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Interactions in Sustainable Supply Chain Management: A Framework Review

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Abstract

Purpose – This study evaluates the research conducted among the interim, dyadic interactions that bridge the stand-alone measures of economic, environmental, and social performance and the level of sustainability, as suggested in the Carter & Rogers (2008) framework.

Design/methodology/approach – This paper conducts a systematic literature review based on the Tranfield *et al*. (2003) method of the articles published in 13 major journals in the area of supply chain management between the years of 2010 and 2016. Results were analyzed using an expert panel.

Findings – The area of research between environmental and social performance is sparse and relegated to empirical investigation. As an important area of interaction, this area needs more research to answer the how and why questions. The economic activity seems to be the persistent theme among the interactions.

Research implications – The literature on the "ES" interactions is lacking in both theoretical and analytical content. Studies explaining the motivations, optimal levels, and context that drive these interactions are needed. The extant research portrays economic performance as if it cannot be sacrificed for social welfare. This approach is not in line with the progressive view of SSCM but instead the binary view with an economic emphasis.

Practical implications – To improve sustainability, organizations need the triple bottom line (TBL) framework that defines sustainability in isolation. However, they also need to understand how and why these interactions take place that drive sustainability in organizations.

Originality/value – This is the first study to examine the literature specifically dedicated to the essential, interim, dyadic interactions that bridge the gap between stand-alone performance and the TBL that creates true sustainability. It also shows how the literature views the existence of sustainability is progressive, but many describe sustainability as binary. It is possible that economic sustainability is binary, and progressive characterizations of SSCM could be the reason behind the results favoring economic performance over environmental and social.

Keywords – Sustainability, Sustainable Supply Chain Management (SSCM), Systematic Literature Review, Improvement Systems Recovery (ISR)

Paper type – Systematic Literature review

Introduction – Stage I

Sustainability is considered a fundamental principle of smart management (Gladwin *et al.*, 1995) and an inescapable priority for business (Porter and Kramer, 2006). Likewise, sustainability is also an increasingly important global topic. For instance, two-thirds of managers and executives from 113 countries report sustainability as being critical to doing business (Kiron *et al*. 2012). Kiron reports that managers no longer ask why they should be sustainable, but rather what they need to do to become sustainable. This is driven somewhat by the way sustainability is defined. The most common and frequently-cited definition of sustainability is "development that meets the needs of the present without compromising the ability of future generations to meet their needs" (United Nations, 1987, p.41). While valuable, this definition does not provide guidance on how to operationalize sustainability or provide an adequate context. Since a key element of global business is global supply chain management, sustainability (SSCM) in this area can have huge impacts on the environment, economics, and social welfare of the current and future generations.

In operationalizing sustainability, Carter and Rogers (2008) developed a framework of sustainability built on the Triple-Bottom-Line (TBL) concept (Elkington, 1998; 2004). They argue that to become sustainable an organization must be economically viable, environmentally friendly, and socially responsible (CSR). The interaction of all three elements is described as being "sustainable". Their framework is generally accepted and has been helpful to begin to answer the question of what organizations need to do to become sustainable. This inspired a plethora of studies on measuring the individual elements of environment, economics, or CSR; or on organizations that practice all three elements, and thus considered themselves sustainable. However, according to Carter and Rogers (2008), there are three interim, dyadic stages to achieving sustainability that bridge the individual elements. This suggest that there is some form of progressive activities from stand-alone measures to full sustainability. They refer to the intersection of all three elements as the highest level of sustainability. Carter and Rogers refer to them as Good (the interaction between environment and CSR); Better 1 (the interaction between environment and economics); and Better 2 (the interaction between economics and CSR). While these categories have been criticized because of their judgmental inference, there are a paucity of studies on these interim dyadic stages. Asgari *et al*. (2015) and Slocum (2015) consider this as judgmental and they re-categorize the SSCM framework of Carter and Rogers (2008) to a less judgmental labelling as "Bearable" (Good), "Viable" (Better 1), "Equitable" (Better 2), and "Sustainable" (Best). Nevertheless, the progressive view still seems to be the fundamental underpinning to achieving sustainability.

The study of these dyadic, interim stages of sustainability are supported in that we found no article that reports an organization achieving sustainability all at once. Instead, case studies report the implementation of sustainability as a progressive process. Organizations begin with stand-alone practices of environmental, social, and economic, which eventually interact into what they describe as Good, Better 1, and Better 2. These overlaps can be viewed as interactions; where an improvement in one area supports an improvement in another. The Good, Better 1, and Better 2 demonstrate the dyadic interactions that are antecedents to true sustainability from the

progressive point of view of the Carter and Rogers (2008) framework. This view sends a message that managers and organizations can support sustainability efforts on one or two variables early-on, instead of trying to achieve three-way interactions.

The problem is that while a plethora of research has been conducted on the implementation of stand-alone Economic, Environmental, and Social performance activities, little research has been conducted on the interim dyadic interactions. This causes the dyadic relationships of sustainability to be poorly understood (Carter and Jennings, 2002). The understanding diminishes even further when the dyadic interactions are considered in conjunction with a point of view that is other than progressive. In other words, some studies characterize sustainability as a point in time where a firm is either sustainable or not, suggesting a binary viewpoint to sustainability.

This study focuses on identifying the recent literature on these dyadic relationships to evaluate what organizations need to do to encourage sustainable activities, whether progressive or binary. In doing so, the literature is informed by suggesting which areas of interaction need further research, which Kiron *et al*. (2012) suggest is an important issue to global executives and managers.

Recent publications on sustainability suggest different perspectives on a firm's effort to be sustainable. Montabon *et al*. (2016) suggest a sustainability framework which views sustainability narrowly as environmental performance, in which economic and social issues are nested. Similarly, Markman and Krause (2016) argue that for true sustainability firms should not consider sustainability issues on the top of economic performance; rather, they should proactively move beyond meeting minimum social and environmental regulations. These perspectives argue that the progressive approach is insufficient and a broader view of sustainability is needed. While pure economic self-interest can be considered as binary, it can also be inferred that progression can propagate from social or environmental elements; perhaps toward the economic dimension. While these papers provide meaningful insights on where sustainability should begin, true sustainability is the ultimate goal.

For our purposes, the typologies from Carter and Rogers (2008) and Asgari *et al.* (2015), work well because they are the characterizations used in the majority of TBL research that we reviewed. Furthermore, detailed explication of dyadic relationships could encourage theory-development to support the binary view of SSCM, which is sparse relative to the progressive view approach.

Background of Progressive SSCM Framework

The TBL that was developed by Elkington (1998, 2004) and advanced by various scholars, considers sustainability as the balance among social, environmental, and economic goals. Social performance is measured through actions taken to solve social issues and the results of those actions. Common variables used to measure social performance are equal opportunity, human rights, business ethics, etc. (Drobetz *et al.*, 2014). Environmental performance is defined as

actions taken to limit harm to, or improve the natural environment. Measurements include CO_2 emissions, waste discharge, recycling, etc. (Drobetz *et al.*, 2014). Economic performance is measured in transaction costs (Theißen *et al.*, 2014), shareholder value (Panda, 2014), operational efficiency (Harja and Helo, 2014). Carter and Rogers (2008) describes the degree of sustainability based on the strength of the interaction of social, environmental, and economic performance. They treat sustainability as outcomes of the TBL. The independent areas which do not show interactions are not directly contributing to sustainability. The unique part of their model is that they show three different levels of sustainability. They describe different forms of sustainability based on hierarchy; for example, "Good?", as the interaction of environmental and social performance. The moderate level of sustainability is described as "Better", which is divided for the purposes of discussion, into "Better 1", the interaction of environmental and economic performance and "Better 2", the interaction of social and economic performance. The interaction of all three variables of the TBL is described as "Best". While each variable can be measured independently, this study focuses on the interactions between the variables. Better 1 and Better 2 are terms that differentiate two types of interactions and are not intended to suggest a hierarchy of importance.

The Conceptual Model Interactions

To address these dyadic interactions, this study reviews the current stream of supply chain management research on sustainability (SSCM) in an effort to categorize the most recent findings based on Carter and Rogers (2008). Articles in mainstream operations and supply chain journals that specifically address the dyadic interactions comprised of social, environmental and economic performance are the sampling frame. It is important to note here that this review excludes studies that measure only the individual elements of environment, economics, or CSR activities and those that address the "Best" interactions. We exclude these studies for three reasons. First, standalone works are not the main focus, but the progressive approach starting from the individual dyadic interactions. This view is widely held in industry. Second, practitioners view these interactions as the first step to move the concept from individual silos to a more integrated approach. Heavily influenced by the neoclassical view of the economy, managers tend to believe that continual iterations of the three factors should lead to reconciliation of all elements in true sustainability. Third, standalone studies in environmental and social areas within the operations and supply chain management domains are increasing while research measuring the interactions are less developed (Seuring and Muller, 2008; Mckinnon 2010; Wolf and Seuring, 2010; Pagell and Shevchenko, 2014).

The conceptual relationships are shown in Figure 1. As mentioned earlier, "Good" and "Better" terminology can be judgmental. A revised classification by Asgari *et al*. (2015) and Slocum (2015) is seen more neutral than the original terms by Carter and Rogers (2008). For this reason, instead of using their terms, we now re-label the interactions to completely neutral terms: ES – interaction of environmental and social performances, SE – interaction of social and economic performance, and EE – environmental and economic performance. The re-labeling does not change the basic ideas but avoids the hierarchical terminology debate.

Progressively, the achievement of sustainability can be viewed as a longitudinal progression of the dyadic interactions until sustainability is achieved. This means that in the progressive view, organizations must consider the parallel interactions of all three variables. Current research tends to discuss these primarily as trade-offs (negative interactions), which only represent one viewpoint. Instead, we characterize the overlaps as interactions, which can include a trade-off (negative interactions) or complimentary (positive interactions). Second, a binary viewpoint suggested by the model is that of cross-sectionalization where organizations don't progress but find themselves at a particular position at a given point in time (Zou *et al*., 2016). While Zou *et al.* do not specifically address cross-sectionalization, their model assumes that all effects occur in parallel. This means that a specific set of decisions or resource allocations created an immediate overlap without waiting for progression. For example, to increase revenue (economic), an organization can simultaneously select to accept appliance returns for refurbishing, instead of sending to a waste facility (environmental), while donating a share of the proceeds to the United Way (CSR). If the company has the resources on-hand, these activities can achieve faster results. On the other hand, an organization can individually decide to accept returns in year 1 (environmental), then decide to refurbish them in year 2 for a new revenue stream (economic), and then decide to donate a portion of the profits to the United Way in year 3. In this second scenario, the interactions between the variables will be progressive, but more longitudinal (i.e. Kirchoff *et al.*, 2011).

The purpose of this paper is to improve the understanding between the dyadic interactions suggested in the ES, EE, and SE categories. This paper does not examine the debate over hierarchy, or why firms choose to become sustainable because the literature sufficiently identifies the key drivers. Instead, this study examines interim levels of sustainability at an operational level, through specific activities. It includes empirical publications from 2010 to 2016 that describe what interactions occur between the variables. It guides practitioners in what constitutes the activities in the dyadic relationships. The remaining sections of this study consist of a theoretical background for the SSCM framework, followed by methodology and results. Finally, conclusions and future directions are presented.

[Insert Figure 1 here]

Systematic Literature Review (SLR) Methodology

The SLR methodology by Tranfield *et al*. (2003) is used as a guide to conduct this review. It demonstrates the stages of a systematic review and sub-phases of each stage. Stage I involves planning the review. Stage II involves conducting the review, and Stage III is reporting the results. Under Stage I, Phases 0 and 1 were completed as part of the introduction and justification sections in the paper. The next section begins with the Phase 2 of Stage I that explains the development of a review protocol.

Review Protocol

Expert Panel

A panel of four experts with a combined 37 years of theoretical and application work in sustainability constituted the review panel. Two are senior PhD students with a collective ten years of international work experience in operations and supply chain prior to joining academia. They have studied the implementation and outcomes of several sustainability plans and completed substantial graduate-level work in sustainability-related fields. The other two panel members were professors in management who conduct research in sustainability. One who also has 15 years of experience in the construction industry, five of which were spent on sustainability activities. The fourth member is a professor who has published 14 Lean Six Sigma studies improving the sustainability of organizations at the firm and supply chain levels, most recently in seaport operations.

Initial scoping study

An initial systematic search was conducted using the terms “Sustainability”, “Corporate Social Responsibility”, “Carter and Rogers framework”, “Sustainable Supply Chain Management” and “Triple-Bottom-Line”. The search yielded 3,518 articles in English-language journals. Articles in so-called “vanity journals” or simple opinion articles were excluded from this list. One article by Carter and Easton (2011), was a thorough literature review on sustainability which includes papers into 2010. Building on their research, we began covering articles since 2010, extending the former review by 6 years. Next, due to wide variety of contexts and methodologies presented in the articles, the expert panel started by classifying studies based on Carter and Rogers (2008). It was the most widely-cited model at the time with 2,360 citations. This resulted in identified thirteen journals being selected for this study. It is important to note that while the systematic approach encourages the use of unpublished studies and industry trials, these were excluded from this study because they couldn’t be validated.

Stage II – Conducting a Review

Selection of Studies

The criteria for the selection of studies is as follows: 1) the study is in an area related to sustainability as represented in Carter and Rogers (2008); 2) the article must include some form of empirical evidence such as interviews, surveys, case studies, or field experiments, including analytical and mathematical models as long as their parameters are based on real-world data; 3) the article is published in a reputable, mainstream operations and supply chain journal, and are not simply proceedings, industry notes, or anecdotal in nature; 4) since the study reviews application studies, the unit of analysis is at the industry or firm level. The quality of the articles is rated based on the fact they are rated as a B level or higher in the ABDC journal list.

Journal Selection

A number of studies in sustainability include the first seven journals (i.e. Carter *et al*., 2009; Giunipero *et al*., 2008; Cantor, 2008). Our review found applicable articles in an additional six journals that are listed under numbers 8 through 13 below. The additional journals were selected in the area of supply chain management without specific methodological, topical or regional focus' (Watson and Montabon, 2014). The journals include:

(1) International Journal of Logistics Management (IJLM)

(2) International Journal of Physical Distribution & Logistics Management (IJPDLM)

(3) Journal of Business Logistics (JBL)

(4) Journal of Operations Management (JOM).

(5) Journal of Supply Chain Management (JSCM)

(6) Transportation Journal (TJ)

(7) Transportation Research Part E (TRE)

(8) Managements Science (MS)

(9) Decision Sciences (DS)

(10) Production & Operations Management (POM)

(11) International Journal of Operations & Production Management (IJOPM)

(12) Journal of Purchasing and Supply Management (JPSM)

(13) Supply Chain Management: An International Journal (SCMI)

Data coding

The various sections of the Carter and Rogers (2008) model are coded as 'Environment', 'CSR', and 'Economics' for stand-alone studies in the areas related to sustainability. The overlap between environment and CSR is coded as 'ES'. The overlap between environment and economics is coded as EE, and economics and social as SE. Overlap of all three areas is coded as ESE.

Article Selection/Data extraction

Data was extracted according to the coding scheme using a content analysis approach employed by Seuring and Gold (2012), and the screening approach by Wu *et al*. (2017). Figure 2 describes the screening process. The initial article search and selection yielded 270 articles on any variable of economics, environment, or CSR. These 270 articles study the overlaps of interactions ES, EE, and SE at a firm and industry level using various methodologies. The article selection excludes articles using "literature review" as their primary methodologies, which does not use discrete performance measurements at firm level. Forty-one articles focused on the ESE interactions. Articles that measure only standalone performance dimensions or ESE were excluded, which resulted in 120 usable articles.

[Insert Figure 2 here]

Data Extraction and Monitoring

To extract the data, a form was developed based on the recommendation of Tranfield *et al*. (2003). The form included the title, author, publication details, methodology (conceptual, empirical, analytical), authors intention for research, performance metrics used, and the area of interaction. The completed extraction form in Appendix A was used, a) as a historical record of what articles were included, b) and how they were coded, c) as a repository form which the results were analyzed, and d) to provide readers with sufficient evidence for refutation, which is important in qualitative research.

Data Synthesis

Performance measures

To classify an article for a specific interaction in the SSCM framework, the literature categorized different performance measures, both direct and indirect. While the area of interest is in the interactions where the factors overlap, we need to first identify metrics for each variable. Then, we can better identify those within the same study. For example, Fahimnia *et al*. (2015) noticed that environmental performance is measured largely based on quantifiable metrics such as greenhouse gas (GHG) or CO2 emissions and waste reduction. Economic performance depends on specific and easily quantifiable metrics such as price, cost (savings), profit, sales growth and productivity/efficiency. In contrast, social performance, represented as CSR, uses more qualitative metrics. In fact, there is little consensus on measurements for social aspects of sustainability (Varsei *et al*., 2014; Fahimnia and Jabbarzadeh, 2016). For this reason, social performance measures tend to vary to a greater extent compared to the other two performance measures. Examples include safety, health, human rights, ethics, and philanthropy as presented in Appendix B. However, as the meaning of CSR extends to both social activities, social performance is not limited to being measured exclusively within the boundaries of individual firms, but extended to their engagement with both internal and external stakeholders including

community, society, employees, buyers and suppliers (i.e. Ashby *et al*., 2012). This is important because the mix of qualitative and quantitative measures complicated the proper identification of multiple variables in the same article.

Articles using analytical and quantitative methods have numerical or quantifiable measures such as profit margin, transportation costs and waste volume (Britto *et al*., 2010; Chen and Wang, 2016; Zhao *et al*., 2016) while others rather employ qualitative or new measures such as stakeholder salience and pressure (Gualandris *et al*., 2015; Tate *et al*., 2011). Empirical methods including case study, survey, experiment, interviews, informal discussions and using available empirical data are more popular with 88 articles, while 31 articles use analytical/mathematical approaches, and 8 articles use conceptual methods. Eight articles use more than one research method. Among empirical methods, surveys are identified as the most popular data collection method.

Some studies use metrics that measure the interactions of sustainability. As an example, social welfare is measured based on consumer surplus, shareholder wealth or environmental cost (i.e. Bian et al., 2016; Dam and Perkova, 2014). The performance measures in Appendix B are classified based on a multitude of measures. Many reflect the grey area between two variables that support interactions. To overcome this issue, classification is primarily based on the nature of the measures, e.g. environmental cost in environmental performance has economic elements. Others include governmental pressure on compliance with environmental regulation and policies which represent social performance/stakeholder engagement with the environment. Within context, these studies support the view that interactions drive sustainability.

Analysis

As a result, 120 articles measuring the intersecting areas in the SSCM framework are included for panel review. The details of categorization of each article in Appendix A illustrate which performance measures the panel used to decide whether the article studies ES, EE, or SE. The SSCM literature classifications are shown in Figure 3. The category of EE comprises 54% of the total, followed by SE at 32% and ES at 14%. This result indicates imbalance in research with heavy emphasis on firms' economic and environmental concerns.

Next, articles are classified by journals (Figure 4) and by their publication year (Figure 5). While TRE and SCMI had a larger number of SSCM relevant publications, JBL, DS and TJ published less than five articles published in the past seven years (2010-2016). This occurs as a result of different publication frequency – whether journals publish by months, quarters, etc. and how many articles are published per issue. However, we also find that the journals with the greatest number of articles have sustainability-related special issues. For instance, TRE had two issues in 2015 with each primary focus on "Sustainability in Maritime Supply Chains - Challenges and Opportunities for Theory and Practice" and "Green Supply Chain Collaboration and Incentives".

[Insert Figure 3 here]

[Insert Figure 4 here]

[Insert Figure 5 here]

The interactions

ES – the interaction of environmental and social performances

The least researched area (17 of 120 articles) was the interaction of social and environmental performance. We examine *ES* as the interaction of environment and CSR in relation with various stakeholders. Articles in this interaction are mainly interested in examining the relationship between implementation of environmental practices and stakeholder integration as social performance (Wichmann *et al*., 2016; Wu *et al*., 2014; Peters *et al*., 2011). They recognize stakeholder integration or influence as a crucial driving factor for firms' successful environmental performance. That is, they find that there is a positive association between stakeholder engagement and environmental performance. Stakeholder influence works as an antecedent in firms' involvement in environmental activities. The forms of stakeholder integration can vary at specific levels of measurement. They include stakeholders' commitment (Gattiker and Carter, 2010), stakeholder pressure (Sarkis *et al.*, 2010; Kim and Lee, 2012), customer expectation (Lam and Dai, 2015), employee affective commitment (Wichmann *et al*., 2016), and buyer and government influence (Wu *et al*., 2014). Other articles investigate the relationship between the environmental sustainability practices in the supply chain (e.g. logistics, purchasing, management, etc.) and social performance through general CSR activities (e.g. diversity, health, safety, human rights, local procurement, labor conditions, etc.) (Large *et al*., 2013; Mansi and Pandy, 2016; Ayuso *et al.*, 2013; Gualandris *et al.*, 2014; Brammer and Walker, 2011; Chen and Delmas, 2011).

EE – the interaction of environmental and economic performances

The largest number of articles (64 of 120 articles) measure the interaction of environmental and economic performance. Most articles in this interaction attempt to examine the link between CO2 or GHG emission and minimization of the operational costs. Cost minimization through emission reduction leads to profit maximization of firms (von Westarp and Schinas, 2016). As an illustration of the EE interaction, Merrick and Bookbinder (2010) find that the quantity and time policy for shipment has positive effect on the CO2 emission reduction and decreased logistics costs. In the same vein, Paskoy *et al*. (2011) measure the CO2 emissions and resulting costs while considering operational transportation cost and capacity limits and find that environmental costs are explicitly measured as operational measures. We find that logistics is a very important area in SSCM particularly to enhance environmental performance as an antecedent of economic

performance in EE interaction (Lättilä *et al.*, 2013; Perotti *et al.*, 2012). Thus, studies are often conducted in the context of reverse logistics (RL) (Hazen *et al.*, 2011; Genchev *et al.* (2011).

Some articles argue that emission reduction for cost minimization can be done through transportation or logistics decisions such as multimodality (Bing *et al.*, 2013), transportation mode selection (Konur and Schaefer, 2014; Chen and Wang, 2016), shipping container reuse (Li *et al*., 2014), vessel scheduling (Qi and Song, 2012) and load planning (Baykasoglu and Subulan, 2016). These papers demonstrate how firms achieve their economic goals through integration of environmental performance in operations. Research in this area considers environmental practices not only in operations but also in strategic management. Zhao *et al.* (2016) examine that optimal node capacity and link capacity in regional hazardous waste management systems can minimize the total cost and risk.

Firms' environmental practices and environmental sustainability strategy affect direct financial indicators but also have influence on indirect indicators measuring economic performance. For example, environmental orientation capabilities have positive impacts on the implementation of green SCM practices and firm economic performance respectively (Kirchoff *et al.*, 2016; Asgari *et al*., 2015) and operational efficiency (Harja and Helo, 2014). However, environmental sustainability brings positive influence on economic measures such as firm competitiveness (Chen *et al.*, 2015; Yang *et al.*, 2013), customer satisfaction (Azebedo *et al.*, 2011), market value (Ba *et al.*, 2013), and shareholder wealth (Dam and Perkova, 2014; Paulaj and de Jong, 2012). Glock *et al*. (2012), Kapia *et al*. (2013), and Golicic and Smith (2013) address that firms should actively implement environmental practices in their decision making using unique economic measures, as suggested in Wolf and Seuring (2010).

SE – the interaction of social and economic performances

In examining social and economic performance, 38 of 120 articles treat these variables as interactions. In SE, many articles report that there is a positive relationship between social responsibility and economic performance (Bian *et al.*, 2016; Panda, 2014). Interestingly, while environmental performance precedes economic performance in EE, the articles in SE shows mixed results in the relationship between social performance and economic performance in regards to order of importance. Joo *et al.* (2010) measure the comparative efficiency of coffee retailers and find that despite an increase in purchasing cost, retailers who committed to CSR generated higher operational efficiency. Likewise, Sohn *et al.* (2015) find that information on firm's CSR, expressed by Corporate Social Performance (CSP) indicators has positive effects on a firm's attractiveness to job seekers. In contrast, Miller and Saldanha (2016) examine the positive relationship between financial performance and safety, an important social factor with potentially huge economic impacts. Another example of this relationship is illustrated by Dobrzykowski *et al.* (2016) which find that firms that adopt lean practices are positively associated with patient safety improvement. These mixed results imply that firms' sustainability may not always begin from an economic driver. Sustainability can begin from efforts to improve management practices for better economic and/or operational performance, which leads to better social performance. Conversely, integration of social concerns in operations bring economic

benefits to firms both directly and indirectly. This does not mean that firms necessarily focus on social performance prior to economic consideration, or vice versa. Rather, progression in sustainability may occur in parallel with performance, which influences improvement in other areas.

Stakeholder influence can drive a firms' social performance (Gualandris *et al.*, 2015; Flammer, 2016; Servaes and Tamayo, 2013). Among internal and external stakeholders in the supply chain including buyers and suppliers, shareholders, customers, government, etc., articles in SE present social performance in terms of the relationship with suppliers. For instance, a dependence on customers/suppliers (stakeholder integration) financial performance (Zhang and Huo, 2013). Thornton *et al.* (2013) suggest that firms' consideration of social responsibility in supplier selection (SRSS) provides financial benefits. This is not limited to within-firm managerial decisions. Suppliers' sustainability-related conditions (SRCs) including green, social, and ethical attributes in their operation processes influence the buyer economic performance (Busse, 2016). Rodrigues *et al.* (2016) examine how nongovernmental organizations (NGOs) supplier development programs influence the level of poverty alleviation of poor suppliers. This results in operational improvement and reduced coordination costs and transaction risks. Sanders *et al.* (2011) further supports the relationship with suppliers when measured as buyer-to-supplier information sharing (IS), buyer-to-supplier performance feedback (PF), and buyer-to-supplier communication openness (CO). Taylor *et al.* (2010) and Cantor *et al.* (2011) identify commitment to safety as one of the important social performance indicators that have positive associations with owner-operator turnover. Britto *et al.* (2010) finds that a stronger financial position has a positive influence on safety. Seeing labor conditions as an indicator of social performance, Odegaard and Roos (2014) analyze how worker's health impacts firms' production efficiency.

Progressive view vis-à-vis binary view of SSCM

In this section we discuss studies that contribute to the discussion on whether sustainability is achieved through a progressive viewpoint or binary. Progressive studies suggest that firm's go through multiple, incremental stages toward sustainability instead of a binary approach where a company is classified as sustainable, or not. To our knowledge, this is the first study to review the literature in this manner. The papers in the EE interaction predominantly examine how adoption of environmentally concerned business practices can result in better economic performance through decreases in cost, profit growth, or firm value. This shows that environmental performance is an antecedent to economic performance, implying that environmental performance should precede economic consideration. However, a firm's environmental performance is often oriented toward economic performance and thus driven by the idea that adoption of environmental practices is expected to bring economic benefits. However, the papers in this area do not examine how firms are motivated in this regard. This is also the case in the SE area. Likewise, we find mixed results showing that firms don't move toward sustainability from a single performance orientation.

Some argue that economic performance is an antecedent to social performance, but these studies also show that social performance can be an antecedent to economic performance. Though in the ES interaction, integration of stakeholder engagement, as part of their social responsibility, has a greater impact on environmental performance. Stakeholders' implicit concern about environmental issues motivates firms to take actions for better environmental sustainability. In this sense, our finding suggests that sustainability drives interactions toward improvements, where performance in one area leads to improvement in others. This supports the view that higher levels of sustainability are achieved progressively. In a few articles, that binary view provides a plausible explanation.

As expected, the most consistent interactions are with economic performance. This approach is not fully supportive of the progressive view of SSCM, but instead the binary view that economic factors are essential. In other words, it is possible that economic sustainability is not progressive, could explain why the research on EE and SE, outpaces research in ES.

Conclusions and Implications

In general, despite the TBL framework that shows that there are essential, interim, dyadic stages between the individual performance of environment, economic, and social performance, and their interactions, there is a dearth of studies examining these areas. Out of the 120 articles on the interim interactions, 64 measure the interactions of environment and economic performance; 38 measure the interaction between social and economic performance; while only 17 measure the interaction between environmental and social performance. Analysis of the methodology yielded 88 empirical papers explaining what happened. These studies are of varying quality due to sample size and rigor of instrument development. This highlights the need for more case and field studies explaining the how and why questions of these interactions. It also demonstrates the need for more analytical work modeling the ideal level of each performance to create an "optimal" interaction within the dyads.

Novel theoretical work explaining the context for these interactions is virtually non-existent, using transaction cost economics as the primary conceptual support. An important issue missing in the literature is the unit of analysis where the interactions are first created. Assessing whether the view of SSCM is binary or progressive could possibly shed further light into the real intensions driving interaction decisions. This suggests that more studies examining where sustainability begins should be developed. The majority of existing efforts begin with intentional strategy by regulatory agencies at the economy level, demand by customers at the supply chain level, or social consciousness at the firm level. However, we find in Lean philosophy, that sustainability can be operationalized as "bottom-up". Lean manufacturing/production improves both economic and environmental performances by eliminating excessive cost and waste (Chakravorty and Hales, 2017; Linton *et al*., 2007; King and Lenox, 2001). Although many studies focus on the impact of lean practices on economic and environmental performance, firms benefit from lean management to achieve social performance by improving safety, health, and

working conditions (Martinez-Jurado, P. J. and Moyano-Fuentes, 2014; Dobrzykowski *et al*., 2016).

Some studies focus on political/regulatory policy of government on the environmental aspects of sustainability and its resulting impact. For example, United States Treasury Department in its 2016 Strategic Sustainability Performance Plan focused on the environmental performance and its resulting economic impact (U.S. Treasury Department, 2016, p.5). While environmental aspects of sustainability dominate the stand-alone factor research, research measuring its interaction with social and economic performance are less developed. Due to the profit motive, they are less likely to be interested in considering only the social and environmental interactions.

With respect to the publication trend, the number of articles examining the dyadic relationships were gradually increasing until 2015, but flattening in 2016. This aligns with increasing interest in sustainability-related issues in the business environment in recent years. It also reflects that both firms and institutions have tried to integrate social and environmental sustainability activities in their operations to improve profits. Furthermore, society as a whole has grown more conscious about green production and operations, unethical conduct, work condition, etc. This trend can be considered as a reflection of growing interest in how to improve sustainability efforts and the activities that provide the greatest benefit, especially early-on.

The few studies that examine the "ES" area are limited and primarily concerned with the antecedents to CSR rather than the interactions. More studies on how and why the interactions occur are needed. Next, we find that the relationships are inconclusive when describing EE with regard to the environmental performance as antecedents to economic performance. Discovering whether the effects are direct, moderating, or mediating is important. Research is needed to examine possible reverse relationships, where economic performance is the antecedent for environmental performance. This could be explained by the "Lean", bottom-up approach.

In SE, a potential gap is found with the number of research articles, 14.1%, which are far less than those found in EE. Although recent literature shows that the perceived relationship between social and economic performance is correlational, the interactions can also be examined as mediation or antecedents to true sustainability – i.e. improving social performance leads to better economic performance and vice versa. This suggests that future research requires more focus on the organizations and how they create higher levels of sustainability. Thus, practicing managers need to understand how and why it occurs, i.e. which dyadic interactions lead to stronger sustainability.

Lastly, this research demonstrates the efforts toward sustainability through a progressive view of SSCM, but there is a dominant binary view used in many studies. While traditional views on sustainability judge sustainable firms as economically viable, contemporary studies increasingly recognize the value of environmental and socially responsibility. However, there is a reluctance to sacrifice economic sustainability to further the others. The interactions between environmental, economic, and social elements, need further analytical examination. Our research shows that research is weakest in the ES, and SE categories, which limits further development of how these interactions occur. We also found anecdotal evidence that the empirical studies

involved firms that were new in sustainability efforts and those that were apparently restarting their efforts to comply with regulations. The lean literature refers to these re-start efforts as Improvement Systems Recovery (ISR) (Chakravorty and Hales, 2017).

Limitations

While we reviewed journals primarily related to SSCM, there is a wide variety of coverage in other disciplines. The review finds that some journals consistently publish research on sustainability as interactions of the TBL factors while others tend to have stand-alone articles or publish more in sustainability-related special issues. In contrast to growing interest in application studies and those from governmental institutions with technology development, SSCM literature in the interactions of TBL performance have lagged behind other disciplines. TRE and SCMI are the leading journals that consistently publish articles related to the SSCM framework. However, it is worth considering that those journals have more frequent publication cycles than others. It is also important to note that articles that are only literature reviews on SSCM were excluded from our analysis and we focused on those articles that clearly presented measures for TBL interactions. Lastly, often inclusive measures for environmental and social sustainability do not clearly distinguish between these two measures. In order to discover the binary view effect, future studies may investigate development of sustainability based on economic versus non-economic measures to overcome this limitation.

Appendix A

[Insert Table 1 here]

Appendix B

[Insert Table 2 here]

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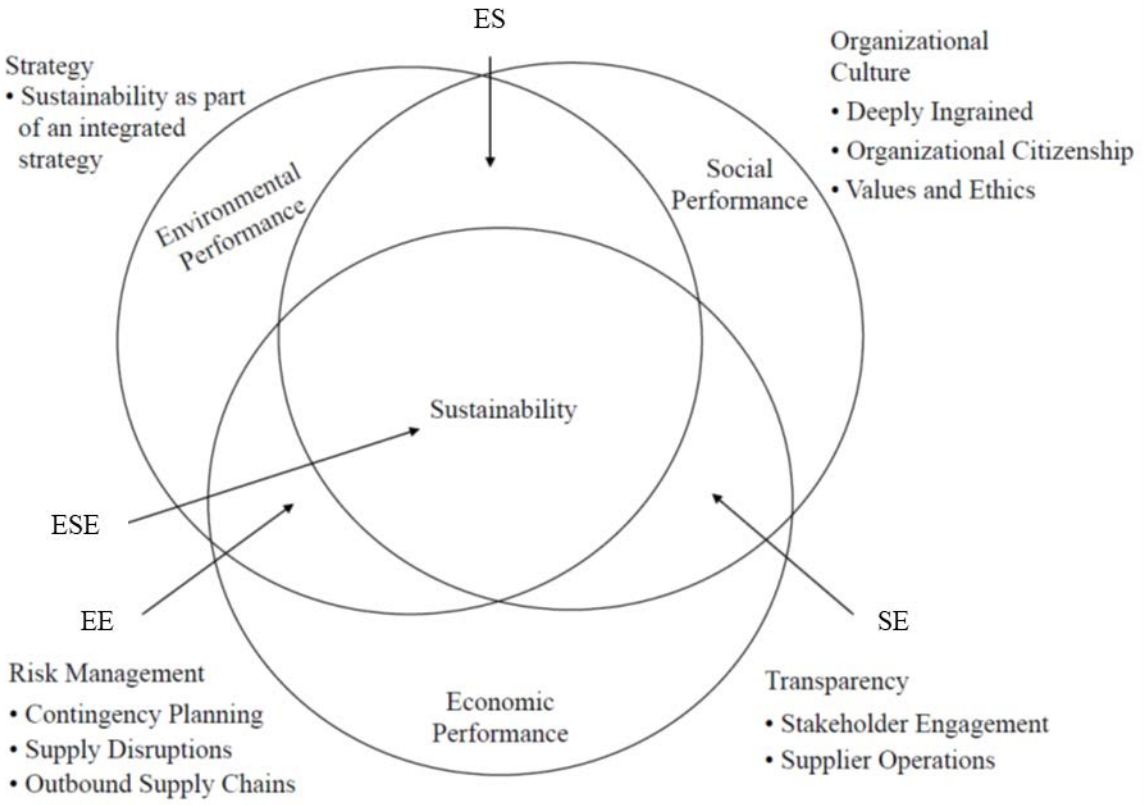
Figure 1: The Conceptual Relationships



Source: Carter and Rogers (2008)

Figure 2. Article screening process

Based on the journal selection criteria in relevant literature	Does it include relevant keywords such as Sustainability, SCM, CSR, SSCM?	Does it measure economic, social and environmental performance in SSCM framework?	Does it measure the interactions in SSCM framework? (Eliminate articles that measure standalone performance or ESE)	In which of the interactions does it fall? ES, SE, or EE?

Figure 3. Classification by interactions

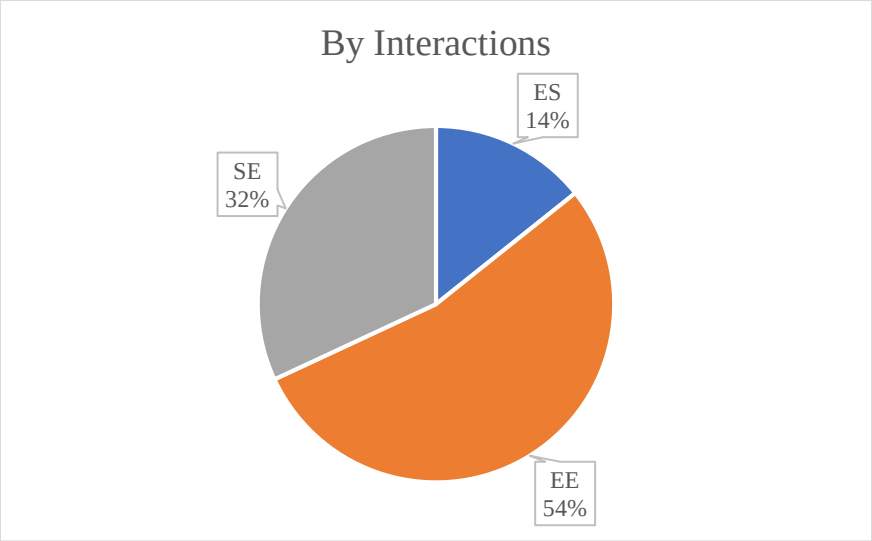


Figure 4. Classification of articles by journals

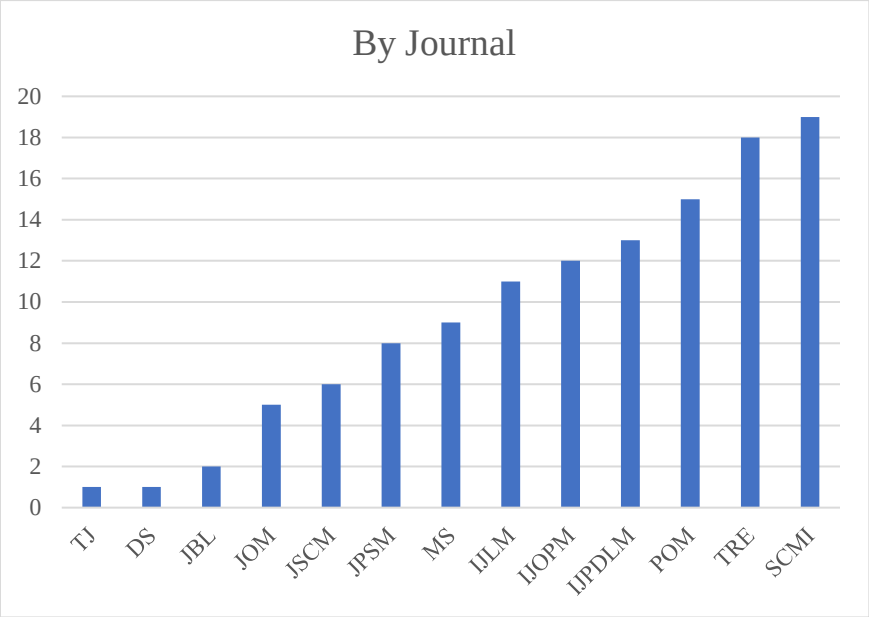


Figure 5. Classification of reviewed articles by publication years

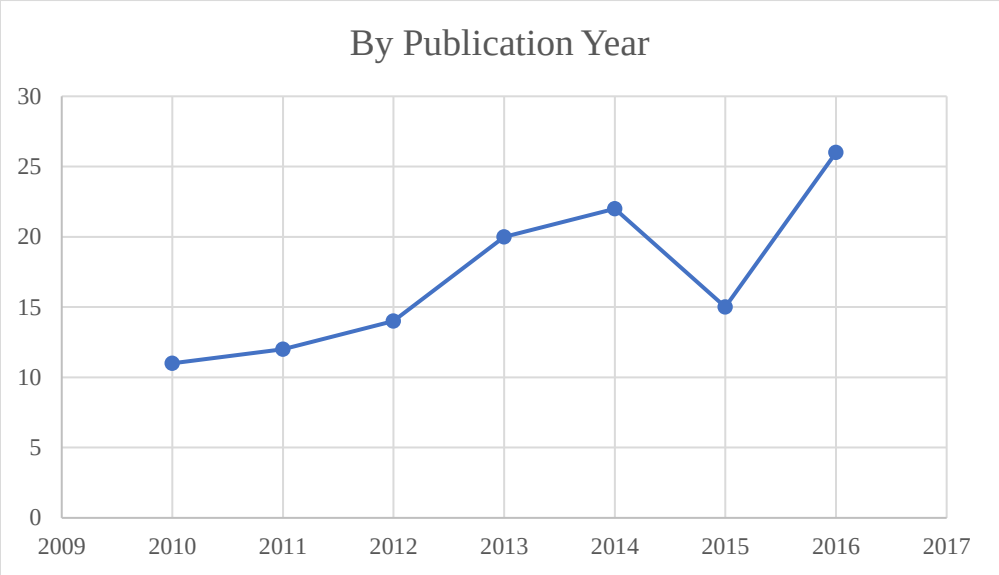


Table 1. Detailed literature review and interaction classification

Author	Year	Journal	3BL	Measurement			Method
				Environmental performance	Social performance	Economic performance	
McKinnon	2010	IJPDLM	EE	CO2 emissions		Product labelling cost	Conceptual, Informal discussion
Wolf and Seuring	2010	IJPDLM	EE	Environmental friendliness, CO2 emission reduction		Cost, price, quality and timeliness of 3PL firms	Case study
Merrick and Bookbinder	2010	IJPDLM	EE	CO2 emissions		Logistics costs	Analytical
Azebedo et al.	2011	TRE	EE	Environmental emissions, business waste, green image		Operational quality, economic and environmental cost, environmental revenues, efficiency, customer satisfaction	Case study
Genchev et al.	2011	IJLM	EE	Reverse logistics (RL)		Costs	Case study
Paskoy et al.	2011	TRE	EE	Estimated CO2 emission rates		Transportation, purchasing, penalty and opportunity costs	Mathematical
Sanchez-Rodrigues et al.	2010	IJPDLM	EE	Level of CO2 emissions of transport operations		Operational efficiency	Focus group discussion, survey
Hanzen et al.	2011	IJLM	EE	GSCM adoption		Competitive advantage (perceived quality)	Survey
Glock et al.	2012	IJLM	EE	Greenhouse gas emission		Profit, costs	Mathematical
Perotti et al.	2012	IJPDLM	EE	Environmental performance (reduction of air emission, waste water, solid waste, and energy consumption, etc.)		Economic performance (market share, revenue, material/purchasing costs, etc.), operational performance (operational costs, training costs, etc.)	Case study
Qi and Song	2012	TRE	EE	Fuel consumption/emission			Analytical
Bing et al.	2013	IJPDLM	EE	CO2 emission		Transportation and emission costs	Analytical
Kapia et al.	2013	IJPDLM	EE	Waste reduction		Profit, retailer margin	Case study
Golicic and Smith	2013	JSCM	EE	Environmental supply chain practices		Financial performance (market-based, operational-based and accounting-based firm performance)	Empirical
Lattila et al.	2013	TRE	EE	CO2 emissions level		Transportation costs	Analytical
Yang et al.	2013	TRE	EE	Green performance (the interaction between the business and the environment), internal green practices, external green collaboration		Firm competitiveness	Survey
Harja and Helo	2014	TRE	EE	GHG emission, waste reduction		Operational efficiency (costs, fuel consumptions)	Case study
Konur and Schaefer	2014	TRE	EE	GHG emission		Transaction costs	Analytical

Li et al.	2014	TRE	EE	Shipping company's green effort (waste reduction)		Revenue and cost reduction from moving empty container	Mathematical
Luo et al.	2015	TRE	EE	Green supply chain collaboration (GSCC) implementation		Transaction cost attributes (asset specificity, volume uncertainty, transaction frequency), competitive environment	Survey
Asgari et al.	2015	TRE	EE	Environmental impact (pollution degrees, environmental legislations, renewables, future development)		Operation costs (transportation, shipping, inventory costs), service quality	Survey
Glock and Kim	2015	IJLM	EE	Carbon emission		Costs	Mathematical
Chen et al.	2015	IJPDLM	EE	Environmental management strategy/practices		Firm competitiveness, environmental cost reduction	Survey
Zhao et al.	2016	TRE	EE	Amount of waste		Transportation cost, location cost, operating cost	Analytical
Kirchoff et al.	2016	IJPDLM	EE	Strategic organizational orientations on green supply chain management (GSCM), GSCM implementation		Firm performance	Survey
Baykasoglu and Subulan	2016	TRE	EE	Total CO2 emissions		Overall transport cost, total transit time (customer service level)	Mathematical, Case study
Chen and Wang	2016	TRE	EE	Carbon emission		Transportation cost, price of carbon emission	Analytical
von Westarp and Schinas	2016	TRE	EE	Carbon footprint per ton per miles/CO2 emission		Profit (revenue, fixed system costs, third-party costs, transshipment costs, load and discharge costs)	Analytical
Drake et al.	2016	POM	EE	Emission		Profit	Analytical
Jacobs	2014	POM	EE	GHG emission reduction		Financial performance (cost, revenue, risk, competitive advantage), shareholder value	Empirical
Ovchinnikov	2014	POM	EE	Environmental impact (total energy consumption/use/ demand during the life cycle of a product)		Profitability	Analytical
Ba et al.	2013	POM	EE	Green innovation		Market value, profitability	Empirical
Galbreth et al.	2013	POM	EE	Product reuse		Price, profit	Analytical
Aflaki et al.	2013	POM	EE	GHG emissions		Operational and maintenance costs, energy efficiency	Conceptual
Jabali et al.	2012	POM	EE	CO2 emission		Travel time cost, fuel cost, carbon cost	Analytical
Quariguasi-Frota-Neto and Bloemhof	2012	POM	EE	Environmental impact (cumulative energy demand (CED))		Energy consumption, eco-efficiency	Empirical

Jacobs and Subramanian	2012	POM	EE	Recycled, collected and disposed quality		Price, collection, recycling and disposal cost	Analytical
Toyasaki et al.	2011	POM	EE	Recycling		Operational efficiency	Analytical
Graham and McAdam	2016	IJOPM	EE	Environmental performance, environmental practices (pollution prevention)		Cost performance	Survey
Adebanjo et al.	2016	IJOPM	EE	Environmental outcomes		Manufacturing performance	Survey
Hartmann et al.	2015	IJOPM	EE	Environmentally conscious operations (ECO)		Financial performance	Survey
Dam and Petkova	2014	IJOPM	EE	Environmental supply chain sustainability program (ESCSP)		Shareholder wealth	Empirical
Lo	2014	IJOPM	EE	Green practices		Cost	Case study
Burgos-Jimenez et al.	2013	IJOPM	EE	Environmental protection, environmental performance, environmental management		Financial performance	Survey
Paulaj and de Jong	2012	IJOPM	EE	ISO 14001 certification		Stock performance (shareholder wealth)	Empirical
Avci et al.	2015	MS	EE	Carbon emission		Operational costs	Analytical
Chava	2014	MS	EE	Firm's environmental profile		Cost of equity and debt capital	Empirical
Cachon	2014	MS	EE	Emission reduction		Retailer's and consumers' costs, fuel efficiency	Analytical
Agrawal et al.	2012	MS	EE	Environmental performance		Profitability, disposal cost	Analytical
Vanpoucke et al.	2016	SCMI	EE	Green supply chain management (GSCM)		Performance	Survey
Campos and Vazquez-Brust	2016	SCMI	EE	Green supply chain practices		Lean performance	Case study
Liu et al.	2016	SCMI	EE	Green supply chain implementation		Supply chain capabilities	Survey
Freeman and Chen	2015	SCMI	EE	Green competency, environmental management performance		Cost, quality, delivery performance	Survey
Lee	2015	SCMI	EE	environmental performance, GSCM		Social capital, operational performance	Survey
Yu et al.	2014	SCMI	EE	Green supply chain management (GSCM) with customers, internal stakeholders, suppliers		Operational performance (flexibility, delivery, quality, cost)	Survey
Bai and Sarkis	2014	SCMI	EE	Environmental performance (environmental cost savings, energy efficiency, etc.)		Business performance (cost, time, quality, flexibility, innovation)	Empirical
Wiengarten et al.	2013	SCMI	EE	Environmental practices		Operational supply chain performance	Survey
Green et al.	2012	SCMI	EE	Green supply chain management practices (IEM, GIS, GP, CWC, ED, IR), environmental performance		Operational performance	Survey

Bjorklund et al	2012	SCMI	EE	Environmental aspects		Economic aspects	Conceptual, case study
Soosay et al.	2012	SCMI	EE	Carbon emission		Consumer value	Case study
Bai et al.	2012	SCMI	EE	Environmental performance (cost, time, quality, flexibility, innovation)		Business performance (cost, time, quality, flexibility, innovation)	Analytical
Ugarte et al.	2016	JPSM	EE	GHG emission		Lean logistics practices	Analytical
Zhu et al.	2013	JPSM	EE	Internal and external environmental practices, environmental performance		Economic and operational performance	Survey
Large and Thomsen	2012	JPSM	EE	Environmental commitment, environmental performance improvement		Purchasing performance	Survey
Forestl et al.	2010	JPSM	EE		Supplier sustainability risk assessment	Operational performance, competitive advantage, risk reduction	Case study
Britto et al.	2010	TJ	SE		Safety performance (number of crash, DRSEA score, VHSEA score)	Financial performance (Net profit margin)	Empirical
Taylor et al.	2010	IJLM	SE		Perceived job satisfaction (pay and compensation, top management support, safety, time at home)	Owner operator driver turnover (intention to stay)	Survey
Joo et al.	2010	IJLM	SE		Consumers attitude toward socially responsible products	Operating efficiency	Empirical
Cantor et al.	2011	JBL	SE		Commitment to safety	Drivers intention to quit	Survey
Lado et al.	2011	IJLM	SE		Customer focus, customer service	Financial performance	Survey
Sanders et al.	2011	IJLM	SE		Buyer-supplier communication openness (relationship)	Supplier performance (cost, quality, etc.)	Survey
Zhu et al.	2011	TRE	SE		Pressure from environmental regulation/policies for green supply chain management	Sales/investment recovery	Survey
Thornton et al.	2013	JSCM	SE		Socially responsible supplier selection (SRSS)	Firm sales revenue, sales growth, market share	Survey
Zhang and Huo	2013	IJPDLM	SE		Dependence on customer/supplier	Financial performance	Empirical
Perry and Towers	2013	IJPDLM	SE		CSR implementation, labor condition, trust in buyer-supplier relationship	Price, cost, supply chain complexity	Case study, Interviews
Sawhney	2013	JOM	SE		Supportive HR practices (job tenure, job-	Plant performance (manufacturing costs, inventory)	Case study, Survey

					rotation training reward structure)		
Panda	2014	TRE	SE		Manufacturer's and retailer's CSR,	Profit, Shareholder's value	Analytical
Sohn et al.	2015	IJPDLM	SE		CSP (GRI-CSR reporting)	Firms' attractiveness to job seekers	Experiment
Kumar et al.	2015	IJPDLM	SE		Supply chain disruptions	Stockholder wealth	Empirical
Gualandris et al.	2015	JOM	SE		Stakeholder salience, stakeholder credibility	Efficiency	Conceptual
Bian et al.	2016	TRE	SE		Social welfare, CSR concerns	Firms' profitability, Consumer surplus	Analytical
Busse	2016	JSCM	SE		Buyer-supplier relationship (buyer's interest in suppliers' sustainability responsibility conditions (SRCs) -green, social, ethical issues): the degree of agreeableness from the perspective of stakeholders	Buyer economic performance, purchasing cost	Conceptual
Dobrzykowski et al.	2016	JOM	SE		Patient safety indicators (CMS)	Net income (AHD)	Survey
Miller and Saldanha	2016	JBL	SE		Motor carrier safety (the extent that truck drivers acting as agents of a motor carrier are operating safely and are utilizing equipment that is in good working condition, HOS Compliance, Vehicle Maintenance)	Net income (AHD)	Empirical
Rodriguez et al.	2016	JSCM	SE		NGO's SD program (localization knowledge, bridging capacity)	Poverty alleviation or poor supplier (operational efficiency, coordination costs, transaction risks; level of the development of suppliers' capabilities and the reduction in transaction costs in the buyer–supplier relationship)	Case study
Letizia and Hendriske	2016	POM	SE		Socially responsible investments	Revenue	Analytical
de Vris et al.	2016	POM	SE		Occupational accidents, safety-specific leadership	Warehouse productivity	Survey
Arya and Mittendorf	2015	POM	SE		CSR activities	Profit	Analytical
Odegaard and Roos	2014	POM	SE		Workers' health	Production efficiency (productivity)	Analytical

Huq et al.	2014	IJOPM	SE		Social sustainability	Productivity, economic benefits	Case study
Hoejmose et al.	2013	IJOPM	SE		Socially responsibility supply chain management	Business strategy (low cost)	Survey
Jeffers	2010	IJOPM	SE		Corporate sustainability (customer-centric)	Firm (financial) performance	Survey
Shafiq et al.	2014	DS	SE		Socially responsible practices	Financial performance	Survey
Pigors and Rockenbach	2016	MS	SE		Socially responsible production	Market competitiveness, profit	Experiment
Flammer	2016	MS	SE		Shareholder's CSR proposal	Financial performance	Experiment
Eccles et al.	2014	MS	SE		Corporate sustainability	Organizational performance, stock market, accounting performance	Survey
Servaes and Tamayo	2013	MS	SE		Awareness on CSR	Firm value	Empirical
Knittel and Stango	2014	MS	SE		Celebrity endorsements (scandals)	Firm value, reputation risk	Analytical
Fletcher et al.	2016	SCMI	SE		Social supply chain	Co-consumption through social media exchanges	Case study
Sancha et al.	2015	SCMI	SE		Social supplier development practice, supplier social performance	Operational performance, economic performance	Survey
Marshall et al.	2015	SCMI	SE		Social sustainability adoption	Revenue	Survey
Adebanjo et al.	2013	SCMI	SE		Health and safety policy and procedures, workmanship insurance	Service flexibility capabilities, etc.	Case study
Saunders et al.	2016	JPSM	SE		Safety	Efficiency, effectiveness, productivity	Case study
Sarkis et al.	2010	JOM	ES	Implementation of environmental practices (eco-design practices, source-reduction, environmental management system)	Stakeholder pressure		Survey
Gattiker and Carter	2010	JOM	ES	Commitment to environmental management projects	Influence tactics (inspirational appeals, consultation and rational persuasion) and avoidance of ingratiation		Survey
Peters et al.	2011	IJLM	ES	Sustainable supply chain initiatives (environmental concerns -i.e. Ability to link products to environmental problem)	Stakeholder integration, sustainable supply chain initiatives (societal concerns -i.e. ability to solve the problem jointly with		Case study
Kim and Lee	2012	IJLM	ES	Adoption of environmental logistics practices	Stakeholder pressure		Survey

Jabbour et al.	2014	TRE	ES	Green performance (pollution/waste emission, legislation compliance, environmental reputation, overall environmental performance), environmental management maturity (green purchasing)	Cooperation with customers		Conceptual, Survey
Wu et al.	2014	JSCM	ES	Energy efficiency initiatives adoption	Stakeholder influence		Conceptual, Case study
Lam and Dai	2015	IJLM	ES	Environmental sustainability performance	Customer requirements (CRs) for environmental sustainability		Analytical, Case study
Wichmann et al.	2016	JSCM	ES	Implementation of Environmental SCM initiatives	Affective commitment		Empirical
Chen and Delmas	2011	POM	ES	Corporate social performance (CSP) - environment	Corporate social performance (CSP)- community, diversity, employee, human rights		Empirical
Castka and Corbett	2016	IJOPM	ES	Environmental standard adoption	Social standard adoption		Empirical
Brammer and Walker	2011	IJOPM	ES	Sustainable procurement (environment)	Sustainable procurement (diversity, safety, human rights, philanthropy, local procurement)		Survey
Gualandris et al.	2014	SCMI	ES	Improving environmental performance of products and processes (e.g. environmental management system (EMS), environmental certification, life-cycle analysis design for environment)	Monitoring the corporate social responsibility of partners along the supply chain (e.g. labor conditions, environmental impacts)		Survey
Markus et al.	2014	SCMI	ES	Environmentally responsible goals	Socially responsible goals		Survey
Ayuso et al.	2013	SCMI	ES	CSR requirements (environment)	CSR requirements (health, safety, labor rights, human rights, corruption)		Survey
Mansi and Pandey	2016	JPSM	ES	Environment	Diversity, human rights, philanthropy, safety		Survey
Gualandris and Kalchschmidt	2014	JPSM	ES	Environmental management systems	corporate responsibility practices		Survey
Large et al.	2013	JPSM	ES	Emission reduction, land use reduction, transport intensity	Working condition improvement, qualified employment		Conceptual, survey

Table 2. Measures for Environmental, Social, and Economic Performance

Performance	Environmental	Social	Economic
Measures	CO2 Emission ISO 14000 (14001) Environmental friendliness Environmental practices Energy source Environmental impact Waste (reduction) Green image Reverse logistics (RL) Environmental performance Greenhouse gas (GHG) emission Recycling Green supply chain management (GSCM) orientation EPS scores Environmental violation Green innovation	Safety performance Stakeholder pressure Job satisfaction Influence tactics & ingratiation Work/labor condition Stakeholder engagement Consumer attitude toward socially responsible products Stakeholder restrictions Transportation fatalities Commitment to safety Customer focus/service Buyer-supplier (relationship) communication openness Regulatory pressure Stakeholder integration Sustainable supply chain initiatives (societal concerns) Ethical labor HR practices Environmental conditions with suppliers Socially responsible supplier selection Dependence on customer/supplier CSR implementation CSR disclosure level/CSR reporting Institutional pressure Manufacturer & supplier CSR SC disruptions Social welfare (CSR) Customer requirements for environmental sustainability Stakeholder salience and credibility Employee affective commitment NGO program adoption Social violation CSR activities Worker's health Corporate social performance (CSP) Social sustainability practices Social standard adoption Social supplier compliance Ethics Sustainable procurement (diversity, safety, human rights, philanthropy, local procurement) Socially responsible sourcing/production Shareholder CSR proposal Celebrity endorsements (unethical issue) CSR awareness Supply chain partners' CSR monitoring	Operational efficiency Financial performance (Net profit margin) Product labelling cost Cost (savings) Price Quality Delivery (timeliness) Employee turnover rate Transaction cost Economies of scale Logistics/transportation cost Revenue Customer satisfaction Profitability Supplier performance Sales growth Investment recovery Competitive advantage Market share Firm attractiveness Organizational performance Consumer awareness (willingness to pay) Firm value Reputation Lean performance Manufacturing performance Customer & HR benefits Travel time/cost Operational monitoring cost Shareholder value Productivity ROI, ROA Poverty alleviation Net income Shareholder and stockholder wealth Social welfare (Consumer surplus) Service flexibility Purchasing performance Economic sustainability