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Supply Chain Integrity: A Key to Sustainable Supply Chain Management

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As stakeholders continue to increasingly hold firms accountable for environmental and social performance in their supply chains, the importance of understanding *how* firms can be more sustainable becomes more prescient. Based on the underlying premise of stakeholder theory that business and ethics decisions are intertwined, the current research introduces the concept of supply chain integrity (SCI) to explore how the interdependence of business and ethics decisions can lead to improvements in sustainable supply chain management (SSCM) practices. Exploratory analysis employing secondary data sources in an elastic net (EN) logistic regression provides support for the proposed construct, by providing preliminary empirical evidence that SCI, measured through two subdimensions of structural and moral SCI, can be linked to firm sustainability. The research contributes to the supply chain management literature by: (1) introducing the concept of SCI; (2) performing an exploratory econometric analysis to provide initial validity of the SCI construct; and (3) providing a research agenda to guide further research on the concept of SCI and its role in SSCM.

Keywords: supply chain management; sustainability; social responsibility; strategy; integrity

INTRODUCTION

Sustainable supply chain management (SSCM) has become a focus for business practitioners and supply chain researchers. Issues of climate change, geopolitics, labor conditions in emerging economies, and pressure from stakeholders and supply chain partners all play a role in shifting corporate focus toward the triple bottom line (TBL), the simultaneous achievement of environmental, social, and financial performance (Elkington 1998, 2004; Orlitzky et al. 2003; Carter and Rogers 2008; Golicic and Smith 2013; Waller et al. 2015). The focus on SSCM is particularly important as the millennial generation comes of age. Millennials are value-driven consumers, expecting good corporate citizenship from the companies with whom they interact (Solomon 2014). Not only is the millennial generation the largest in history, but this group of consumers is still growing worldwide. Millennials also seem to wield significant influence over other generations' attitudes and consumption patterns (Solomon 2014), suggesting that value-based consumption attitudes and behaviors will become increasingly widespread. As market pressures continue to evolve, supply chain managers will increasingly assume responsibility for improving their firms' SSCM performance, due to the boundary spanning nature of their roles across functional and organizational boundaries (Carter and Jennings 2004).

As sustainability gained traction in the supply chain literature, initial attention focused on whether sustainability leads to enhanced firm (financial) performance (see, e.g., Porter and van der Linde 1995; Kleindorfer et al. 2005; Pagell and Wu 2009; Reuter et al. 2010; Golicic and Smith 2013; Thornton et al. 2013). More recently, SSCM researchers have noted that the question of *whether* sustainability pays is no longer the most salient; rather, it has been surpassed by the question of *how* firms can be more environmentally sustainable and socially responsible (Pagell et al. 2013). Current SSCM thought emphasizes TBL performance as an outcome of various sustainability activities that span four facets of the firm—strategy, risk management, organizational culture, and transparency (Carter and Rogers 2008; Carter and Easton 2011). But, while much supply chain research has focused on the TBL as an outcome since it was first introduced (Elkington 1998), less emphasis has been placed on the four facets related to sustainability as introduced in Carter and colleagues' SSCM framework with respect to *how* they relate to each other in enabling SSCM across the economic, social, and environmental arenas.

Such understanding is important as the value-based millennial consumers become increasingly influential in the marketplace. Firms will need to develop strategy, risk management, transparency, and organizational cultures that readily demonstrate integrity-laden approaches to supply chain management. While integrity is most commonly thought of as an individual-level construct relating to one's virtue and character (Paine 1994; Audi and Murphy 2006; Brown 2006; Palanski and Yammarino 2007; Maak 2008; Maurer 2009), the notion of firm-level corporate integrity is well established in the business ethics literature (Gowans 1984; Guerrette 1986; Solomon 1992b; Paine 1994; Koehn 2005; Audi and Murphy 2006; Brown 2006; Maak 2008; Becker 2009; Maurer 2009; Li et al. 2016). Corporate integrity provides a foundation for value-based decisions that companies make. Interestingly, Maak (2008, 361) introduced the notion of supply chain integrity (SCI) as a "major challenge for the corporation" to ensure its own corporate integrity when dealing with external organizations. However, the SCI construct has yet to be conceptually developed or introduced to the supply chain literature.

Therefore, the purpose of this study is to develop the logic and definition of SCI as a construct useful to SSCM researchers and practitioners. We develop the SCI construct within the framework provided by Carter and Rogers (2008), as a means to further understand *how* firms can be more sustainable through

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their supply chain management practices. Following the conceptual development of SCI, we conduct an exploratory analysis as a first step toward construct validation, trying to assess the conceptual merit of the proposed construct. In essence, the exploratory analysis provides preliminary empirical evidence for answering the research question as to whether SCI can help differentiate between sustainable and nonsustainable firms, a question that is important as firms continue to consider *how* to be more sustainable. Specifically, we use secondary data sources to explore whether the nascent SCI construct can differentiate between organizations and their designations as sustainable companies (or not). We conduct a set of analyses across manufacturers and retailers as a means of assessing the robustness of the proposed construct across supply chain echelons, thus setting the stage for future research to more fully develop the SCI concept and a more explicit framework for supply chain managers to build the sustainable supply chains increasingly required by customers and other stakeholders.

This research effort makes three contributions to the logistics and supply chain literature. First, the introduction of SCI adds depth to the SSCM framework (Carter and Rogers 2008; Carter and Easton 2011) by bringing concepts found in the business ethics literature into the SSCM literature base to explore the interdependence between business and ethics decisions as related to sustainability (Maak 2008). Using a stakeholder theory perspective, we conceptually develop the SCI construct within the framework of SSCM presented by Carter and Rogers (2008). Second, we perform an exploratory analysis using EN logistic regression evaluated with the Information Complexity (ICOMP) criterion, to empirically assess the merit of the proposed SCI construct by examining how well the proposed construct can differentiate between firms with respect to sustainability (Zou and Hastie 2005; Bozdogan and Pamukcu 2016). Finally, an agenda is developed to guide scholars in pursuing future research within the SSCM domain that can help firms to understand *how* being sustainable is affected by different contexts and mechanisms.

The article is structured as follows. A review of the literature on sustainability thought in supply chain management research lays the groundwork for developing the new concept of SCI. The methodology section contains an explanation of the use of secondary data in a logistic regression to explore whether the proposed SCI construct can differentiate between firms with regard to sustainability. Finally, the findings are discussed and a research agenda to guide future inquiry is presented.

SUSTAINABILITY THOUGHT IN SUPPLY CHAIN RESEARCH

Scholarly interest in sustainability began to emerge based on the seminal work of Bowen (1953) and Carroll (1979, 1991), who refined the notion of corporate social responsibility (CSR). CSR focuses on the pyramid of corporate responsibilities: the economic, legal, ethical, and philanthropic activities of the firm (Carter and Jennings 2004). In its original conceptualization, the economic and legal responsibilities of a firm were considered mandatory, while ethical and philanthropic responsibilities were considered to be of lower importance (Richter 2010).

Supply chain scholars continue to adapt CSR into sustainability discussions, often using the terms "CSR" and "sustainability" interchangeably. Yet, in the supply chain literature, the concept of sustainability invokes a TBL approach toward performance, based on the work of Elkington (1998, 2004). SSCM, as defined by Carter and Rogers (2008), is "the strategic, transparent integration and achievement of an organization's social, environmental, and economic goals in the systemic coordination of key interorganizational business processes for improving the long-term economic performance of the individual company and its supply chains" (p. 368). Such SSCM theorizing shifts the conversation from social/environmental "responsibility" to one of business strategy by which a firm can prosper over the long term (Carter and Easton 2011).

Of particular relevance to the current research is the TBL logic found in the SSCM framework (Carter and Rogers 2008; Carter and Easton 2011). The TBL becomes the focal lens for supply chain managers by which to make decisions that affect both the "natural environment and society, but which also result in long-term economic benefits and competitive advantage for the firm" (Carter and Rogers 2008, 365). Within the SSCM framework, four supporting facets of SSCM are identified: risk management, transparency, strategy, and corporate culture. Each of these four facets is actively addressed within the supply chain literature and increasingly being tied to TBL performance. Yet the underlying role of these four facets within the SSCM framework remains underexplored.

SSCM research has also consistently been linked to stakeholder theory as a rationale for why firms should care about environmental or social sustainability (Carter and Jennings 2002; Sarkis et al. 2010; Hofer et al. 2012; Swanson and Smith 2013). Stakeholder theory has diverged into three distinct approaches—descriptive, normative, and instrumental (Brenner 1992; Donaldson and Preston 1995; Jones and Wicks 1999). However, Freeman (1999) takes exception to this divergence, arguing that a divorce has resulted between business and ethics in both research and practice. He articulates that the original focus on stakeholders vis-à-vis shareholders was explicitly meant to imply a value-laden approach to management (Freeman 1994, 1999). Thus, the discourse of business should not be separated from the discourse of ethics. Indeed, the original stakeholder approach was built on instrumental premises that inherently include descriptive and normative considerations, clearly suggesting the interrelated nature of business and ethics (Freeman 1984).

The focus of stakeholder theory is built primarily on the notion that consequences count, which is important when considering the evolution of SSCM to include a TBL approach. Stakeholder theory posits that firms need to consider the larger group of stakeholders in their decision-making frameworks. Not only do a firm's actions have consequences for stakeholders, but also stakeholders' actions can have consequences for the firm. Those consequences are extended beyond the economic realm to also include environmental and social consequences. This becomes especially important when considering the challenges of managing global supply chains. Stakeholder theory is becoming increasingly sensitized to the complexities and uncertainties involved in managing multinational networks due to several factors: the liberalization of markets and political institutions, the emergence of environmentalism and social values, and the

dramatic growth in information technology capabilities and adoption worldwide (Freeman et al. 2007). Additionally, the complexity of global operations raises the awareness levels of firms' responsibilities embedded in their value creation processes (Jensen and Sandström 2011).

SUPPLY CHAIN INTEGRITY

We extend the concept of corporate integrity, which has previously been introduced in the business ethics literature (e.g., Gowans 1984; Guerrette 1986; Solomon 1992b; Paine 1994; Koehn 2005; Audi and Murphy 2006; Brown 2006; Maak 2008; Becker 2009; Maurer 2009; Li et al. 2016), to the supply chain context to provide a research foundation for SCM scholars, as well as a foundation for a business framework that will more fully enable managers and their firms to realize their social, environmental, and economic objectives.

The concept of corporate integrity

The corporate integrity concept refers to a firm's awareness of and commitment to high ethical principles and business practices (Paine 1994; Brown 2005; Marsh 2009). Integrity is often identified as one of the most important or desirable moral traits in an organization (Audi and Murphy 2006; Stevens 2012; Cox et al. 2013; Dodd and Dodd 2014). Businesses typically adopt the term to guide their corporate philosophies of ethical practice. For example, Walmart's statement of ethics emphasizes the importance of an individual's "moral integrity" (Walmart 2008). However, Walmart does not clearly define "moral integrity" and assumes employees maintain a common understanding of the concept. This is not a fault per se, as the general prevalence and recognition of the word results in shared understanding of the meaning of "integrity" in industry.

Business ethics researchers have explored various levels of analysis in their development of the corporate integrity construct. At the individual level of analysis, Audi and Murphy (2006) argue that the multitude of interpretations of individual integrity can be distilled into having either an integrational sense of the term or one that relates to virtue ethics. Brown (2006) connects the individual and firm levels of analysis by exploring whether individual leaders can have personal integrity in a corporation that does not. He explains the link between levels by concluding, "leaders have integrity only to the degree that they participate in and promote corporate integrity" (Brown 2006, 17). Other researchers have also built upon the individual as the unit of analysis to examine firm-level or corporate integrity (Paine 1994; Maak 2008; Maurer 2009). Because firms can be considered corporate citizens of communities with the ability to manage policies, actions, and ethical concerns of stakeholders, integrity can also reside at the firm level of analysis with both an internal and external orientation (Donaldson 1982; Velasquez and Goodpaster 1983; French 1984, 1995; Maak 2008).

While multiple business ethics definitions of corporate integrity exist, they generally align with one of two connotations: structural integrity and moral integrity (Solomon 1992a; Koehn 2005; Audi and Murphy 2006; Maak 2008; Becker 2009; Maurer 2009). Structural integrity refers to the completeness or consistency sense of the term "integrity." However, to define corporate integrity only in this manner is insufficient (McFall 1987; Koehn 2005; Bauman 2013). Consider, for example, if a manager at Volkswagen who was involved in the 2015 vehicle emissions scandal was acting in accordance with prevalent organizational norms, that manager could be deemed to have integrity under a consistency-based definition of the term. Of course, it is not reasonable to accept that this individual acted morally with respect to the company's stakeholder groups if that person actively facilitated the company's deceit in circumventing emissions standards. This exemplifies the need for a moral dimension of corporate integrity as well. The second dimension, moral integrity, refers to either a specific set of moral virtues or moral virtue in general (Audi and Murphy 2006).

Over the past 15 years, the predominant stream of business ethics research has built upon this dualistic definition of corporate integrity. Several authors (e.g., Palanski and Yammarino 2007; Bauman 2013) provide excellent discussions of the philosophical and theoretical origins of corporate integrity. Synthesizing the reviews of these authors with the stream of corporate integrity research allows for theoretical development of the concept of SCI.

The concept of SCI

Much of the research that has been conducted with regard to corporate integrity has focused on an intrafirm orientation. For example, Paine (1994) compares the effectiveness of integrity-based strategies over compliance-based strategies for firms to encourage ethical behavior of individuals within the organization. Other researchers, however, call for firms to consider themselves as part of a society, rather than private and separate from society (Brown 2006; Richter 2010). Maak (2008) explicitly argues for an interfirm extension of corporate integrity, on the basis that activities in the supply chain influence a firm's corporate integrity. In other words, a company's SCI, or its cognizance of and dedication to maintaining high ethical principles in its supply chain activities, is paramount to having corporate integrity. However, while Maak (2008) invokes the concept in the ethics literature, SCI has yet to be explored or examined within the supply chain domain. We therefore propose SCI as a firm-level, interfirm-oriented concept. Positioning SCI as a firm-level concept within the broader context of an interfirm domain is consistent with the conceptualization of corporate integrity as a firm-level concept and also replicates the externally focused approach taken by those who research the concept of supply chain orientation within the supply chain literature (Mentzer et al. 2001).

Adapting established concepts from the business ethics literature to the supply chain context, a synthesized definition of SCI is presented as *the dedication to maintaining integrity in supply chain activities and the recognition of the systemic and strategic implications of maintaining integrity in supply chain processes and flows.* Thus, SCI is characterized by both structural and moral dimensions that underlie supply chain activities. The Structural SCI of a firm is its development of a series of sustainable supply chain practices while seeking like-minded supply chain partners and being able to act in accordance with stated

responsibility objectives. Structural SCI also relates to sustainability decisions that can be considered "good" business decisions, that is, decisions that promote TBL performance. However, SCI also requires attentiveness to ethics and the effects on stakeholders, including communities in which a firm operates, which is referred to as Moral SCI. In other words, SCI requires both structural and moral components, which is consistent with extant understandings of corporate integrity (Audi and Murphy 2006; Maak 2008).

Structural dimension of SCI

Structural SCI refers to the unity of character that a firm creates by selecting a combination of socially and environmentally responsible sourcing, production, and logistics practices, where a lapse in any one of the components degrades the others (Audi and Murphy 2006). If the supply chain practices are selected strategically such that they align with corporate strategy and allow the firm to pursue economic performance in sustainable ways or achieve other benefits such as mitigating supply-side risk (Zsidisin et al. 2004; Bell et al. 2012), then a gestalt of sustainable performance may be achieved. Structural SCI is also concerned with a firm's ability to communicate to stakeholders how consistent its supply chain actions are with its stated sustainability objectives, which essentially equates to transparency (Koehn 2005; New 2010; Carter and Easton 2011). Thus, in the context of the SSCM framework, Structural SCI essentially encapsulates the strategy, risk management, and transparency facets. The following exemplar of Structural SCI in practice helps clarify the integrity-based concepts being conveyed.

A perennially recognized leader in supply chain operations, Intel has gone to great lengths to increase social and environmental performance efforts by certifying its supply chain as "conflict-free," a testament to removing any possibility of sourcing tin, tungsten, tantalum, or gold (3TG) from mines that support conflict in the Democratic Republic of Congo (MH&L 2016; Scott 2016). In its annual CSR Report, Intel outlines five components that are most critical to its overall corporate responsibility mission: Caring for our People, Caring for our Planet, Inspiring the Next Generation, Supply Chain Responsibility, and Respecting Human Rights (Intel 2015). Focusing on this gestalt of areas has resulted in Intel being able to achieve certification of certain 3TG smelters as conflict-free, while eliminating supply chain problems such as unethical labor issues (e.g., underage or underpaid workers), and undereducated workforce of their suppliers. The gestalt or the firm's unity of character would be degraded by the absence or failure of any one of the subareas. That is, the unity of character is a mechanism that enables Intel to achieve superior sustainability in its supply chain.

Intel also displays a strong resolution to report the results of its responsibility initiatives whether the results are favorable or unfavorable to its reputation. In its most recent sustainability report, Intel outlines quantitative goals for each of the five aspects of its responsibility mission and explains where it missed goals and how the company intends to fix its approach to ensure the goal will be met in the future (Intel 2015). By making this information publically available, Intel is taking measures to make transparent its consistency between its stated actions in its sustainability reports and its actual actions.

Intel is one of many possible examples of a sustainable company. While the specific sustainable supply chain activities that Intel has chosen are important to increasing its social and environmental performance, what is more important is the combination of the behaviors across the five components of its corporate responsibility mission. That combination, or unity of character (Audi and Murphy 2006), reflects a strategic decision to mitigate risk associated with the supply of 3TG minerals and make transparent the results, which are all elements of Structural SCI and help to explain how Intel achieves its sustainability performance. This suggests Structural SCI acts as a mechanism linking the strategy, risk management, and transparency facets of SSCM (Carter and Rogers 2008).

Moral dimension of SCI

A firm with a global supply chain that remains receptive to the needs of its immediate community and its culture, and also to the needs of the communities in which its suppliers and customers are located, may recognize opportunities to empower and develop the workforce of its suppliers and customers, thus strengthening its supply chain (Pagell et al. 2010). That is, a firm that shows compassion and receptivity to the regions and communities affected by its supply chain operations has the potential to form strong relationships with those communities, and customers or suppliers within those communities (Brown 2006). Furthermore, a firm that maintains self-awareness and impartial judgment in understanding how its supply chain operations affect those communities, whether positively or negatively, allows it to more clearly see chances to change how it does business in those areas (Koehn 2005). Last, a firm's level of commitment to serving the needs of the communities it affects is critical to a firm's SCI and sustainable performance (Maak 2008). Thus, when firms demonstrate a corporate culture that maintains values and ethics in their supply chain operations (Carter and Rogers 2008; Carter and Easton 2011), they are implementing the Moral dimension of SCI.

Consider, as an example, Taylor Guitars, an American manufacturer of high-end acoustic guitars, as one such firm that has demonstrated compassion and receptivity toward its supplier communities. Taylor recognized industry-wide ebony sourcing practices in Africa had caused depressed economic conditions in local areas and damaged ebony forests, harming the ebony supply altogether for the guitar industry (Taylor 2012). To ensure long-term supply availability, the company chose to support the communities providing the valuable ebony resource. Partnering with Madinter Trade S.L., an American manufacturer of guitar parts, Taylor purchased an ebony mill in Cameroon and established more sustainable harvesting practices while creating livable wages for employees of the mill. Taylor Guitars also demonstrates introspection and objectivity in assessing how its operations affect ebony forests in Africa, exemplifying the company's impartial self-awareness of the consequences of its activities on different communities. Taylor's subsequent commitment to serving the appropriate needs of those communities is demonstrated through its investments in the lumber mill.

The Moral SCI behaviors of compassion and receptivity, self-awareness and impartial judgment, and commitment suggest a means for increased firm sustainability. In other words, Moral SCI forms a mechanism through which firms create responsible corporate citizenship behavior and thus develop more sustainable supply chains.

To summarize our conceptual development, and in parallel with the introduction of corporate integrity within the business ethics literature, SCI emphasizes that "good" business decisions and "ethical" decisions need not be divorced from each other. In fact, when conceptualized within the SSCM framework, SCI supports the argument that firms can make good business decisions in responsible and sustainable ways (Carter and Rogers 2008; Carter and Easton 2011). The two dimensions of SCI suggest how the four SSCM facets of strategy—risk management, transparency, and organizational culture—are interdependent upon each other in creating sustainable supply chain outcomes (as measured by the TBL). Structural SCI is directly concerned with strategy, risk management, and transparency, where supply chain processes and activities spanning these three areas create a unity of character for the firm. Moral SCI is concerned with value-laden approaches to management and an organizational culture that promotes ethical decision making, which also supports the firm's strategic, transparency, and risk management activities.

Thus far, the SCI construct has been defined, with two suggested dimensions along structural and moral lines. As with any construct, the ultimate aim is to understand the role of SCI relative to other constructs. This is a normal part of developing, and ultimately testing, theory. But before that can happen, the SCI construct needs to be validated. Before engaging in scale development efforts, we performed an exploratory analysis to assess at a high level the credibility of the underlying ideas, to provide initial validation of the SCI construct along its two proposed dimensions.

EXPLORATORY ANALYSIS OF THE SCI CONSTRUCT

The exploratory approach was warranted to assess the merit of the proposed SCI construct before further theorization about the construct and its relationship to other constructs. We turned to secondary data sources that enabled the creation of proxy variables for the two dimensions of SCI, as well as a categorical variable identifying a firm as either "sustainable" or "nonsustainable." Essentially, we asked whether SCI could differentiate between firms that are deemed sustainable and those that are not considered sustainable. To explore SCI's ability to differentiate between the two categories of firms (sustainable, or not), we set up an econometric analysis that would allow us to regress the SCI dimensions against the firm type. Lack of discernment between firms would suggest that the construct as currently defined has little merit; on the contrary, if SCI can differentiate between firms, such an outcome would support the underlying rationale for the construct, as defined within the SSCM framework.

Rabinovich and Cheon (2011) assert that secondary data analyses can be used to support the nascent development of concepts and relationships. Such an approach is particularly appropriate "in the early stages of the study of a phenomenon, when neither theory nor knowledge about correlates of the phenomenon is well developed" (Menard 1995, 42), and has been described as suitable when theoretical grounding is lacking or nascent (Menard 1995; Agresti and Finlay 1997; Hosmer and Lemeshow 2000). As such, an EN logistic regression using the ICOMP model evaluation criterion is employed with secondary data, as a first step in the ongoing development of the SCI construct.

Data collection

Data were collected from three sources to operationalize dependent, independent, and control variables. First, the MSCI KLD 400 Social Index (referred to henceforth as the Social Index) is an investment portfolio of the top 400 large-, mid-, and small-cap companies in the United States with positive social responsibility and environmental sustainability characteristics, excluding any company that has negative social or environmental impacts. This was used to operationalize the dependent variable related to social and environmental performance. Second, the independent variables were operationalized through use of the MSCI KLD ESG STATS database (referred to henceforth as KLD ESG), which consists of over 60 types of events or corporate behaviors across three pillars—environmental, social, and governance (ESG). This database has been used in previous research on CSR (e.g., Waddock and Graves 1997; Bird et al. 2007) and represents one of the most favorable means to quantify corporate social and environmental sustainability events and corporate behaviors for academic research (Waddock 2003; Mattingly and Berman 2006; Kim et al. 2012). The KLD ESG database also has the highest granularity of measures relative to similar databases, thus providing the ability to amalgamate proxies into a suitable measure of SCI. Both the Social Index and KLD ESG database are managed and provided by the investment research firm Morgan-Stanley Capital International. Finally, Compustat was used to collect demographic information about the companies in the analysis to operationalize several control variables.

Dependent variable: measuring social and environmental sustainability performance

To explore the salience of the SCI concept, a dependent variable that could demonstrate differences in companies based on the dimensions of SCI was needed. Consistent with previous research (e.g., McWilliams and Siegel 2000; Rodriguez-Domingues et al. 2009; Zhang et al. 2013), the Social Index was used to differentiate between companies considered to be highly socially responsible and environmentally sustainable (SRES) from those that are comparatively less so. The measure used for the dependent variable is binary with the company being classified as either a SRES or non-SRES company. The total number of companies on the Social Index was first filtered based on availability in the KLD ESG database for the years 2010–12, resulting in a total of 1,060 firm-year observations of SRES companies. This list of companies was further reduced by North American Industry Classification System (NAICS) classification. We selected companies with manufacturing classifications 31–33, wholesaler classification 42, and retailer classifications 44–45. Narrowing the analysis by these three sets of classifications had two purposes: (1) to focus on SCI of goods-related firms rather than service-related firms; and (2) to be able to discern differences between three levels of the supply chain: manufacturer,

wholesaler, and retailer. After filtering based on NAICS classification, 474 manufacturing, 28 wholesaler, and 70 retail firm-year observations remained. Because the small number of wholesalers on the Social Index would result in a sample size less than the advised size for logistic regression (Peng et al. 2002), the final analysis was focused on estimating manufacturer and retailer models only.

Independent variables: measuring SCI

The KLD ESG ratings consist of paired items within each of the ESG pillars. Each paired item has both a "strength" and "concern" indicator. KLD rates a company as having a strength or a concern in each item of the ESG pillars with a single point (+1). If the company was not rated in that area or if nothing occurred during the fiscal year to be considered a strength or concern for the company, then a score of zero was assigned. For example, if a company had an event such as an overseas factory collapse in its supply chain, that would be considered a concern under the "Supply Chain Labor Standards" measurement item and the company would receive a single point for that event in the "concerns" column for that year. Data for the years 2010–12 were collected when the number and availability of ESG measurement items were broadest before KLD modified its ESG measurement items in 2013. Twenty-two indicators from the KLD ESG database were chosen as proxies for the dimensions of SCI (seven for Structural SCI and 15 for Moral SCI). The seven proxies for Structural SCI were selected based on their congruence with the completeness or wholeness connotation of integrity in the supply chain. That is, any measure that indicates a firm's deliberate selection of certain virtues, its propensity to seek supply chain partners with comparably high integrity, or demonstration of consistency in stated and achieved sustainability goals was selected. Similarly, the 15 indicators of Moral SCI were selected based on congruence with the moral virtue connotation of integrity. Indicators of a firm's compassion and receptivity to communities, self-awareness and impartial judgment of the consequences of its operations, and commitment to sustainability were chosen. The specific indicators chosen and the SCI dimension they proxy are provided in Appendix A1.

Data were then collected on companies examined in the KLD ESG data set but not listed on the Social Index, resulting in 6,796 total firm-year observations of "non-SRES" companies. The list of 6,796 firm-year observations was then reduced by selecting manufacturing NAICS classifications 31–33 and 44–45 and matching each SRES firm that was listed in both the Social Index and KLD ESG database with two non-SRES firms (i.e., only listed in the KLD ESG database). The manufacturer model has a total sample size of $N = 1{,}414$ firm-year observations, comprised of 940 non-SRES and 474 SRES firms. The retailer model has a total sample size of $N = 212$, comprised of 141 non-SRES firms and 71 SRES firms. While there is a variety of guidance on sample sizes for logistic regression, both the manufacturer and retailer models meet prescribed sample size guidelines of 100 observations at a minimum (Peng et al. 2002) and 10 observations per variable (Hosmer and Lemeshow 2000).

Adopting techniques from previous research, three measures each of Structural SCI (SSCI) and Moral SCI (MSCI) are gleaned from this data set (Waddock and Graves 1997; Bird et al. 2007; Boulouta 2013). The first is an aggregate score ($SSCI_{AGG}$ and $MSCI_{AGG}$), which is the difference between the total number of strengths and the total number of concerns in a given area for each year. The limitation to this measure is that an aggregate score of zero could be reflective of either a company which had an equal number of strengths and concerns in a given year or a company that simply was not rated on that dimension. Simply using the aggregate scores would discard valuable information. Thus, two additional measures were employed: total strengths ($SSCI_{STR}$ and $MSCI_{STR}$) and total concerns ($SSCI_{CON}$ and $MSCI_{CON}$). Both are summations of the relevant strengths or concerns in a given year. In addition to preventing the loss of useful information, these two sets of measures enhance explanatory power and increase potential for insights that can be made.

Control variables

The control variables included are company size, as measured by total assets and total number of employees. Both items were collected from the Compustat database for the 2010–12 timeframe to match the independent and dependent variables. A control variable for industry was introduced as well but this variable was not significant in either the manufacturer or retailer model and therefore is not presented here.

EN logistic regression

The central premise of our exploratory analysis is that firms scoring highly on Structural SCI and Moral SCI measures are more likely to be considered SRES companies with comparatively high social and environmental performance, as indicated by inclusion on the Social Index. This analysis is intended to determine whether Structural SCI and Moral SCI indicators can be used to differentiate between those firms that appear on the Social Index from those that do not. Logistic regression, which is used to determine the probability that an independent variable predicts one of two outcomes of a dependent variable, is useful to predict group membership given certain characteristics, without more stringent constraints as in related methods (Menard 1995; Hosmer and Lemeshow 2000; Hair et al. 2010). Logistic regression was therefore selected because it does not require an assumption of normality in data or equality of covariance matrices (Vogt et al. 2014).

An EN algorithm for the logistic regression was chosen to select the best model in each of six analyses based on ICOMP criterion (Bozdogan and Pamukcu 2016). EN is a regularized regression technique used for variable selection that minimizes overfitting of models (Zou and Hastie 2005). We adopt the EN method for the logistic regression because it penalizes the entry of a variable into the model as well as the magnitude of each parameter, thus increasing the chance that the parameters obtained in the final model reflect global and not just local optimal weights (Atanasov et al. 2017). While EN has not been used to date in logistics and supply chain management research, it has been used in related disciplines such as marketing (e.g., Rutz et al. 2011) and strategic management (e.g., Atanasov et al. 2017).

ICOMP is a model selection criterion that accounts for the complexity of a system being modeled, where complexity "is a measure of the degree of interdependency between the whole system and a simple enumerative composition of its subsystems

or parts" (Bozdogan 2000, 72). More succinctly, ICOMP is a measure of the ability of a model to maximize explanatory power with the fewest number of parameters (Akman and Hallam 2010). This means ICOMP simultaneously measures model fit and individual parameters and is superior to only assessing *R*-square because it accounts for the interdependencies of the parameter estimates as well as the dependencies of the model residuals (Bozdogan 2000, 2004; Akman and Hallam 2010; Bozdogan and Pamukcu 2016). Furthermore, *p*-value as a measure of the significance of an individual parameter in an estimation model only summarizes the data through testing and does not account for the probability that an effect is there in the first place (Nuzzo 2014; Wasserstein and Lazar 2016). Complementary measures to *p*-values include examining effect sizes and using methods that emphasize estimation over testing, which includes ICOMP (Bozdogan 2004; Wasserstein and Lazar 2016). A more detailed discussion of EN as a regression technique and ICOMP as a measure of model fit is provided in Appendix A2.

RESULTS

The results of the six analyses (three each for manufacturers and retailers) using the Structural SCI and Moral SCI aggregate scores, total strengths scores, and total concerns scores as independent variables are presented in Table 1a,b. For the six analyses, the best model was selected based on the two measures of firm size, Structural SCI, and Moral SCI. In all but the retailer concerns analysis, the estimation model that includes Structural SCI and Moral SCI were the best fitting models, as indicated by ICOMP, implying that Structural and Moral SCI were important predictors of whether or not a sustainable firm can be differentiated from a nonsustainable firm. Multicollinearity was assessed in each of the six analyses by calculating variance inflation factors (VIFs) for each predictor and controlled for by using ICOMP to find the best estimation model. Multicollinearity of the Structural and Moral SCI predictors in all six manufacturer and retailer analyses was not an issue, as all VIFs were below the recommended value of 2.5 for logistic regression (Allison 2001). However, the VIFs of the two control measures of firm size in the retailer analyses (but not in the manufacturer analyses) exceeded the 2.5 recommended value. This is accounted for by using the ICOMP criterion, which penalizes the presence of multicollinearity through the complexity measure of the inverse-Fisher information matrix (Bozdogan 2000, 2004). This implies that a final estimation model controls for and minimizes the impact of multicollinearity; therefore, it was not an issue in these analyses.

Manufacturer analyses

The aggregate analysis for manufacturers reveals that both Structural SCI and Moral SCI can differentiate between SRES and non-SRES firms, as indicated by inclusion in the final model. The odds ratios indicate that for every one-unit increase in Structural SCI, a firm is 1.10 times more likely to be considered a SRES company, whereas a one-unit increase in Moral SCI means a company is 2.50 times more likely to be considered SRES. The strengths analysis is consistent with the aggregate analysis in that both types of SCI are predictors of a firm's inclusion on the Social Index. A one-unit increase in a Structural SCI strength means that a company is 1.17 times more likely to be considered a sustainable company and a Moral SCI strength means that a company is 1.44 times more likely. Finally, the concerns analysis shows that both Structural SCI and Moral SCI can differentiate between SRES and non-SRES firms. The negative sign on the coefficient implies that a one-unit increase in Structural SCI concerns makes a company less likely (0.76 times) to be considered SRES. Consistently, a one-unit increase in Moral SCI concerns means that a company is less likely (0.07 times) to be considered a SRES company.

Firm size as measured by number of employees and total assets was controlled for in each of the analyses. All three models indicated that as manufacturing companies add one unit (1,000) of employees, the odds increase that the firm is more likely to be considered a company listed in the Social Index. These findings are consistent with previous research arguing that larger firms are more visible and thus subject to greater scrutiny, and therefore are more likely to be adopters of sustainability practice (Brammer and Millington 2006; Chiu and Sharfman 2011; Marano and Kostova 2016). This is confounded, however, by the total assets measure, which indicates an opposing effect on the odds of being sustainable. That is, all three analyses show that as manufacturers have more assets, they are less likely to be considered sustainable. This control variable suggests an interesting tension between measures of firm size.

Retailer analyses

The aggregate analysis for retailers indicates that Structural and Moral SCI can differentiate between firms that are SRES or non-SRES, as measured by inclusion on the Social Index. A one-unit increase in Structural SCI raises the odds that a retailer is considered SRES by 1.59 times. A one-unit increase in Moral SCI raises the odds that a retailer is considered SRES by 3.15 times. Similar to the results of the aggregate analysis, the strengths analysis for retailers also shows both forms of SCI are predictors of being SRES. A one-unit increase in Structural SCI means that a retailer is 2.11 times more likely to be considered SRES whereas a one-unit increase in Moral SCI implies a firm is 1.97 times more likely. In the concerns analysis, Structural SCI was dropped because as a variable selection method, the EN regression demonstrated that the best estimation model as measured by ICOMP was one that only included Moral SCI. A Moral SCI concern, that is, the occurrence of a negative event, is a significant predictor of a retailer's sustainability performance, as a one-unit increase means a firm is 0.11 times less likely to be considered to be a SRES firm.

Firm size in terms of total assets and number of employees was controlled for in each model, the results of which are reported in Table 1b. Both measures of firm size were selected for the final model in each analysis, implying they have significance to the prediction of the dependent variable. However, the number of employees variable is not significant as measured by *p*-value, which is the largest among all variables in any of the analyses. This might be explained by the fact that *p*-values tend to be inflated when there is strong correlation with another variable in the model (Wasserstein and Lazar

Table 1: EN logistic regression results. (a) Manufacturers. (b) Retailers

(a)

	B	SE	*t*-Stat	Sig.	Odds ratio
Aggregate measures of SSCI and MSCI					
Total assets	−0.18	0.09	−2.03	0.04	0.84
No. employees	0.77	0.09	8.81	0.00	2.16
$SSCI_{AGG}$	0.09	0.11	0.89	0.37	1.10
$MSCI_{AGG}$	0.92	0.14	6.48	0.00	2.50
Constant	−0.51	0.55	−0.94	0.35	0.60
Model information: ICOMP = 1,360.2; model chi-squared = 508, $p < .001$; N = 1,414, df = 1,409					
Total strengths as measures of SSCI and MSCI					
Total assets	−0.14	0.09	−1.60	0.11	0.87
No. employees	0.76	0.09	8.84	0.00	2.15
$SSCI_{STR}$	0.16	0.18	0.91	0.36	1.17
$MSCI_{STR}$	0.37	0.14	2.60	0.01	1.44
Constant	−0.75	0.55	−1.35	0.18	0.47
Model information: ICOMP = 1,423.3; model chi-squared = 465, $p < .001$; N = 1,414, df = 1,409					
Total concerns as measures of SSCI and MSCI					
Total assets	0.18	0.09	2.05	0.04	1.20
No. employees	0.69	0.09	7.87	0.00	2.00
$SSCI_{CON}$	−0.27	0.14	−1.86	0.06	0.76
$MSCI_{CON}$	−2.63	0.31	−8.49	0.00	0.07
Constant	−2.67	0.56	−4.74	0.00	0.07
Model information: ICOMP = 1,331.2; model chi-squared = 546, $p < .001$; N = 1,414, df = 1,409					

(b)

	B	SE	*t*-Stat	Sig.	Odds ratio
Aggregate measures of SSCI and MSCI					
Total assets	0.87	0.24	3.60	0.00	2.39
No. employees	−0.21	0.23	−0.90	0.37	0.81
$SSCI_{AGG}$	0.46	0.27	1.71	0.09	1.59
$MSCI_{AGG}$	1.15	0.37	3.11	0.00	3.15
Constant	−7.16	1.37	−5.24	0.00	0.00
Model information: ICOMP = 196.66; model chi-squared = 81.8, $p < .001$; N = 212, df = 207					
Total strengths as measures of SSCI and MSCI					
Total assets	0.78	0.24	3.29	0.00	2.18
No. employees	−0.15	0.23	−0.64	0.52	0.86
$SSCI_{STR}$	0.75	0.40	1.87	0.06	2.11
$MSCI_{STR}$	0.68	0.40	1.71	0.09	1.97
Constant	−6.78	1.36	−4.99	0.00	0.00
Model information: ICOMP = 198.85; model chi-squared = 76.3, $p < .001$; N = 212, df = 207					
Total concerns as measures of SSCI and MSCI					
Total assets	1.07	0.25	4.18	0.00	2.90
No. employees	−0.08	0.25	−0.33	0.74	0.93
$SSCI_{CON}$	–	–	–	–	–
$MSCI_{CON}$	−2.22	0.79	−2.83	0.01	0.11
Constant	−8.80	1.49	−5.90	0.00	0.00
Model information: ICOMP = 213.02; model chi-squared = 75.3, $p < .001$; N = 212, df = 208					

2016); in this case, the two measures of firm size are correlated with each other, thus explaining why there is a high *p*-value. Comparing this with the results of the manufacturer analyses, firm size does have an effect of the odds of a firm being sustainable or not, but the effects depending on firm size are the opposite of that of manufacturers. That is, as retail firms add one unit (1,000) of employees, they are less likely to be sustainable but as they add more assets, they are more likely to be SRES, as indicated by the sign on the coefficient for each variable. These results are discussed further in the ensuing section.

DISCUSSION

The results of the six analyses provide initial credibility for the role of the SCI construct in the SSCM framework. The proxy measures employed were able to differentiate between firms considered to be sustainable from those that are not, which was evaluated across two echelons of the supply chain. Thus, the six analyses for manufacturers and retailers have in common the general finding that having SCI means that a firm is more likely to be considered a sustainable company. This study was part of the SCI construct development process and provides initial empirical support for the idea that that firms with Structural SCI and Moral SCI are more likely to be sustainable. We have also suggested that the reason for the increased probability of SCI-laden firms being sustainable is that SCI links the strategy, risk management, transparency, and organizational culture facets of SSCM. Further construct development is needed, however, to expatiate exactly how SCI links those four facets.

An intriguing result for both types of companies emerges from the results of concerns analyses. Of the aggregate, strengths, and concerns models, the largest coefficient magnitudes for Structural and Moral SCI for either type of company are in the concerns analyses. This suggests that when events occur in supply chains that can be considered ethical violations, there is potentially a greater negative impact of not having SCI, compared to the benefits that can be gained from having it. Thus, firms are more likely to be punished for not having SCI than they are to be rewarded or recognized for having SCI. Therefore, SCI may be a means of reputational risk mitigation (Lemke and Petersen 2013; Petersen and Lemke 2015), and should be explored with such a perspective in mind.

The differences between effect sizes of Structural and Moral SCI across company types also present interesting results. While the results show that both Structural SCI and Moral SCI are important to discerning between sustainable and nonsustainable companies, that retailers mostly have larger coefficient magnitudes suggests that SCI may have a greater impact on SSCM for retailers than for manufacturers. That is, there appears to be a contextual influence of supply chain echelon on the impact of SCI. This might be because retailers are closer to end consumers and stakeholders who are concerned with the consumer marketplace and thus tend to receive the lion's share of media scrutiny following adverse events or discovery of less sustainable processes in the supply chain (Schmidt et al. 2017). As a result of this greater supply and reputational risk, retailers may have more leverage in promoting SCI activities (Brockhaus et al. 2013), such as community impact, labor relations, human rights support (or violations against), and social engagement in supply chain partners. Therefore, retailers with greater SCI may be more likely to be seen as sustainable companies than those without it.

For manufacturers, the story seems to be more nuanced. While both Structural and Moral SCI are important, Moral SCI has a greater impact than Structural SCI on the odds of whether a company is sustainable or not. A possible explanation is that compared to Structural SCI, the attributes encompassed within Moral SCI are more reflective of an internal organizational culture that considers welfare of others, which has been shown to increase sustainability performance (Carter and Jennings 2004; Carter and Rogers 2008; Thornton et al. 2013; Griffis et al. 2014). Additionally, the stakeholder-oriented actions that firms take which benefit supplier communities or the environment, for example, potentially originate from managers within the firm and are more likely to be highlighted (Ehrgott et al. 2011, 2013). This is consistent with the idea that SCI spans facets of SSCM—in this case, organizational culture, strategy, and risk management. The finding that SCI affects companies differently depending on the supply chain echelon is limited by the nature of the secondary data used in this study. Thus, as the SCI construct continues to be refined, more research will be needed to examine how or why the echelon has an impact on how companies develop SCI and use it as a means of increasing SSCM.

The inclusion of firm size as a predictor was intended to address the possibility of a so-called halo effect, in which larger firms may be perceived as being more sustainable because of the fact they are more likely to be in the press. We found that for manufacturers, larger firms in terms of the number of employees were certainly more likely to be considered sustainable. However, this contrasts with measuring firm size as total assets, which shows an opposite effect. Manufacturers with more total assets were less likely to be considered sustainable. This suggests that as manufacturing companies acquire more assets to increase capacity to fill growing demand, they are potentially growing their carbon footprint or increasing the possibility of having adverse events occur in the supply chain as well. The opposite situation was found in the retailer analyses. For retailers, larger firms as measured by the number of employees were less likely to be sustainable; yet, as retailers acquire total assets, they are more likely to be sustainable. This might be explained as a function of retailer susceptibility to consumer-oriented stakeholder scrutiny and a need to invest in more sustainable technologies sooner than their upstream supply chain partners (Schmidt et al. 2017). The theoretical tension between measures of firm size should also be considered as the SCI construct continues to be developed.

Limitations

The interpretation of these results should be considered with limitations in mind. First, the econometric analysis performed is an exploratory one based on initial theoretical development, previous literature, and use of proxies for the dimensions of SCI (the items used are listed in Appendix A1). While the method employed

was performed with rigor and relevance in mind (Mentzer 2008; Goldsby and Zinn 2016), future research should refine the SCI construct more deeply and collect primary data to broaden the impact of the findings, as well as to clearly position SCI vis-à-vis related concepts such as corporate values and culture.

Second, while the data used to operationalize the independent variables in the exploratory analysis were sourced from the KLD ESG database and the dependent variable was sourced from the Social Index, both sources are now owned and managed by Morgan-Stanley Capital International (MSCI), which acquired Kinder, Lydenberg, Domini & Co., Inc. (KLD) in 2010. The two databases are linked in that MSCI uses results from the KLD ESG database to select the companies that comprise the Social Index. To mitigate possible common-method variance resulting from this linkage, we matched each company on the Social Index with two companies that are not; however, the use of these databases may still limit generalizability of our findings. Furthermore, the KLD ESG database does not include companies that produce alcohol, tobacco, firearms, gambling services, and nuclear power; thus, these types of firms were not included in the exploratory analysis.

Third, future research needs to overcome limitations related to the range of the SCI construct. We have positioned SCI as a firm-level construct, but there are surely micro level dimensions of SCI that need to be explored. The data themselves are collected at the firm level and do not include micro level data on individual behavior; yet, a firm's actions are ultimately executed by individuals through their own actions. Integrity has been studied in the psychology and ethics literatures at an individual level. As supply chain researchers increasingly address the individual micro-level behaviors underlying firm-level constructs, research on SCI will also need to be expanded to address the individual-level cognition, behaviors, and motivations that drive organization actions with respect to SCI. Such an approach may also help tease out the factors giving rise to each of the independent variables included in the current research.

Last, the analysis was limited in scope to U.S. manufacturers and retailers over a period of three years. Future research should explore SCI in other types of firms, including raw material suppliers, component suppliers, and wholesalers as the construct is refined and tested for robustness. Future research should also address the SCI phenomenon across other cultures beyond the U.S. business community and over longer periods of time to explore how SCI evolves. This is particularly important in light of the current impact of the millennial generation and ever-changing dynamics within consumer markets.

Research agenda

Given the introductory approach to the concept of SCI in this research, avenues for future research are warranted. Table 2 provides a summary of several research directions for scholars to pursue, based on the preliminary establishment of the SCI construct within the SSCM literature. First, a formal and rigorous construct development process should be undertaken to more fully develop SCI as a construct that can be employed in future research. SCI has initially been defined along two dimensions, based on conceptual adaptation from the corporate integrity literature (Audi and Murphy 2006; Maak 2008). Each of these dimensions needs to be fully developed and there may be other dimensions that need to be included when considering the broader context of SCI. One approach to formally develop the SCI construct uses Hinkin's (1995) three-stage method. Other options to further refine SCI include use of a qualitative method such as case studies (Yin 2014) or grounded theory (Glaser and Strauss 1967; Glaser 2001), which have been demonstrated to be fruitful in supply chain management research (e.g., Mello and Flint 2009; Randall and Mello 2011; Saldanha et al. 2015). Adopting a grounded theory approach to further develop and confirm the SCI construct would lead to a theoretical framework rooted in practice and grown from interviews and site observations. The insights gleaned from such an endeavor can then be used to assess the validity and generalizability of the SCI construct through quantitative analysis.

Second, an abundance of supply chain issues can be explored with the SCI concept. For instance, SCI can be explored as a means of mitigating supply-side risk (Zsidisin et al. 2004), which can affect a firm's TBL performance (Carter 2000). An organization's supply-side risk can be impacted by a multitude of factors, including poor financial health, which could trigger unethical sourcing behavior such as seeking shortcuts around ethical practices in the form of kickbacks from suppliers to award contracts (Turner et al. 1994). So, what is the role SCI plays in preventing or assuaging the negative consequences from increasing supply risks in global markets? Firms that have taken measures to prioritize TBL performance have gained competitive advantage and in some cases, mitigated certain supply-side risks that may have resulted from having a relationship with suppliers of unknown integrity (Hart 1995; Carter and Rogers 2008; Reuter et al. 2010; Thornton et al. 2013). Building Moral and Structural SCI at the firm level may also be a means for mitigating reputational risk that arises from dealing with suppliers of unknown character or integrity (Min and Galle 1991; Emmelhainz and Adams 1999; Rogers 2011). Such efforts would help fulfill calls for increasing multidisciplinary research on supply chain management to address risks that span functions and organizations (Sanders and Wagner 2011; Sanders et al. 2013; Talluri et al. 2013; Manuj et al. 2014).

Upon refinement of the SCI construct, a third prominent research opportunity lies in exploring its antecedents and outcomes. Regarding antecedents, what are the general characteristics or mind-sets of firms that do or do not infuse SCI into their business operations? How are they influenced, either intrinsically or extrinsically, to ensure integrity and sustainability in their supply chain operations? Future research should specifically address both environmental and social antecedents to SCI. Existing research studying the antecedents to socially responsible supplier selection (Thornton et al. 2013; Griffis et al. 2014) can be combined with previous business ethics research to develop integrity-based antecedents of SCI. Regarding outcomes, researchers using a more fully developed SCI construct will be able to explore the nature and strength of the relationship between SCI and TBL performance within certain contexts (Elkington 1998, 2004).

Fourth, the multilevel aspects of SCI provide opportunities to integrate organizational and individual-level motives and actions. SCI has been defined in this research as a firm-level concept, but is conceptually related to individual integrity and corporate

Table 2: Future research avenues

Topic	Possible method	Possible contribution
Construct development		
SCI Construct Refinement and Scale Development	Hinkin's (1995) three-stage scale development method	Development of SCI construct convergent validity and subdimension discriminant validity
Empirical grounding of SCI Construct	Grounded theory (Glaser and Strauss 1967; Mello and Flint 2009)	An empirically grounded theoretical framework for understanding the underlying social process for how organizations develop and maintain SCI
Antecedents and consequences of SCI		
Antecedents of SCI	Case studies (Eisenhardt 1989; Yin 2014)	Refined understanding of the underlying dynamics prevalent that either enhance or erode SCI
Relationship between SCI and TBL performance*	Econometrics (Hansen 2015; Wooldridge 2015)	Exploration of the influence on social, environmental, and financial performance by SCI
Multilevel aspects of SCI		
Individual Employees' Effects on Firm SCI	Multilevel modeling	Possible recognition of the need to examine individual- and firm-level integrity to study SCI
SCI and Cross-Organizational Integration	Mixed-method approach to develop a theoretical framework that can be tested empirically	How organizations can influence supply chain partners to increase SCI
Supply chain issues		
SCI and Reputational Risk Management	Laboratory experiments (Knemeyer and Naylor 2011; Deck and Smith 2013)	Understanding of the effects of SCI on an organization's reputation
SCI and Supply Chain Risk Management	Case studies (Eisenhardt 1989; Yin 2014)	Understanding of how SCI can allow companies to mitigate supply chain risks
Relationship between SCI, Strategy, Risk Management, Transparency, and Corporate Culture (ethics)	Case studies (Eisenhardt 1989; Yin 2014) Middle-range theorizing (Merton 1968; Stank et al. 2017)	Elaboration of the relationships between mechanisms that create enhanced sustainable supply chain performance
Role of SCI in Sustainable Supply Chain Management	Case studies (Eisenhardt 1989; Yin 2014) Middle-range theorizing (Merton 1968; Stank et al. 2017)	Theory development. Understanding of the role of SCI as part of the Organizational Culture "pillar" of SSCM; and links to other SSCM pillars

Note: *Including impact of firm characteristics on the SCI–TBL performance relationship (e.g., supply chain echelon; size; industry; form (public/private); R&D intensity).

integrity. Researchers have built upon the individual as the unit of analysis to examine firm-level or corporate integrity (Paine 1994; Maak 2008; Maurer 2009). Linking individuals and organizations is a logical progression, as firms are considered corporate citizens of communities and have the ability to manage policies, actions, and ethical concerns of stakeholders (Donaldson 1982; Velasquez and Goodpaster 1983; French 1984, 1995; Maak 2008). Strategic management and supply chain researchers alike are increasingly addressing the microfoundations of organizational actions (Oliva and Watson 2011; Felin et al. 2015), recognizing that firm behaviors are essentially dependent on individuals within the firm. Studies can be performed to explore the sociocognitive processes at the micro level to examine how supply chain managers receive, comprehend, and develop mental schema for implementing SCI into their organizations.

Contributions

The SCI concept development, which was adapted from the business ethics literature, and the subsequent exploratory analysis have provided insights to the research question of how SCI relates to SSCM. Several contributions to theory and practice have resulted.

Theoretical implications

This research effort makes three theoretical contributions to the supply chain management literature. First, the SCI concept bridges a previous gap in the SSCM literature relating to interdependence of business and ethics decisions (Maak 2008). The SCI concept contributes to emergent SSCM theory by linking the foundational pillars, strategy, transparency, organizational culture, and risk management, through integrity-based approaches to supply chain activities. While the four facets each contribute individually to a firm's sustainability, SCI provides a foundation for understanding how a gestalt is created between two or more of the facets and can help differentiate between firms that are sustainable from those that are less sustainable. Second, using an EN logistic regression and ICOMP model evaluation criterion, this research uncovers and empirically demonstrates at an exploratory level that both Structural and Moral

dimensions of SCI can help differentiate between firms that are sustainable from those that are less so. Additionally, a firm's supply chain echelon (manufacturer vs. retailer) and firm size (number of employees vs. total assets) provide at least two contextual explanations addressing *why* SCI effects might vary across firms in the supply chain. Both findings provide merit to the idea of SCI as underlying SSCM, but further research is needed to generalize the results more broadly. Last, this research effort contributes an agenda to advance theoretical development of SCI and its relation to other constructs. The agenda provides a foundation for further exploration of SCI to more deeply explore the mechanisms, contexts, and boundary conditions of SCI (Busse et al. 2016; Stank et al. 2017).

Managerial implications

The SCI concept as presented in this research also has important managerial implications. This research suggests the importance of incorporating business strategy decisions with value-laden decision making in the supply chain realm. The research provides new insights on the structural and moral areas upon which managers should focus. Due to the scale of global connectivity in business, increased visibility and transparency into supply chain practices around the world can impact a firm's reputation. Therefore, firms seeking competitive advantage by accessing suppliers and resources abroad are often faced with the dilemma of ensuring responsible sourcing or prioritizing environmental stewardship at the cost of financial performance. This is exemplified in the case of conflict minerals and natural resource scarcity that causes buyers of 3TG minerals to map their supply chains to ensure they are not financing guerilla warfare or slave labor (Bell et al. 2012, 2013). SCI provides a means for managing and mitigating the supply chain risk (Manuj and Mentzer 2008; Rao and Goldsby 2009) that arises from having to make decisions with incomplete information such as in the case of working with suppliers of unknown character and integrity. For example, actively building Structural SCI attributes, such as unity of character or consistency, at the firm level can help to demonstrate a dedication to a gestalt of important virtues and increase reputational capital gained through supply chain transparency. Similarly, managers can seek to strengthen their firm's Moral SCI by enhancing their recognition of the needs of a multitude of stakeholders, trying to objectively understand how those stakeholders are impacted, and committing to reducing negative impacts. Such activities also help to mitigate the effect of an unexpected disruption resulting from suppliers' potential use of questionable resources or practices.

This research also demonstrates a way for practitioners to increase organizational legitimacy in downstream markets and with supply chain partners. SCI may also create the ability to demonstrate that materials have been sourced ethically and responsibly. This is an important implication because building trust with supply chain partners and external stakeholders influences a firm's performance (Chun et al. 2013). Additionally, the increasingly recognized importance of SSCM to firm performance and reputation means that supply chain managers will not only be looked at to deliver economic-based efficiencies within the constraints of customers' desires, but will also be expected to provide environmental and social leadership as a way of creating competitive differentiation and building loyal customer bases. This is especially true in light of the growing sustainability focus of customers from the millennial generation who have shown their desire to buy from sustainable companies (Solomon 2014). Therefore, managers should recognize the incentives for building SCI to achieve superior sustainability performance.

Finally, this research suggests that managers should recognize the risks and benefits accruing through ethical behaviors. Being held responsible for a violation of Moral SCI, for example, should spur managers to address the decision-making frameworks within their firms so as to mitigate the occurrence of such events. Likewise, recognizing the potential benefits of Structural SCI should spur managers to find supply chain partners with SCI, and in doing so developing a specific set of values from which to gain a gestalt of character, and increasing transparency across the supply chain. The importance of firms having strong SCI continues to rise as customers continue to demand that firms take responsibility for the actions of their suppliers as well (Klassen and Vereecke 2012).

CONCLUSION

As firms grapple with ongoing issues of SSCM in an ever-more complex world, the concept of SCI provides a promising avenue of future research that explores the interdependence of the SSCM facets in the supply chain discipline. The efforts of this research demonstrate the promise of the SCI construct, and the potential to help firms develop more sustainable supply chains. As sustainability continues to evolve to more fully embrace a TBL approach in both research and practice, SCI provides new insights to how SSCM can be achieved and offers opportunities for managers to frame their decision making.

APPENDIX A1: KLD ESG Proxies for Supply Chain Integrity

SCI dimension	KLD ESG item name	KLD ESG item definition
Structural SCI	Supply chain management	This indicator measures the severity of controversies related to the environmental impact of a company's supply chain and the sourcing of natural resources. Factors affecting this evaluation include, but are not limited to, a history of widespread or egregious environmental impacts in a

Continued.

APPENDIX A1: (Continued)

SCI dimension	KLD ESG item name	KLD ESG item definition
		firm's supply chain, legal cases, resistance to improved practices, and criticism by nongovernmental organizations (NGOs) and/or other third-party observers
	Supply chain labor standards	This indicator evaluates how well companies manage risks of production disruptions and brand value damage due to substandard treatment of workers in the company's supply chain. Companies that establish labor management policies meeting stringent international norms, implement programs to verify compliance with the policies, and introduce incentives for compliance among suppliers score higher
	Supply chain	This indicator measures the severity of controversies related to a firm's supply chain. Factors affecting this evaluation include, but are not limited to, a history of involvement in supply chain-related legal cases, widespread or egregious instances of abuses of supply chain employee labor rights, supply chain employee safety, resistance to improved practices, and criticism by NGOs and/or other third-party observers
	Ownership strength	The company owns between 20% and 50% of another company KLD has cited as having an area of social strength, or is more than 20% owned by a firm that KLD has rated as having social strengths. When a company owns more than 50% of another firm, it has a controlling interest, and KLD treats the second firm as if it is a division of the first
	Ownership concern	The company owns between 20% and 50% of a company KLD has cited as having an area of social concern, or is more than 20% owned by a firm KLD has rated as having areas of concern. When a company owns more than 50% of another firm, it has a controlling interest, and KLD treats the second firm as if it is a division of the first
	Transparency strength	The company is particularly effective in reporting on a wide range of social and environmental performance measures or is exceptional in reporting on one particular measure. In 2005, KLD added the Transparency Strength, which incorporates information from the former Environment: Communications Strength (ENV-str-E) as part of its content
	Transparency concern	The company is distinctly weak in reporting on a wide range of social and environmental performance measures. In 2005, KLD added the Transparency Concern
Moral SCI	Innovative giving	This indicator evaluates company charitable giving programs. Companies whose programs support affordable housing, access to health care, K-12 public education, initiatives to relieve hunger, or in-kind giving and other programs targeted at disadvantaged communities, score higher
	Community engagement	The company has a notable community engagement program concerning involvement of local communities in areas where the firm has major operations
	Community impact	This indicator measures the severity of controversies related to a firm's interactions with communities in which it does business. Factors affecting this evaluation include, but are not limited to, a history of involvement in land use and/or development-related legal cases, widespread or egregious community impacts due to company operations, and criticism by NGOs and/or other third-party observers
	Human rights violations	This indicator measures the severity of controversies related to the impact of a firm's operations on human rights. Factors affecting this evaluation include, but are not limited to, a history of involvement in human rights-related legal cases, widespread or egregious complicity in killings, physical abuse, or violation of other rights, resistance to improved practices, and criticism by NGOs and/or other third-party observers
	Social opportunities	This indicator evaluates company efforts that benefit the disadvantaged. *Detailed definition omitted due to space limitations, see KLD ESG (2015)*
	Labor rights strength	The company has outstanding transparency on overseas sourcing disclosure and monitoring, or has particularly good union relations outside the United States, or has undertaken labor rights-related initiatives that KLD considers outstanding or innovative. In 2002, the Labor Rights Strength was added
Moral SCI (continued)	Labor rights concern	The company's operations have had major recent controversies primarily related to labor standards in its supply chain. KLD started assigning concerns for this issue in 1998 and subsequently renamed it from International Labor Concern. KLD subsequently created the Labor Rights Concern using data from the International Labor Concern. KLD started assigning concerns for this issue in 1998

Continued.

APPENDIX A1: (Continued)

SCI dimension	KLD ESG item name	KLD ESG item definition
	Access to finance	This indicator evaluates the extent to which a company is taking advantage of opportunities for growth and strengthening reputation through providing lending, financing, or products to underrepresented or underbanked communities. Top performing companies will offer products and services to communities with limited or no access to financial products
	Indigenous peoples relations strength	The company has established relations with Indigenous peoples near its proposed or current operations (either in or outside the United States) that respect the sovereignty, land, culture, human rights, and intellectual property of Indigenous peoples. In 2000, KLD added the Indigenous Peoples Relations Strength. In 2004, KLD moved the Indigenous Peoples Relations Strength from Community to Human Rights
	Indigenous peoples relations concern	The company has been involved in serious controversies with Indigenous peoples (either in or outside the United States) that indicate the company has not respected the sovereignty, land, culture, human rights, and intellectual property of Indigenous peoples. KLD started assigning concerns for this issue in 2000
	Raw material sourcing	This indicator evaluates how companies manage the risks of damaging their brand value by sourcing or utilizing raw materials with high environmental impact. Companies that have policies and procedures to source materials with lower environmental impact and participate in initiatives to reduce environmental impact of raw materials production score higher
	Child labor	This indicator measures the severity of child labor controversies in a firm's supply chain. Factors affecting this evaluation include, but are not limited to, a history of involvement in child labor-related legal cases, widespread or egregious instances of child labor in the firm's supply chain, resistance to improved practices, and criticism by NGOs and/or other third-party observers
	Political accountability strength	The company has shown markedly responsible leadership on public policy issues and/or has an exceptional record of transparency and accountability concerning its political involvement in state- or federal-level U.S. politics, or in non-U.S. politics. In 2005, KLD added the Political Accountability Strength
	Political accountability concern	The company has been involved in noteworthy controversies on public policy issues and/or has a very poor record of transparency and accountability concerning its political involvement in state- or federal-level U.S. politics, or in non-U.S. politics. In 2005, KLD added the Political Accountability Concern
	Human rights policies and initiatives	The company has undertaken exceptional human rights initiatives, including outstanding transparency or disclosure on human rights issues, or has otherwise shown industry leadership on human rights issues not covered by other MSCI human rights ratings

APPENDIX A2: EN logistic regression and ICOMP

This is a brief presentation of the underlying mathematics of the EN variable selection algorithm used in our logistic regression and the ICOMP criterion used to evaluate model fit, based on Bozdogan and Pamukcu (2016), Zou and Hastie (2005), and Bozdogan (2000, 2004). Briefly, for an α strictly between 0 and 1, and a non-negative regularization parameter λ, EN logistic regression solves the problem

$$\min_{\beta_0,\beta}\left\{\frac{1}{n}\,\text{Deviance}(\beta_0,\beta)+\lambda P_\alpha(\beta)\right\},$$

where

$$\text{Deviance}(\beta_0,\beta)=-2\log L_{\text{Saturated}}-2\log L_{\text{FittedModel}}$$

measures the "goodness of fit" of the EN logistic regression model. The saturated model is the "benchmark"—it is the model which fits best in the sense of having smallest $-2\log L$, minus twice the log likelihood of the model.

Further,

$$P_\alpha(\beta)=\frac{(1-\alpha)}{2}\parallel\beta\parallel_2^2+\alpha\parallel\beta\parallel_1=\sum_{j=1}\left(\frac{(1-\alpha)}{2}\beta_j^2+\alpha|\beta_j|\right)$$

is the penalty function in EN logistic regression model. We rely on the model selection using ICOMP criterion to choose the best subset of "predictors" for each data set. The analytical form of ICOMP we score is given by

$$\text{ICOMP(ENet\_Logistic Reg)} = n\log(2\pi) + n\log(\hat{\sigma}^2) + n + 2C_1(\widehat{\text{Cov}}(\hat{\beta})_{\text{Misspec}})$$

where

$$\hat{\sigma}^2 = \frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2$$

is the estimated variance of the residuals of the EN logistic regression model, and

$$\widehat{\text{Cov}}(\hat{\beta})_{\text{Misspec}} = \hat{F}^{-1}\hat{R}\hat{F}^{-1} = \begin{bmatrix} \frac{\hat{\sigma}^2}{n} & 0 \\ 0 & \frac{2\hat{\sigma}^4}{n} \end{bmatrix} \begin{bmatrix} \frac{n}{\hat{\sigma}^2} & \frac{nSk}{2\hat{\sigma}^3} \\ \frac{nSk}{2\hat{\sigma}^3} & \frac{n(Kt-1)}{4\hat{\sigma}^4} \end{bmatrix} \begin{bmatrix} \frac{\hat{\sigma}^2}{n} & 0 \\ 0 & \frac{2\hat{\sigma}^4}{0} \end{bmatrix}$$

is the estimated robust covariance matrix of the coefficients with

$$Sk = \text{Coefficient of skewness} = \frac{\left(\frac{1}{n}\sum_{i=1}^{n}\hat{\varepsilon}_i^3\right)}{\hat{\sigma}^3}$$

and

$$Kt = \text{Coefficient of kurtosis} = \frac{\left(\frac{1}{n}\sum_{i=1}^{n}\hat{\varepsilon}_i^4\right)}{\hat{\sigma}^4}$$

This form of ICOMP takes into account skewness and kurtosis in our data sets, and it penalizes the presence of skewness and kurtosis as we fit the EN logistic regression models. We minimize ICOMP to choose the best fitting model as our figures of merit, or the performance measure.

REFERENCES

Agresti, A., and Finlay, B. 1997. *Statistical Methods for the Social Sciences*. Upper Saddle River, NJ: Prentice Hall.

Akman, O., and Hallam, J.W. 2010. "Natural Selection at Work: An Accelerated Evolutionary Computing Approach to Predictive Model Selection." *Frontiers in Neuroscience* 4:33.

Allison, P.D. 2001. *Logistic Regression Using SAS: Theory and Application*. Cary, NC: SAS Institute.

Atanasov, P., Rescober, P., Stone, E., Swift, S.A., Servan-Schreiber, E., Tetlock, P., Ungar, L., and Mellers, B. 2017. "Distilling the Wisdom of Crowds: Prediction Markets vs. Prediction Polls." *Management Science* 63(3):691–706.

Audi, R., and Murphy, P.E. 2006. "The Many Faces of Integrity." *Business Ethics Quarterly* 16(1):3–21.

Bauman, D.C. 2013. "Leadership and the Three Faces of Integrity." *Leadership Quarterly* 24(3):414–26.

Becker, G.K. 2009. "Integrity as Moral Ideal and Business Benchmark." *Journal of International Business Ethics* 2 (2):70–84.

Bell, J.E., Autry, C.W., Mollenkopf, D.A., and Thornton, L.M. 2012. "A Natural Resource Scarcity Typology: Theoretical Foundations and Strategic Implications for Supply Chain Management." *Journal of Business Logistics* 33(2):158–66.

Bell, J.E., Mollenkopf, D.A., and Stolze, H.J. 2013. "Natural Resource Scarcity and the Closed-Loop Supply Chain: A Resource-Advantage View." *International Journal of Physical Distribution & Logistics Management* 43(5/6):351–79.

Bird, R., Hall, A.D., Momentè, F., and Reggiani, F. 2007. "What Corporate Social Responsibility Activities Are Valued by the Market?" *Journal of Business Ethics* 76(2):189–206.

Boulouta, I. 2013. "Hidden Connections: The Link Between Board Gender Diversity and Corporate Social Performance." *Journal of Business Ethics* 113(2):185–97.

Bowen, H. 1953. *Social Responsibilities of the Businessman*. New York, NY: Harper & Brothers.

Bozdogan, H. 2000. "Akaike's Information Criterion and Recent Developments in Information Complexity." *Journal of Mathematical Psychology* 44(1):62–91.

Bozdogan, H. 2004. *Statistical Data Mining and Knowledge Discovery*. Boca Raton, FL: Chapman and Hall/CRC.

Bozdogan, H., and Pamukcu, E. 2016. "Novel Dimension Reduction Techniques for High-Dimensional Data Using Information Complexity." *Tutorial in Operations Research: Optimization Challenges in Complex, Networked and Risky Systems*. INFORMS. Published online November 4, 2016. pages 140–70. https://doi.org/10.1287/educ.2016.0154

Brammer, S., and Millington, A. 2006. "Firm Size, Organizational Visibility and Corporate Philanthropy: An Empirical Analysis." *Business Ethics: A European Review* 15 (1):6–18.

Brenner, S.N. 1992. "The Stakeholder Theory of the Firm." *Business Ethics Quarterly* 2(2):99–119.

Brockhaus, S., Kersten, W., and Knemeyer, A.M. 2013. "Where Do We Go From Here? Progressing Sustainability Implementation Efforts Across Supply Chains." *Journal of Business Logistics* 34(2):167–82.

Brown, M.T. 2005. *Corporate Integrity*. Cambridge; New York: Cambridge University Press.

Brown, M.T. 2006. "Corporate Integrity and Public Interest: A Relational Approach to Business Ethics and Leadership." *Journal of Business Ethics* 66(1):11–18.

Busse, C., Kach, A.P., and Wagner, S.M. 2016. "Boundary Conditions: What They Are, How to Explore Them, Why We Need Them, and When to Consider Them." *Organizational Research Methods* 20:574–609.

Carroll, A.B. 1979. "A Three-Dimensional Conceptual Model of Corporate Performance." *Academy of Management Review* 4 (4):497–505.

Carroll, A.B. 1991. "The Pyramid of Corporate Social Responsibility: Towards the Moral Management of Organizational Stakeholders." *Business Horizons* 34(4):39–48.

Carter, C.R. 2000. "Ethical Issues in International Buyer-Supplier Relationships: A Dyadic Examination." *Journal of Operations Management* 18(2):191–208.

Carter, C.R., and Easton, P.L. 2011. "Sustainable Supply Chain Management: Evolution and Future Directions." *International Journal of Physical Distribution & Logistics Management* 41 (1):46–62.

Carter, C.R., and Jennings, M.M. 2002. "Logistics Social Responsibility: An Integrative Framework." *Journal of Business Logistics* 23(1):145–80.

Carter, C.R., and Jennings, M.M. 2004. "The Role of Purchasing in Corporate Social Responsibility: A Structural Equation Analysis." *Journal of Business Logistics* 25 (1):145–86.

Carter, C.R., and Rogers, D.S. 2008. "A Framework of Sustainable Supply Chain Management: Moving Toward New Theory." *International Journal of Physical Distribution & Logistics Management* 38(5–6):360–87.

Chiu, S.C., and Sharfman, M. 2011. "Legitimacy, Visibility, and the Antecedents of Corporate Social Performance: An Investigation of the Instrumental Perspective." *Journal of Management* 37(6):1558–85.

Chun, J.S., Shin, Y., Choi, J.N., and Kim, M.S. 2013. "How Does Corporate Ethics Contribute to Firm Financial Performance? The Mediating Role of Collective Organizational Commitment and Organizational Citizenship Behavior." *Journal of Management* 39(4):853–77.

Cox, D., La Caze, M., and Levine, M. 2013. "Integrity." http://plato.stanford.edu/archives/fall2013/entries/integrity/

Deck, C., and Smith, V. 2013. "Using Laboratory Experiments in Logistics and Supply Chain Research." *Journal of Business Logistics* 34(1):6–14.

Dodd, C.H., and Dodd, M.J. 2014. "What Is Integrity?" In *Business and Corporate Integrity: Sustaining Organizational Compliance, Ethics, and Trust*, edited by R.C. Chandler, 3–13. Santa Barbara, CA: Praeger.

Donaldson, T. 1982. *Corporations and Morality*. Englewood Cliffs, NJ: Prentice-Hall.

Donaldson, T., and Preston, L.E. 1995. "The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications." *Academy of Management Review* 20(1):65–91.

Ehrgott, M., Reimann, F., Kaufmann, L., and Carter, C.R. 2011. "Social Sustainability in Selecting Emerging Economy Suppliers." *Journal of Business Ethics* 98(1):99–119.

Ehrgott, M., Reimann, F., Kaufmann, L., and Carter, C.R. 2013. "Environmental Development of Emerging Economy Suppliers: Antecedents and Outcomes." *Journal of Business Logistics* 34(2):131–47.

Eisenhardt, K.M. 1989. "Building Theories From Case Study Research." *Academy of Management Review* 14(4):532–50.

Elkington, J. 1998. *Cannibals With Forks: The Triple Bottom Line of the 21st Century*. Stoney Creek, CT: New Society Publishers.

Elkington, J. 2004. "Enter the Triple Bottom Line." In *The Triple Bottom Line: Does It All Add Up?*, edited by A. Henriques and J. Richardson, 1–16. Sterling, VA: Earthscan.

Emmelhainz, M.A., and Adams, R.J. 1999. "The Apparel Industry Response to 'Sweatshop' Concerns: A Review and Analysis of Codes of Conduct." *Journal of Supply Chain Management* 35(3):51–57.

Felin, T., Foss, N.J., and Ployhart, R.E. 2015. "The Microfoundations Movement in Strategy and Organization Theory." *The Academy of Management Annals* 9(1): 575–632.

Freeman, R.E. 1984. *Strategic Management: A Stakeholder Approach*. Boston, MA: Pitman Publishing.

Freeman, R.E. 1994. "The Politics of Stakeholder Theory: Some Future Directions." *Business Ethics Quarterly* 4(4):409–22.

Freeman, R.E. 1999. "Divergent Stakeholder Theory." *Academy of Management Review* 24(2):233–36.

Freeman, R.E., Harrison, J.S., and Wicks, A.C. 2007. *Managing for Stakeholders: Survival, Reputation, and Success*. New Haven, CT: Yale University Press.

French, P.A. 1984. *Collective and Corporate Responsibility*. New York, NY: Columbia University Press.

French, P.A. 1995. *Corporate Ethics*. Fort Worth, TX: Harcourt Brace College Publishers.

Glaser, B.G. 2001. *The Grounded Theory Perspective: Conceptualization Contrasted With Description*. Mill Valley, CA: Sociology Press.

Glaser, B.G., and Strauss, A. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Inquiry*. London, UK: Weidenfeld and Nicolson.

Goldsby, T., and Zinn, W. 2016. "Adding Relevance to Rigor in Research: The JBL Practitioner Panel." *Journal of Business Logistics* 37(4):310–11.

Golicic, S.L., and Smith, C.D. 2013. "A Meta-Analysis of Environmentally Sustainable Supply Chain Management Practices and Firm Performance." *Journal of Supply Chain Management* 49(2):78–95.

Gowans, C.W. 1984. "Integrity in the Corporation: The Plight of Corporate Product Advocates." *Journal of Business Ethics* 3 (1):21–28.

Griffis, S.E., Autry, C.W., Thornton, L.M., and Brik, A.B. 2014. "Assessing Antecedents of Socially Responsible Supplier Selection in Three Global Supply Chain Contexts." *Decision Sciences* 45(6):1187–215.

Guerrette, R.H. 1986. "Environmental Integrity and Corporate Responsibility." *Journal of Business Ethics* 5(5):409–15.

Hair, J.F., Black, W.C., Babin, B.J., and Anderson, R.E. 2010. *Multivariate Data Analysis*. 7th ed. Upper Saddle River, NJ: Pearson Prentice Hall.

Hansen, B.E. 2015. "*Econometrics*." Madison, WI: University of Wisconsin. http://www.ssc.wisc.edu/~bhansen/econometrics/

Hart, S.L. 1995. "A Natural-Resource-Based View of the Firm." *Academy of Management Review* 20(4):986–1014.

Hinkin, T.R. 1995. "A Review of Scale Development Practices in the Study of Organizations." *Journal of Management* 21 (5):967–88.

Hofer, C., Cantor, D.E., and Dai, J. 2012. "The Competitive Determinants of a Firm's Environmental Management Activities: Evidence From US Manufacturing Industries." *Journal of Operations Management* 30(1):69–84.

Hosmer, D.W., and Lemeshow, S. 2000. *Applied Logistic Regression*. 2nd ed. Hoboken, NJ: John Wiley & Sons Inc.

Intel. 2015. "Corporate Responsibility Report." http://www.intel.com/content/www/us/en/corporate-responsibility/corporate-responsibility-report-overview.html

Jensen, T., and Sandström, J. 2011. "Stakeholder Theory and Globalization: The Challenges of Power and Responsibility." *Organization Studies* 32(4):473–88.

Jones, T.M., and Wicks, A.C. 1999. "Convergent Stakeholder Theory." *Academy of Management Review* 24(2):206–21.

Kim, Y., Park, M.S., and Wier, B. 2012. "Is Earnings Quality Associated With Corporate Social Responsibility?" *The Accounting Review* 87(3):761–96.

Klassen, R.D., and Vereecke, A. 2012. "Social Issues in Supply Chains: Capabilities Link Responsibility, Risk (Opportunity), and Performance." *International Journal of Production Economics* 140(1):103–15.

Kleindorfer, P.R., Singhal, K., and Van Wasssenhove, L.N. 2005. "Sustainable Operations Management." *Production and Operations Management* 14(4):482–92.

Knemeyer, A.M., and Naylor, R.W. 2011. "Using Behavioral Experiments to Expand Our Horizons and Deepen Our Understanding of Logistics and Supply Chain Decision Making." *Journal of Business Logistics* 32(4):296–302.

Koehn, D. 2005. "Integrity as a Business Asset." *Journal of Business Ethics* 58(1–3):125–36.

Lemke, F., and Petersen, H.L. 2013. "Teaching Reputational Risk Management in the Supply Chain." *Supply Chain Management: An International Journal* 18(4):413–29.

Li, F., Zhang, S., and Yang, X. 2016. "Moral Integrity and Relationship Commitment: An Empirical Examination in a Cross-Cultural Setting." *Journal of Business Ethics*. https://doi.org/10.1007/s10551-016-3246-z

Maak, T. 2008. "Undivided Corporate Responsibility: Towards a Theory of Corporate Integrity." *Journal of Business Ethics* 82 (2):353–68.

Manuj, I., Esper, T.L., and Stank, T.P. 2014. "Supply Chain Risk Management Approaches Under Different Conditions of Risk." *Journal of Business Logistics* 35(3):241–58.

Manuj, I., and Mentzer, J.T. 2008. "Global Supply Chain Risk Management Strategies." *International Journal of Physical Distribution & Logistics Management* 38(3):192–223.

Marano, V., and Kostova, T. 2016. "Unpacking the Institutional Complexity in Adoption of CSR Practices in Multinational Enterprises." *Journal of Management Studies* 53(1):28–54.

Marsh, F.K. 2009. "Ethical Concerns at the Bottom of the Pyramid-Corporate Responsibility or Corporate Integrity? A Brief Commentary." *Journal of International Business Ethics* 2(1):33–35.

Mattingly, J.E., and Berman, S.L. 2006. "Measurement of Corporate Social Action Discovering Taxonomy in the Kinder Lydenburg Domini Ratings Data." *Business & Society* 45 (1):20–46.

Maurer, V.G. 2009. "Corporate Social Responsibility and the 'Divided Corporate Self': The Case of Chiquita in Colombia." *Journal of Business Ethics* 88(S4):595–603.

McFall, L. 1987. "Integrity." *Ethics* 98(1):5–20.

McWilliams, A., and Siegel, D. 2000. "Corporate Social Responsibility and Financial Performance: Correlation or Misspecification?" *Strategic Management Journal* 21(5):603–609.

Mello, J.E., and Flint, D.J. 2009. "A Refined View of Grounded Theory and Its Application to Logistics Research." *Journal of Business Logistics* 30(1):107–25.

Menard, S. 1995. *Applied Logistic Regression Analysis. Quantitative Applications in the Social Sciences. No. 106*. London: Sage.

Mentzer, J.T. 2008. "Rigor Versus Relevance: Why Would We Choose Only One?" *Journal of Supply Chain Management* 44 (2):72–77.

Mentzer, J.T., DeWitt, W., Keebler, J.S., Min, S., Nix, N.W., Smith, C.D., and Zacharia, Z.G. 2001. "Defining Supply Chain Management." *Journal of Business Logistics* 22(2):1–25.

Merton, R.K. 1968. *Social Theory and Social Structure*. Reprinted ed. New York, NY: Free Press.

MH&L. 2016. "Intel Announces 'Conflict Free' Supply Chain." *Materials Handling and Logistics*. http://mhlnews.com/global-supply-chain/intel-announces-conflict-free-supply-ch

Min, H., and Galle, W.P. 1991. "International Purchasing Strategies of Multinational US Firms." *International Journal of Purchasing and Materials Management* 27(3):9–18.

New, S. 2010. "The Transparent Supply Chain." *Harvard Business Review* 88(10):76–82.

Nuzzo, R. 2014. "Scientific Method: Statistical Errors." *Nature* 506(1):150–52.

Oliva, R., and Watson, N. 2011. "Cross-Functional Alignment in Supply Chain Planning: A Case Study of Sales and Operations Planning." *Journal of Operations Management* 29(5):434–48.

Orlitzky, M., Schmidt, F.L., and Rynes, S.L. 2003. "Corporate Social and Financial Performance: A Meta-Analysis." *Organization Studies* 24(3):403–41.

Pagell, M., Wiengarten, F., and Fynes, B. 2013. "Institutional Effects and the Decision to Make Environmental Investments." *International Journal of Production Research* 51(2):427–46.

Pagell, M., and Wu, Z.H. 2009. "Building a More Complete Theory of Sustainable Supply Chain Management Using Case Studies of 10 Exemplars." *Journal of Supply Chain Management* 45(2):37–56.

Pagell, M., Wu, Z.H., and Wasserman, M.E. 2010. "Thinking Differently About Purchasing Portfolios: An Assessment of Sustainable Sourcing." *Journal of Supply Chain Management* 46(1):57–73.

Paine, L.S. 1994. "Managing for Organizational Integrity." *Harvard Business Review* 72(2):106–17.

Palanski, M.E., and Yammarino, F.J. 2007. "Integrity and Leadership: Clearing the Conceptual Confusion." *European Management Journal* 25(3):171–84.

Peng, C.J., Lee, K.L., and Ingersoll, G.M. 2002. "An Introduction to Logistics Regression Analysis and Reporting." *The Journal of Educational Research* 96(1):3–14.

Petersen, H.L., and Lemke, F. 2015. "Mitigating Reputational Risks in Supply Chains." *Supply Chain Management: An International Journal* 20(5):495–510.

Porter, M.E., and van der Linde, C. 1995. "Green and Competitive: Ending the Stalemate." *Harvard Business Review* 73(5):120–34.

Rabinovich, E., and Cheon, S.H. 2011. "Expanding Horizons and Deepening Understanding via the Use of Secondary Data Sources." *Journal of Business Logistics* 32(4):303–16.

Randall, W.S., and Mello, J.E. 2011. "Grounded Theory: An Inductive Method for Supply Chain Research." *International*

Journal of Physical Distribution & Logistics Management 42 (8/9):863–80.

Rao, S., and Goldsby, T.J. 2009. "Supply Chain Risks: A Review and Typology." *The International Journal of Logistics Management* 20(1):97–123.

Reuter, C., Foerstl, K., Hartmann, E., and Blome, C. 2010. "Sustainable Global Supplier Management: The Role of Dynamic Capabilities in Achieving Competitive Advantage." *Journal of Supply Chain Management* 46(2):45–63.

Richter, U.H. 2010. "Liberal Thought in Reasoning on CSR." *Journal of Business Ethics* 97(4):625–49.

Rodriguez-Domingues, L., Gallego-Alvarez, I., and Garcia-Sanchez, I. 2009. "Corporate Governance and Codes of Ethics." *Journal of Business Ethics* 90(2):187–202.

Rogers, D.S. 2011. "Sustainability is Free: The Case for Doing the Right Thing." *Supply Chain Management Review* 15 (6):10–17.

Rutz, O.J., Trusov, M., and Bucklin, R.E. 2011. "Modeling Indirect Effects of Paid Search Advertising: Which Keywords Lead to More Future Visits?" *Marketing Science* 30(4):646–65.

Saldanha, J.P., Mello, J.E., Knemeyer, A.M., and Vijayaraghavan, T.A.S. 2015. "Implementing Supply Chain Technologies in Emerging Markets: An Institutional Theory Perspective." *Journal of Supply Chain Management* 51(1):5–26.

Sanders, N.R., and Wagner, S.M. 2011. "Multidisciplinary and Multimethod Research for Addressing Contemporary Supply Chain Challenges." *Journal of Business Logistics* 32(4):317–23.

Sanders, N.R., Zacharia, Z.G., and Fugate, B.S. 2013. "The Interdisciplinary Future of Supply Chain Management Research." *Decision Sciences* 44(3):413–29.

Sarkis, J., Gonzales-Torre, P., and Adenso-Diaz, B. 2010. "Stakeholder Pressure and the Adoption of Environmental Practices: The Mediating Effect of Training." *Journal of Operations Management* 28(2):163–76.

Schmidt, C.G., Foerstl, K., and Schaltenbrand, B. 2017. "The Supply Chain Position Paradox: Green Practices and Firm Performance." *Journal of Supply Chain Management* 53(1):3–25.

Scott, A. 2016. "Intel Supply Chain Will Be Conflict Free This Year." *Supply Management*, January 7: http://www.cips.org/supply-management/news/2016/January/intel-supply-chain-will-be-conflict-free-this-year/

Solomon, M. 2014. "2015 is the Year of the Millennial Customer: 5 Key Traits These 80 Million Consumers Share." https://www.forbes.com/sites/micahsolomon/2014/12/29/5-traits-that-define-the-80-million-millennial-customers-coming-your-way/#78dd5e525e56

Solomon, R.C. 1992a. "Corporate Roles, Personal Virtues: An Aristotelean Approach to Business Ethics." *Business Ethics Quarterly* 2(3):317–39.

Solomon, R.C. 1992b. *Ethics and Excellence: Cooperation and Integrity in Business*. New York, NY: Oxford University Press.

Stank, T.P., Pellathy, D., In, J., Mollenkopf, D.A., and Bell, J.B. 2017. "New Frontiers in Logistics Research: Theorizing at the Middle Range." *Journal of Business Logistics* 38 (1):6–17.

Stevens, B. 2012. "How Ethical Are U.S. Business Executives? A Study of Perceptions." *Journal of Business Ethics* 117 (2):361–69.

Swanson, R.D., and Smith, R.J. 2013. "A Path to a Public-Private Partnership: Commercial Logistics Concepts Applied to Disaster Response." *Journal of Business Logistics* 34 (4):335–46.

Talluri, S., Kull, T.J., Yildiz, H., and Yoon, J. 2013. "Assessing the Efficiency of Risk Mitigation Strategies in Supply Chains." *Journal of Business Logistics* 34(4):253–69.

Taylor. 2012. "Sustainable Ebony." http://www.taylorguitars.com/about/sustainable-ebony

Thornton, L.M., Autry, C.W., Gligor, D.M., and Brik, A.B. 2013. "Does Socially Responsible Supplier Selection Pay Off for Customer Firms? A Cross-Cultural Comparison." *Journal of Supply Chain Management* 49(3):66–89.

Turner, G.B., Taylor, G.S., and Hartley, M.F. 1994. "Ethics Policies and Gratuity Acceptance by Purchasers." *International Journal of Purchasing & Materials Management* 30(3):43–47.

Velasquez, M.G., and Goodpaster, K.E. 1983. "Why Corporations Are Not Morally Responsible for Anything They Do." *Business & Professional Ethics Journal* 2 (3):1–18.

Vogt, W.P., Gardner, D.C., Haeffele, L.M., and Vogt, E.R. 2014. *Selecting the Right Analyses for Your Data: Quantitative, Qualitative, and Mixed Methods*. New York, NY: Guilford Publications.

Waddock, S.A. 2003. "Stakeholder Performance Implications of Corporate Responsibility." *International Journal of Business Performance Management* 5(2–3):114–24.

Waddock, S.A., and Graves, S.B. 1997. "The Corporate Social Performance-Financial Performance Link." *Strategic Management Journal* 18(4):303–19.

Waller, M.A., Fawcett, S.E., and Johnson, J.L. 2015. "The Luxury Paradox: How Systems Thinking and Supply Chain Collaboration Can Bring Sustainability Into Mainstream Practice." *Journal of Business Logistics* 36(4):303–305.

Walmart. 2008. "Walmart Statement of Ethics." https://walmartethics.com/uploadedFiles/Content/U.S.%20-%20English.pdf

Wasserstein, R.L., and Lazar, N.A. 2016. "The ASA's Statement on p-Values: Context, Process, and Purpose." *The American Statistician* 70(2):129–33.

Wooldridge, J. 2015. *Introductory Econometrics: A Modern Approach*. Mason, OH: Nelson Education.

Yin, R. 2014. *Case Study Research: Design and Methods*. 5th ed. Los Angeles, CA: Sage Publishing.

Zhang, J., Zhu, H., and Ding, H. 2013. "Board Composition and Corporate Social Responsibility: An Empirical Investigation in the Post Sarbanes-Oxley Era." *Journal of Business Ethics* 114(3):381–92.

Zou, H., and Hastie, T. 2005. "Regularization and Variable Selection via the Elastic Net." *Journal of the Royal Statistical Society, Series B* 67(2):301–20.

Zsidisin, G.A., Ellram, L.M., Carter, J.R., and Cavinato, J.L. 2004. "An Analysis of Supply Risk Assessment Techniques." *International Journal of Physical Distribution & Logistics Management* 34(5):397–413.

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