J. Prod. Econ. 167, 156–169.
Simpson, D.F., Power, D.J., 2005. Use the supply relationship to develop lean and green suppliers. Supply Chain Manag. Int. J. 10 (1), 60–68.
Sosik, J.J., Kahai, S.S., Piovoso, M.J., 2009. Silver bullet or voodoo statistics? A primer for using the partial least square data analytic technique in group and organization research. Group & Organ. Manag. 34 (1), 5–36.
Tenenhaus, M., Vinzi, V.E., Chatelin, Y.M., Lauro, C., 2005. PLS path modelling. Comput. Stat. Data Anal. 48 (1), 159–205.
Tsoulfas, G.T., Pappis, C.P., 2006. Environmental principles applicable to supply chain design and operation. J. Clean. Prod. 14 (18), 1593–1602.
Türkay, M., Oruç, C., Fujita, K., Asakura, T., 2004. Multi-company collaborative supply chain management with economical and environmental considerations. Comput. Chem. Eng. 28 (6), 985–992.
Vachon, S., 2007. Green supply chain practices and the selection of environmental technologies. Int. J. Prod. Res. 45 (18–19), 4357–4379.
Vachon, S., Klassen, R.D., 2006. Extending green practices across supply chain: impact of upstream and downstream integration. J. Oper. Prod. Manag. 26 (7), 795–821.
Vachon, S., Klassen, R.D., 2008. Environmental management and manufacturing performance: the role of collaboration in supply chain. Int. J. Prod. Econ. 111 (2), 299–315.
Vachon, S., Mao, Z., 2008. Linking supply chain strength to sustainable development: a country-level analysis. J. Clean. Prod. 16 (15), 1552–1560.
Vermeulen, W.J.V., Seuring, S., 2009. Sustainability through the market-the impacts of sustainable supply chain management: introduction. Sustain. Dev. 17, 269–273.
Wagner Mainardes, E., Alves, H., Raposo, M., 2011. Stakeholder theory: issues to resolve. Manag. Decis. 49 (2), 226–252.
Williams, L.J., Edwards, J.R., Vandenberg, R.J., 2003. Recent advances in causal modeling methods for organizational and management research. J. Manag. 29 (6), 903–936.
Wold, H., 1985. Partial least squares. In: Kotz, S., Johnson, N.L. (Eds.), Encyclopaedia of Statistical Sciences. Wiley, New York, pp. 581–591.
Wu, Z., Pagell, M., 2011. Balancing priorities-decision-making in Sustainable Supply chain Management. J. Op. Manag. 29 (6), 577–590.
Young, A., Kielkiewicz-Young, A., 2001. Sustainable supply network management. Corp. Environ. Strat. 8 (3), 260–268.
Ytterhus, B.E., Arnestad, P., Lothe, S., 1999. Environmental initiatives in the retailing sector: an analysis of supply chain pressure and partnership. Eco-management Auditing 6 (4), 181–188.
Zhu, Q.H., Sarkis, J., 2004. Relationship between operational practices and performance among early adopter of green supply chain management practices in Chinese manufacturing enterprises. J. Oper. Manag. 22 (3), 265–289.
Zhu, Q., Sarkis, J., 2007. The moderating effect of institutional pressure on emergent green supply chain practices. Int. J. Prod. Res. 45 (18–19), 4333–4355.

Zhu, Q., Sarkis, J., Lai, K.H., 2007a. Green supply chain management: pressure, practices and performance within the Chinese automobile industry. J. Clean. Prod. 15 (11–12), 1041–1052.
Zhu, Q., Sarkis, J., Lai, K.H., 2007b. Initiatives and outcomes of green supply chain management implementation by Chinese manufacturers". J. Environ. Manag. 85 (1), 179–189.
Zhu, Q., Sarkis, J., Lai, K.H., 2008a. Green supply chain management implications for "closing the loop". Transp. Res. 44 (1), 1–18.
Zhu, Q., Sarkis, J., Lai, K.H., 2008b. Confirmation of a measurement model for green supply chain management implementation. Int. J. Prod. Econ. 111 (2), 261–273.
Zhu, Q., Liu, J., Lai, K.H., 2016. Corporate social responsibility practices and performance improvement among Chinese national state-owned enterprises. Int. J. Prod. Econ. 171, 417–426.
Zutshi, A., Sohal, A.S., 2004. Adoption and maintenance of environmental management systems-Critical success factors. Manag. Environ. Qual. Int. J. 15 (4), 399–419.