The influence of supply chain management competency on customer satisfaction and shareholder value

Alexander Ellinger, Hyunju Shin, William Magnus Northington and Frank G. Adams
Culverhouse College of Commerce and Business Administration, University of Alabama, Tuscaloosa, Alabama, USA

Debra Hofman and Kevin O'Marah
Gartner Supply Chain Research Group, Boston, Massachusetts, USA

Abstract

Purpose – The relationship between supply chain management (SCM) competency and firm performance is not well established empirically. This is largely because proven metrics for quantifying the effects of SCM are scarce. Drawing on the strategic managerial concept of supply chain orientation as a source of competitive advantage, this paper aims to apply three independent sources of secondary data to examine the influence of SCM competency on two important firm performance metrics: customer satisfaction and shareholder value.

Design/methodology/approach – SCM competency is assessed with data from the expert opinion element of Gartner Supply Chain Group's (formerly AMR Research) supply chain top 25 rankings; the American Customer Satisfaction Index (ACSI) database and the recently developed Economic Value Added (EVA) Momentum financial metric are utilized as outcome measures.

Findings – Firms recognized by peers and experts for superior SCM competency exhibit higher levels of customer satisfaction and shareholder value than their respective industry averages.

Research limitations/implications – Further evidence is required to prove causality does exist between these variables. Limitations associated with the use of secondary data restricted the number of top performer firms available for this analysis. Nevertheless, the strong correlations found between SCM competency and two critical firm performance metrics may help senior managers and managers from other functional areas to better understand potential advantages associated with developing greater SCM competency.

Practical implications – The assessment of two metrics that differentiate top SCM performers from their industry competitors may also help SCM professionals to better convey the impact of SCM competency to non-supply chain managers and external participants in the supply chain whose support and cooperation are critical to the success of process improvement initiatives.

Originality/value – In addition to the study findings, blending qualitative expert opinion, formal customer satisfaction and quantitative financial performance secondary data represents a relatively novel and informative method that responds to contentions that different approaches should be employed to develop a more holistic understanding of SCM.

Keywords Supply chain management competency, Customer satisfaction, Shareholder value analysis, Economic value added, Supply chain management metrics, Delphi method

Paper type Research paper

1. Introduction

Supply chain management (SCM) "will ultimately separate the winners from the losers," (Spekman *et al.*, 2002, p. 41). Yet, the relationship between SCM competency and firm performance is not well established empirically (Christopher and Ryals, 1999; Lambert and Burduroglu, 2000; Timme and Williams-Timme, 2000). A major reason for this shortcoming is that proven metrics for quantifying the effects of SCM are scarce (Farris and Hutchison, 2002, 2003; Johnson and Templar, 2011; Lambert and Pohlen, 2001; Melnyk *et al.* 2004). Consequently, many senior managers (Hammer, 2004; Slone *et al.*, 2007) and non-SCM managers (Trent, 2004) struggle to fully appreciate the potential strategic, tactical and financial benefits associated with developing SCM competency. Moreover, SCM professionals frequently struggle to successfully articulate the influence of SCM operational initiatives and resource investments on firm performance (Moberg *et al.*, 2008; Timme and Williams-Timme, 2000).

SCM competency plays a major role in creating (or destroying) shareholder value by influencing customer satisfaction (Daugherty *et al.*, 1998; Green *et al.*, 2006) as well as the major drivers of firm financial performance: revenue growth, operating costs and working capital efficiency (Camerinelli, 2009; Lambert and Burduroglu, 2000). Since

The current issue and full text archive of this journal is available at **www.emeraldinsight.com/1359-8546.htm**

Supply Chain Management: An International Journal
17/3 (2012) 249–262

[DOI 10.1108/13598541211227090]

Received: 1 August 2011
Revised: 4 November 2011
11 November 2011
15 November 2011
Accepted: 18 November 2011

SCM impacts each of the key drivers of firm performance, van Hoek (1998) suggests that lack of appropriate metrics for quantifying the influence of SCM restricts the optimization of supply chains, and researchers call for theoretically driven research to identify and evaluate metrics that may be useful for explicating the effect of SCM competency (Lambert and Pohlen, 2001; Melnyk *et al.*, 2004; Stock *et al.*, 2010).

The purpose of our study is to address this gap by examining the influence of SCM competency on two important firm performance metrics: customer satisfaction and shareholder value. SCM competency is assessed with data from Gartner Supply Chain Group (formerly AMR Research)'s 2007-2010 supply chain top 25 rankings. Firms' scores on the American Customer Satisfaction Index (ACSI) and the newly developed Economic Value Added (EVA) Momentum financial metric (Stewart, 2009) are utilized as outcome measures. In addition to extending extant research on SCM competency as a means of attaining competitive advantage, this study builds on Johnson and Templar (2011)'s recent utilization of secondary financial data to develop and test a "unified proxy for supply chain performance". This research also adds to a contemporary stream of empirical studies that employ secondary financial data to assess relationships between discrete aspects of SCM competency and firm performance (see, Chen *et al.*, 2005: inventory reduction; Chen *et al.*, 2004: strategic purchasing; Fullerton *et al.*, 2003: JIT; Hendricks and Singhal, 2003, 2005a, b: supply chain glitches; Hendricks *et al.*, 2007: ERP implementation). However, researchers question the validity of making general links between specific aspects of SCM competency and performance, pointing out that the relative importance of specific practices may vary across supply chain roles (Cook *et al.*, 2011). Drawing on the strategic managerial concept of supply chain orientation (SCO) as a source of competitive advantage, this research study provides a more general assessment of the influence of SCM competency on firm performance.

2. Background

2.1 SCM competency

SCM is an "integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model," (www.cscmp.org). Numerous studies in this journal (see, Cook *et al.*, 2011; Green *et al.*, 2006, 2008; Halley and Beaulieu, 2009; Johnson and Templar, 2011; Kim, 2006; Sezen, 2008; Spekman *et al.*, 2002; Tracey *et al.*, 2005; van Hoek, 1998) and in other leading strategic SCM publications (see, Bowersox *et al.*, 2000; Christopher, 2011; Lambert and Cooper, 2000; Lee, 2004; Ketchen *et al.* 2008; Mentzer *et al.*, 2001) examine the notion of SCM competency as a means of creating competitive advantage. As stated in many of these and in multiple other studies in trade and academic journals, relatively few firms are highly competent supply chain managers (e.g. Spekman *et al.*, 2002; Trent, 2004).

The literature indicates that SCM competency is primarily a function of integration between and within supply chain member firms (Chen *et al.*, 2009; Fawcett *et al.*, 2008; Kim, 2006). Integration facilitates knowledge sharing that connects sourcing and manufacturing operations with market requirements to better match supply with demand (Esper *et al.*, 2010a; Tracey *et al.*, 2005). Moreover, collaborative integration between internal and external supply chain participants focuses on better aligning supply chain participants' incentives and reward systems (Fawcett *et al.*, 2008; Narayanan and Raman, 2004) to reduce duplication and non-value creating activities. The ability to leverage information technology and process innovation to speed up the supply chain, reduce system-wide inventory and resource utilization (Hult *et al.*, 2002) and sustain cashflow (Farris and Hutchison, 2002, 2003) is also well recognized in the literature as a significant source of competitive advantage.

The current research utilizes top SCM performer firms identified by expert and peer-opinion interpretations of Gartner Supply Chain Group's Demand Driven Supply Network Ideal (DDSNI) as the proxy measure for SCM competency. The characteristics of Gartner Supply Chain Group's DDSNI are highly consistent with the characteristics of SCM competency outlined in the extant literature (e.g. Ketchen *et al.*, 2008; Lee, 2004; Michigan State University Global Logistics Research Team, 1995). Principal characteristics of the DDSNI include supply chain integration, the ability to influence demand rather than merely respond to it and the incorporation of innovative supply chain operations (O'Marah and Hofman, 2010). As shown in Appendix 1 (Table AI), the DDSNI assesses four principal areas of SCM competency: Supply (supply chain execution, supply management and manufacturing), Information (sales and operations planning, application of technology and infrastructure and performance management), Demand (service management, demand sensing and demand shaping) and Product (lifecycle management, launch and innovation), and these elements of the principal areas of SCM competency are assessed with multiple criteria (gartner.com/supplychaintop25).

2.2 Customer satisfaction

The ability to generate higher levels of customer satisfaction is regarded as an important differentiator and has therefore become a key element of many firms' business strategies. Customer satisfaction is a measure of how the products and services provided by a company meet or exceed customer expectations (Fornell, 1992; Olsen and Johnson, 2003). As such customer satisfaction metrics indicate how successful an organization is at providing products and/or services to the marketplace (Anderson *et al.*, 1997; Fornell, 1992). Customer satisfaction is formally measured by several publicly available customer satisfaction databases including the American Customer Satisfaction Index (ACSI) in the USA and the Customer Satisfaction Barometer in Sweden (Anderson, Fornell and Lehmann, 1994; Anderson and Fornell, 2000; Fornell, 1992; Fornell *et al.*, 1996). Data from these sources are frequently employed in empirical research studies (e.g. Anderson and Sullivan, 1993; Fornell, 1995; Fornell *et al.*, 2010; Reichheld and Teal, 2001).

The ACSI score comprises of three items: overall satisfaction, expectancy disconfirmation (performance that falls short or exceeds expectations) and performance versus the customer's ideal product or service in that category (the italicised items in Appendix 2 – Table AII). Fornell *et al.* (1996, p. 10) state that the use of reflective indicators of overall customer satisfaction is "consistent with the cumulative nature of ACSI, because each measure represents a qualitatively different benchmark customers use

in making qualitative evaluations." The ACSI score is an integral component of the ACSI Model which is a multi-equation, cause and effect econometric model that utilizes customer interviews to determine levels of perceived quality, customer expectations, and perceived value and their impact on customer satisfaction (the ACSI score) and the influence of customer satisfaction on customer complaints and customer loyalty. As shown in Appendix 2 (Table AII), the constructs in the ACSI model consist of weighted, multi-item components, with the questions asked of consumers used to assess the determinants of each construct. ACSI data has been utilized in more than 70 empirical research studies (www.theacsi.org).

Improving levels of customer satisfaction is important for firms due to the influence customer satisfaction has on economic performance (Anderson *et al.*, 1997; Fornell *et al.*, 2006). At the microeconomic level, customer satisfaction is associated with increases in market share and profitability (Anderson, Fornell and Lehmann, 1994; Reichheld and Sasser, 1990). Research shows that firms with higher levels of customer satisfaction generate higher return on investment (Anderson, Fornell and Lehmann, 1994), productivity (Anderson *et al.*, 1997), market value added (Fornell, 2001; Ittner and Larcker, 1996), shareholder value (Anderson *et al.*, 2004; Gruca and Rego, 2005), and stock market performance (Fornell *et al.*, 2006). Furthermore, increasing and maintaining high levels of customer satisfaction enhances customer loyalty and serves as a safeguard against increasing price competition and the commoditization of products (Anderson, Fornell and Lehmann, 1994; Anderson and Sullivan, 1993; Oliva *et al.*, 1992). At the macroeconomic level, research shows that aggregated customer satisfaction indices such as ACSI are strong predictors of gross domestic product growth and even stronger predictors of personal consumption expenditure (Fornell *et al.*, 2010).

In the context of supply chain management, the literature consistently associates SCM competency with higher levels of customer satisfaction (e.g. Daugherty *et al.*, 1998; Green *et al.*, 2006; Innis and La Londe, 1994; Spekman *et al.*, 2002; Stank *et al.*, 2003; Tracey *et al.*, 2005). As SCM competency enables firms to create value by better meeting customer service expectations, customer satisfaction increases. Many firms are therefore trying to improve levels of customer satisfaction through superior execution of their order management (Shapiro *et al.*, 1992) and other key supply chain processes (Croxton *et al.*, 2001). The current research utilizes the ACSI score as a measure of customer satisfaction and tests the measure's efficacy as a means of differentiating firms on SCM competency.

2.3 Shareholder value: economic value added

Economic value added (EVA) is a financial metric that captures the concept of economic profit and is associated with the creation of shareholder value (Tully, 1993; Young and O'Byrne, 2001). Essentially, EVA is the difference between profit after taxes and the true cost of the capital employed to generate those profits. A negative EVA is generated if the cost of capital employed is greater than the profit after tax. The impact of a negative EVA, especially if it continues over an extended period, is erosion of shareholder value. Likewise, improvements in EVA are associated with boosts in shareholder value (Stewart, 1994). As firms attempt to maximize shareholder value, EVA has been applied as an indicator of value creation through SCM competency (Christopher and Ryals, 1999). Supply chain management directly affects EVA in four different areas: operating costs, fixed assets, working capital, and revenue growth (Lambert and Burduroglu, 2000). Essentially, the EVA approach suggests that as SCM competency helps firms to perform at an optimal level, firms will be rewarded with increased levels of shareholder value.

Despite the widespread application of EVA as a performance metric, the effectiveness and appropriateness of this approach, as with many ratio-based measures, is questioned (Biddle *et al.*, 1999; Christopher and Ryals, 1999; Stewart, 2009). More specifically, the metric is criticized for its "short-term focus and undervaluation of growth potential and intangible assets" (Srivastava *et al.*, 1999, p. 173). Brewer *et al.* (1999) note that EVA has additional limitations including lack of control for firm size differences, financial orientation, and short-term orientation. Since EVA is expressed as a financial amount, larger firms tend to have higher EVAs than smaller competitors (Brewer *et al.*, 1999; Hansen and Mowen, 1997). The financial orientation of EVA makes it easy for managers to manipulate its value (Horngren *et al.*, 1997). Finally, the short-term orientation of EVA "overemphasizes the need to generate immediate results; therefore, it creates a disincentive for managers to invest in innovative product or process technologies" (Brewer *et al.*, 1999, p. 8). All of these shortcomings can lead to managers making incorrect judgments due to the misrepresentation that is inherent in most ratios (Stewart, 2009). In summary, like most profit measures, EVA has limited utility for making accurate comparisons between firms since it is relatively susceptible to manipulation.

EVA Momentum, a new metric developed by EVA Dimensions in 2009 eliminates many of the limitations associated with EVA and other profit measures to better enable direct comparisons between firms' ability to generate shareholder value (Ehrbar, 2009; Stewart, 2009). EVA Momentum is a ratio of the change in a firms' EVA divided by a prior period's sales. Stewart (2009) identifies six ways in which EVA Momentum addresses problems associated with conventional financial data based ratios.

First, EVA Momentum incorporates EVA in its calculation, and is therefore also a measure of economic profit or the creation of shareholder value. Second, because the calculation incorporates trailing period sales, EVA Momentum is a financial measure that managers can maximize with less risk of generating potentially misleading information. In effect, the higher the EVA Momentum, the better (Stewart, 2009). Third, by creating a ratio that incorporates EVA and prior period sales, EVA Momentum generates a standardized ratio that can be appropriately used to compare firms to one another or to overall industry averages (Ehrbar, 2009). Fourth, EVA Momentum is less likely to be manipulated or "gamed" because the metric takes into account prior period sales along with the traditional EVA calculation (Colvin, 2010). This allows EVA momentum to measure the change in economic profit over time rather than just taking a snapshot of a level of economic profit at a single point in time. Stewart (2009) describes this as making the EVA Momentum metric "situation neutral." Fifth, the EVA Momentum metric is market-calibrated with a true zero point. If a firm's EVA Momentum is zero, the firm is doing exactly what investors

expect (i.e. meeting expected return on investments). Thus, unlike other financial metrics that tend to be arbitrary, EVA Momentum has a consistent break-even point. Positive EVA Momentum indicates the firm is doing better than expected, while negative EVA Momentum suggests it is doing worse (Ehrbar, 2009; Stewart, 2009). Finally, the zero-point characteristic serves as an early warning system that managers can use to see if their organizations are meeting shareholder expectations (Stewart, 2009).

Due to the standardization of EVA Momentum, managers can quickly determine whether their firms are creating an acceptable level of shareholder value. Most firms' EVA Momentums are around zero or negative (Ehrbar, 2009). Colvin (2010, p. 1) suggests that this is because the "combination of growing sales and an excellent or improving EVA is the extremely rare basis of great financial performance". The current research assesses the EVA Momentum metric as a measure of shareholder value and tests the measure's efficacy as a means of differentiating top SCM performers.

3. Theoretical foundation and research hypotheses

The strategic managerial concept of supply chain orientation (Mentzer *et al.*, 2001) provides the theoretical foundation for the relationships proposed and tested in our study. Supply chain orientation (SCO) is "the recognition by an organization of the systemic, strategic implications of the tactical activities involved in managing the various flows in a supply chain" (Mentzer *et al.*, 2001, p. 11). SCO and SCM are inextricably linked. SCO is the "management philosophy" that recognizes SCM within the firm, while SCM is the "sum total of all the overt management actions undertaken to realize that philosophy" (Mentzer *et al.*, 2001, p. 11). In short, SCO is an organizational mindset that is required for firms to leverage SCM competency into superior performance (Esper *et al.*, 2010b; Mentzer *et al.*, 2001; Min *et al.*, 2007). Research indicates that supply chain oriented firms more successfully align their marketing and supply chain strategies (Jüttner *et al.*, 2010), better implement flow coordination mechanisms with supply chain partners (Fugate *et al.*, 2006), and improve the effectiveness of supply chain processes (Aronsson *et al.*, 2011; Mollenkopf *et al.*, 2007; Trent, 2004).

Gartner Group's ideal supply chain firm efficiently and effectively coordinates all functional areas to develop, obtain resources for, and provide products in response to customer preferences and needs, increasing the firm's value through excellent demand-driven execution of all supply chain operations www.gartner.com/technology/supply-chain/top25_methodology.jsp. Consistent with Mentzer *et al.*(2001), the current research proposes that firms recognized by peers and industry experts as top performers on the DDSNI are exhibiting the supply chain oriented managerial mindset that is an integral part of SCM competency. The symbiotic nature of SCO and SCM proposed by Mentzer *et al.*, further suggests that firms perceived by their peers and industry experts to be performing effectively on the multiple DDSNI SCM competency characteristics shown in Appendix 1 (Table AI) have high SCOs in order to be able to do so. This rationale is supported by the ongoing stream of descriptive case studies about SCM top performer firms authored by Gartner Supply Chain Group industry experts and posted on their web site. Our argument is also consistent with Prahalad and Hamel's (1990) contention that firm competencies are developed to a greater or lesser extent depending on their fit with the firm's overarching strategic architecture and with Stank *et al.*'s (2005) assertion that how firms choose to coordinate processes is predicated by their strategic orientations.

Although many different competencies within the value chain may create competitive advantage (Porter, 1985), SCM is frequently characterized as a distinctive competency associated with superior firm performance particularly in business-to-business markets (see, Day, 1994; Halley and Beaulieu, 2009; Michigan State University Global Logistics Research Team, 1995; Spekman *et al.*, 2002; Srivastava *et al.*, 1999; Tracey *et al.*, 2005). Researchers also contend that SCM competency is an important contributor to customer satisfaction and shareholder value (Green *et al.*, 2006; Lambert and Burduroglu, 2000; Mentzer *et al.*, 2001; Srivastava *et al.*, 1999). Based on the impact that SCM competency has on customer satisfaction and shareholder value, and consistent with Defee *et al.*'s (2009, p. 90) contention that "supply chain oriented organizations should essentially behave differently to firms that are not inclined to place strategic emphasis on supply chain management", we propose that firms recognized for SCM competency exhibit higher levels of customer satisfaction and shareholder value than their respective industry averages:

H1. Top SCM performer firms have higher levels of customer satisfaction than their respective industry averages.

H2. Top SCM performer firms have higher levels of shareholder value than their respective industry averages.

4. Research method

Three independent sources of secondary data are utilized to test the study hypotheses.

4.1 Gartner Supply Chain Group's top 25 rankings' expert opinion data

Gartner Supply Chain Group's (formerly AMR Research) annual rankings are designed to recognize SCM competency by highlighting firms that best demonstrate leadership in applying demand-driven principles to build global supply chains that maximize business results by serving customers with both operational and innovation excellence (gartner.com/supplychaintop25). Gartner's motivation for compiling these rankings is "to show how supply chain excellence contributes to economic value creation, and, in so doing, to raise awareness of the importance and influence of the profession" (Friscia *et al.*, 2009a, p. 2).

Supply chain top 25 firms are chosen from a master list of companies derived primarily from *Fortune*'s Global 500 ranking. For consistency, certain industries like financial services and insurance are excluded so the master list contains firms in the manufacturing and retail sectors (www.gartner.com/supplychaintop25). The supply chain top 25 ranking process includes two components: financial and opinion. The financial element measures SCM performance while the opinion element measures SCM competency. To negate any risk of tautology (i.e.' financial independent

variables predicting financial outcome variables) the financial elements of Gartner's supply chain top 25 ranking process are not utilized in our study and the SCM top performers identified in the current research are selected based purely on the opinion data element. Moreover, consistent with the approach utilized in Ellinger *et al.*(2011), a series of tests performed to assess correlations between the financial and opinion elements of the Gartner supply chain top 25 Rankings for the years under examination indicated that these two components are not significantly correlated.

The opinion component of the ranking process utilized in this study as a proxy for SCM competency comprises of two elements: polls of Gartner Supply Chain Group experts and a peer panel of supply chain experts (O'Marah and Hofman, 2010). The opinion component of ranking process provides a "forward-looking view that reflects the progress companies are making as they move toward the idealized demand-driven supply network blueprint" (O'Marah and Hofman, 2010, p. 16). The Delphi-style polling process is based on Surowiecki's (2004) notion of leveraging the "wisdom of crowds" which proposes that a diverse group of independently-deciding individuals is highly capable of making certain types of decisions and predictions effectively. Delphi method is a structured process for collecting and distilling knowledge from a group of experts through the administration of questionnaires and controlled opinion feedback (Adler and Ziglio, 1996; Helmer and Rescher, 1959) that is appropriate when there is incomplete knowledge about a phenomenon (Anderson, Rungtusanatham and Schroeder, 1994).

Consistent with Surowiecki's (2004) method, Gartner's Delphi-style polling process is designed to tap into each participant's specific knowledge. The peer panel draws on the knowledge of SCM professionals that, as customers and/or suppliers, interact and have direct experience with the firms being ranked (O'Marah and Hofman, 2010). Eligibility for participation in the panel is restricted to supply chain professionals working for manufacturers or retailers and academics researching in the area of SCM. Only one panelist per organization is allowed (www.gartner.com/supplychaintop25).

Panelists' demographic characteristics are relatively consistent over the period under review with 170 and 154 panelists completing the 2009 and 2010 voting processes. The most frequently represented industries in the 2009 and 2010 peer opinion panels are high tech/semiconductor (19 per cent for both years), consumer packaged goods (18 per cent and 20 per cent), industrial goods (15 per cent and 14 per cent), life sciences and chemical energy (each 11 per cent for both years) and retail (9 per cent and 10 per cent). The roles of participants in the 2009 and 2010 peer opinion panels were senior director, director or manager (53 per cent and 51 per cent), vice president (21 per cent and 23 per cent), senior vice president, executive vice president or C-level (12 per cent for both years) and academic (14 per cent for both years). There were 20 and 27 Gartner expert panelists for the 2009 and 2010 Gartner expert polls, each of whom drew on his or her primary field research and ongoing work with firms (Friscia *et al.*, 2009b; O'Marah and Hofman, 2010).

Peer panel voting is conducted in mid-April via a web-based, structured voting process. Panelists are taken through a four-stage process to arrive at a final selection of firms that, in each of their opinions, come closest to Gartner's DDSNI as defined in Gartner Supply Chain Group Research reports and included in the instructions on the voting web site (O'Marah and Hofman, 2010). The first stage provides instructions and a comprehensive description of the DDSNI. The second stage requests demographic information. The third stage provides panelists with a complete list of the firms to be considered and asks voters to choose 30-50 firms that, in each of their opinions, most closely meet the ideal. After each participant chooses this subset of leaders, the fourth stage requires panelists to force-rank the firms from 1 through 25 with 1 being the company most closely meeting the DDSNI. Individual votes are collated across the entire panel with 25 points for a No. 1 ranking, 24 points for a No. 2 ranking and so on. The Gartner expert and peer panels use exactly the same polling procedure and the two sets of opinion data are weighted equally in the ranking process (O'Marah and Hofman, 2010).

4.2 ACSI Database

Founded by the National Quality Research Center at the University of Michigan in 1994, the American Customer Satisfaction Index (ACSI) database is an economic indicator designed to provide empirical data on customer satisfaction within the USA through ongoing customer evaluations of the quality of goods and services. The ACSI measures customer satisfaction annually for more than 225 companies in 45 industries and ten economic sectors. This broad aggregation of data allows for comparison among and across companies, industries, and sectors (www.theacsi.org).

ACSI computes customer satisfaction scores by annually contacting approximately 70,000 North American customers (about 250 customers per firm in the database). These customers are interviewed with a structured guide developed by Fornell *et al.* (1996), and their scores on this questionnaire are aggregated to create an individual customer satisfaction index score for each firm that ranges between 0-100. The individual firm index scores are then combined to compute industry and sector level indices (www.theacsi.org).

4.3 EVA Dimensions Database

EVA Dimensions is a consulting organization that offers benchmarking, valuation modeling and other financial database services designed to facilitate the measurement and maximization of value-based management. The EVA Dimensions database includes EVA Margin and EVA Momentum financial performance measures for 5,701 firms in a variety of industries. The EVA Dimensions database has several different EVA Momentum calculations including a base metric, a five-year cumulative average metric as well as before-tax metrics. The EVA Momentum measure used to test our study hypotheses is the EVA Before-tax Momentum 5-Year Average (EVAM5YABT). Using a pre-tax calculation, the EVAM5YABT metric allows for comparison of operational efficiency and asset management that might be hidden after taxes are imposed on the firms. EVAM5YABT is calculated as a five-year cumulative average to more effectively capture annual growth (or decline) in the economic profit margin of a firm over time. Further, EVAM5YABT's longer-term view offers a more valid assessment of the ongoing impact of supply chain management competency on shareholder value (Stewart, 2009).

4.4 Hypotheses testing

Top SCM performer firms identified based on the opinion element of Gartner's supply chain top 25 firm rankings (the proxy measure for supply chain competency) and firms' individual ACSI scores (the proxy measure for customer satisfaction) from the ACSI database were utilized in the three-step process employed to test *H1*. First, top SCM performer firms that are included in one or more of the firm rankings created from the opinion element of Gartner's 2007-2010 supply chain top 25 rankings as well as in the ACSI database for each year from 2000 to 2009 were identified. The 22 top SCM performer firms from nine industries that comprise the sample used for the test of *H1* are shown in Table I. Second, industry averages for each of the 22 top SCM performer firms were extracted from the published yearly ACSI industry average scores in the database. Third, using PASW Statistics 18, paired *t*-tests were performed for each of the ten years under examination to compare the top SCM performer firms' annual ACSI scores with their respective annual industry average ACSI scores.

Next, top SCM performer firms identified based on the opinion element of Gartner's supply chain top 25 firm rankings (the proxy measure for supply chain competency) and EVAM5YABT scores from the EVA Dimensions database (the proxy measure for shareholder value) were used in the six-step process employed to test *H2*. First, using the four annual opinion-based rankings (i.e. 2007-2010), 25 top SCM performer firms for each of the years that are also included in the EVA Dimensions database were identified. The data from Gartner's annual supply chain top 25 Rankings are based on experts' perceptions of firms' SCM competency for the previous year. Therefore, each of the four groups of top SCM performer firms used to test *H2* is compared with data from the previous year's EVA Dimensions database and, as shown in Table II, the 2010 top SCM performer firms are compared with 2009 EVA Dimensions data.

Second, EVAM5YABT industry average scores for each of the 25 top SCM performer firms identified were created for comparison purposes. Third, the mean and standard deviation of each year's EVAM5YABT industry average score was calculated. Because EVAM5YABT industry average scores were being computed for this research, rather than drawn from an existing source (like the ACSI industry averages used in the test of *H1*), particular care was taken to prevent the influence of outliers. Outliers, or extreme responses, are defined as "observations with a unique combination of characteristics identifiable as distinctly different from the other observations" (Hair *et al.*, 2006, p. 73). Problematic outliers can seriously distort statistical tests (Hair *et al.*, 2006). In this study, an outlier was identified as a company whose EVAM5YABT score exceeded three standard deviations from the mean of the EVAM5YABT industry average for a given annual period (see, Hair *et al.*, 2006, p. 75), which is not representative of the population and as a result prevents objective analysis of the data (Hair *et al.*, 2006).

Fourth, firms exceeding $+/-$ three standard deviations of the industry mean for a given year were classified as outliers and deleted from the industry average calculations. Fifth, step four was iteratively repeated until all firms used for the calculation of each year's EVAM5YABT industry average were within $+/-3$ standard deviations of that year's EVAM5YABT mean score. Sixth, paired *t*-tests were performed to compare the top SCM performer firms' EVAM5YABT scores with those of their respective industry averages for each of the four years under examination (i.e. 2007-2010 Gartner opinion data and 2006-2009 EVA Dimensions financial data). The 25 top SCM performer firms utilized for the tests of H2 are shown in Table II. As would be expected, many top SCM performer firms identified in the tests of *H2* are also among the firms used in the tests of *H1*.

Table I Top SCM performer firms ($n = 22$) identified Gartner Supply Chain Group (2007-2010) and ACSI (2000-2009) Databases

Top SCM performer firms	ACSI industry
Adidas (includes Reebok)	Athletic shoes
Anheuser-Busch	Breweries
Apple	Personal computers
Coca-Cola	Soft drinks
Colgate-Palmolive	Personal care and cleaning products
Costco Wholesale	Supermarkets
Dell	Personal computers
General Mills	Food manufacturing
Hewlett-Packard	Personal computers
Honda Motor	Automobiles and light vehicles
Kellogg	Food manufacturing
Kraft	Food manufacturing
Miller Brewing	Breweries
Nestle	Food manufacturing
Nike	Athletic shoes
PepsiCo	Soft drinks
Procter and Gamble	Personal care and cleaning products
Publix Super Markets	Supermarkets
Target	Department and discount stores
Toyota Motor	Automobiles and light vehicles
Unilever	Personal care and cleaning products
Wal-Mart	Department and discount stores

5. Study findings

H1 proposes that top SCM performer firms demonstrate higher levels of customer satisfaction than their respective industry averages. As shown in Table III, the tests for equality of paired means reveal that top SCM performer firms have higher mean ACSI scores than their respective industry averages for each of the ten years from 2000-2009. For six of the ten years, the mean ACSI scores for top SCM performer firms are significantly higher than the respective mean industry average ACSI scores ($p < 0.05$: 2001, 2002, 2004, 2005, 2006 and 2008). For three years, the mean ACSI score for the top SCM performer firms is marginally higher than the industry average ($p < 0.10$: 2000, 2003 and 2009). For the remaining year (2007), the mean ACSI score for the top SCM performer firms is higher than the respective mean industry average ACSI score but the difference is not statistically significant.

Although these findings may appear somewhat inconclusive, the probability (*p*-value) of obtaining the same positive result over ten consecutive years (under the null hypothesis of no difference) is 1/1024, or less than 0.001. Therefore, the results of these tests conducted over a ten-year

Table II Top SCM performer firms ($n = 22$) identified in Gartner Supply Chain Group and EVA Dimensions Databases

EVA 2006 (Gartner, 2007)		EVA 2007 (Gartner, 2008)		EVA 2008 (Gartner, 2009)		EVA 2009 (Gartner, 2010)	
Firm	**Industry**	**Firm**	**Industry**	**Firm**	**Industry**	**Firm**	**Industry**
Anheuser-Busch	Food and beverage	3M	Conglomerates and machinery	Apple	Computers and peripherals	Amazon.com	Internet and catalog retail
Apple	Computers and peripherals	Anheuser-Busch	Food and beverage	Best Buy	Specialty retail	Apple	Computers and peripherals
Best Buy	Specialty retail	Apple	Computers and peripherals	Cisco Systems	Communications equipment	Best Buy	Specialty retail
Boeing	Aerospace and defense	Best Buy	Specialty retail	Costco Wholesale	Communications equipment	Cisco Systems	Communications equipment
Caterpillar	Conglomerates and machinery	Boeing	Aerospace and defense	Dell	Computers and peripherals	Colgate-Palmolive	Household and personal products
Cisco Systems	Communications equipment	Caterpillar	Conglomerates and machinery	Hewlett-Packard	Computers and peripherals	Dell	Computers and peripherals
Costco Wholesale	Food and staples retailing	Cisco Systems	Communications equipment	Honda Motor	Auto and suppliers	Hewlett-Packard	Computers and peripherals
Dow Chemical	Chemicals	Dell	Computers and peripherals	IBM	IT services	IBM	IT services
Hewlett-Packard	Computers and peripherals	Hewlett-Packard	Computers and peripherals	Intel	Semiconductors and semiconductor equipment	Intel	Semiconductors and semiconductor equipment
IBM	IT services	Honda Motor	Auto and suppliers	Johnson and Johnson	Pharmaceuticals	Johnson and Johnson	Pharmaceuticals
Intel	Semiconductors and semiconductor equipment	IBM	IT services	Johnson Controls	Auto and suppliers	Kraft	Food and beverage
Johnson and Johnson	Pharmaceuticals	Johnson and Johnson	Pharmaceuticals	Nike	Textiles apparel and luxury goods	McDonald's	Restaurants
Johnson Controls	Auto and suppliers	Johnson Controls	Auto and suppliers	Nokia	Communications equipment	Microsoft	Software
Lowe's	Specialty retail	Lowe's	Specialty retail	PepsiCo	Food and beverage	Nike	Textiles apparel and luxury goods
Motorola	Communications equipment	Motorola	Communications equipment	Procter and Gamble	Household and personal products	Nokia	Communications equipment
Nike	Textiles apparel and luxury goods	Nike	Textiles apparel and luxury goods	Schlumberger	Energy equipment and services	PepsiCo	Food and beverage
Nokia	Communications equipment	Nokia	Communications equipment	SonyEricsson	Household durables	Procter and Gamble	Household and personal products
PepsiCo	Food and beverage	PepsiCo	Food and beverage	Target	Specialty retail	Schlumberger	Energy equipment and services
Procter and Gamble	Household and personal products	Procter and Gamble	Household and personal products	Tesco	Energy equipment and services	Tesco	Energy equipment and services
Target	Specialty retail	Target	Specialty retail	Texas Instruments	Semiconductors and semiconductor equipment	Texas Instruments	Semiconductors and semiconductor equipment
Tesco	Energy equipment and services	Tesco	Energy equipment and services	Coca-Cola	Food and beverage	Coca-Cola	Food and beverage
Coca-Cola	Food and beverage	Texas Instruments	Semiconductors and semiconductor equipment	Toyota Motor	Auto and suppliers	Toyota Motor	Auto and suppliers
Home Depot	Specialty retail	Coca-Cola	Food and beverage	Unilever	Food and beverage	Unilever	Food and beverage
Toyota Motor	Auto and suppliers	Toyota Motor	Auto and suppliers	Wal-Mart	Food and staples retailing	Wal-Mart	Food and staples retailing
Wal-Mart	Food and staples retailing	Wal-Mart	Food and staples retailing	Walt Disney	Media	Walt Disney	Media

Table III Paired *t*-test results on ACSI scores for top SCM performer firms versus industry averages

	Top SCM performer firm ACSI score		Industry average ACSI score		Difference				
	M	SD	M	SD	M	SD	*t*-value	*df*	*p*-value (two-tailed)
2000	80.41	3.63	79.40	4.36	1.01	2.46	1.93	21	0.068 *
2001	79.55	4.03	78.35	4.33	1.20	2.42	2.32	21	0.030 **
2002	79.68	3.94	78.55	4.24	1.13	2.43	2.18	21	0.041 **
2003	80.32	4.04	79.09	4.31	1.23	3.28	1.76	21	0.094 *
2004	80.55	3.98	78.83	3.92	1.72	3.39	2.37	21	0.027 **
2005	80.45	4.25	78.90	4.12	1.55	3.16	2.31	21	0.031 **
2006	81.57	4.41	79.99	3.77	1.58	3.08	2.40	21	0.026 **
2007	80.80	4.54	79.97	3.92	0.82	3.16	1.22	21	0.235
2008	81.93	4.74	80.25	4.03	1.69	3.37	2.35	21	0.029 **
2009	82.36	4.51	80.95	4.11	1.41	3.53	1.87	21	0.075 *

Notes: * $p > 0.10$; ** $p > 0.05$; $n = 22$

period indicate that a relationship potentially exists between SCM competency and customer satisfaction.

The study findings also provide support for *H2* that proposes top SCM performer firms create higher levels of shareholder value than their respective industry averages. As shown in Table IV, the tests for equality of paired means indicate that the top SCM performer firms have higher EVAM5YABT scores than their industry averages for each of the four years from 2006-2009. For three of the four years, the mean EVAM5YABT scores are significantly higher than the mean industry EVAM5YABT scores ($p < 0.01$: 2006 and $p < 0.05$: 2008 and 2009). For the remaining year (2007), the mean EVAM5YABT scores for the top SCM performer firms is higher than the industry average, but not significantly so. Collectively, the results of the tests of *H1* and *H2* indicate the potential existence of relationships between SCM and the two dependent variables by supporting our predictions that firms recognized by industry experts and peers for SCM competency demonstrate higher levels of customer satisfaction and shareholder value than their respective industry averages. However, further research is required to prove the existence of causality between these variables.

6. Discussion and implications

Strategic SCM researchers' attention is increasingly focused on evaluating supply chain management phenomena as evidence becomes more prevalent that leveraging SCM competency favorably influences the performance of "industrial networks" (Gadde *et al.*, 2003). SCM affects every area of the business within a typical firm with supply chain-related expenditures consuming up to 75 per cent of revenue (Trent, 2004) and directly affects the differentiation and cost of a firm's products and services (Johnson and Templar, 2011). The influence of SCM competency on firm performance is reflected in firms' income statements and balance sheets since the key drivers of firm financial performance are profoundly affected by how supply chains are managed (Camerinelli, 2009; Timme and Williams-Timme, 2000). Our study findings reveal that firms most closely adhering to industry expert and peer interpretations of Gartner's DDSNI exhibit higher levels of customer satisfaction and shareholder value than their respective industry averages over the years under examination. Thus, consistent with Johnson and Templar's (2011) empirical study, our results suggest that SCM competency may be a strong enabler of firm performance.

Applying the concept of SCO as a theoretical foundation for this study responds to contentions that strategic SCM research needs more theory (Chen and Paulraj, 2004; Ketchen and Hult, 2007; Stock *et al.*, 2010). The study findings offer empirical support and validation for previous conceptual research that proposes SCM is a distinctive competency that can create disproportionate corporate value (Day, 1994; Olavarrieta and Ellinger, 1997; Rungtusanatham *et al.*, 2003; Srivastava *et al.*, 1999), and answers Min *et al.*'s

Table IV Paired *t*-test results on EVA before-tax momentum five-year metric scores for top SCM performer firms versus industry averages

	Top SCM performer firm EVA		Industry average EVA		Difference				
Year	M	SD	M	SD	M	SD	*t*-value	*df*	*p*-value (two-tailed)
2006	0.024	0.029	0.007	0.016	0.017	0.031	2.82	24	0.009 **
2007	0.028	0.037	0.017	0.022	0.011	0.033	1.65	24	0.113
2008	0.024	0.046	0.001	0.006	0.023	0.047	2.43	24	0.023 *
2009	0.018	0.056	−0.008	0.025	0.026	0.056	2.32	24	0.029 *

Notes: * $p > 0.05$; ** $p > 0.01$; $n = 25$

(2007) call for research that examines the longitudinal influence of SCM competency on firm performance. The study findings also add credence to Defee *et al.*'s (2009) proposal that supply chain oriented firms should behave differently to firms that do not place as much strategic emphasis on SCM.

The utilization of expert and peer opinion data as proxy measures for SCM competency responds to contentions that ordered processes for collecting professional assessments of firms' SCM competency are needed to better understand the relationship between SCM competency and firm performance (Olavarrieta and Ellinger, 1997). As far as can be determined, our study is one of the first to employ secondary Delphi-style assessments of SCM competency. Such analyses are rare due to the inherent complexity of evaluating SCM competency. With this in mind, a rigorous protocol was followed for the compilation of the EVA Momentum industry averages and great care was taken to ensure the "noise" inherent in the real-world secondary data under examination did not unduly impair the testing of the study hypotheses. Testing the efficacy of the ACSI score and the EVA Momentum financial metric as appropriate measures for differentiating firms on SCM competency also responds to claims that researchers should expand efforts to identify and assess metrics that would be most useful for explicating the effects of SCM.

In addition to the relationships suggested by the study findings, deploying three independent secondary data sources represents a further contribution to the extant strategic SCM literature. There is growing consensus among SCM researchers that developing a more holistic understanding of SCM requires the use of different methodological approaches (see, Carter *et al.*, 2008; Frankel *et al.*, 2005, 2008; Mentzer *et al.*, 2001). However, the majority of empirical SCM studies survey-based primary data collections (Frankel *et al.*, 2005; Keller *et al.*, 2002). Thus, Calantone and Vickery (2010) suggest that many topics in the area could benefit from the application of secondary data including examinations of the effect of SCM initiatives on competitive performance. The blending of qualitative expert opinion, formal customer satisfaction and quantitative financial performance secondary data in our study represents a relatively novel and informative approach for assessing the influence of SCM competency on firm performance.

6.1 Limitations and future research

Despite the many benefits associated with the use of objective secondary data, a well-recognized limitation associated with the use of secondary data is that the researcher is constrained by the availability of data. An obvious limitation of this research study is that the number of top SCM performer firms utilized in the testing of the study hypotheses is relatively small. We recognize that testing more exemplar firms against their respective industry averages would have been preferable and suggest that doing so may have yielded more robust findings. In addition, the firms under examination comprise only large US-based companies in a relatively limited number of industries. We must therefore acknowledge that sampling characteristics associated with the use of secondary data sources limit the generalizability of the study findings. Another limitation of our research study is that the analyses do not consider specific moderating influences. Although correlations between the variables tested are relatively high, the possibility still exists that multiple factors not tested in our analyses may influence the proposed relationships. Further evidence is therefore required to prove the existence of causality between the variables examined in this study. Identifying moderating variables provides scope for wider future testing of additional hypotheses that relate to the core issue of the relationship between SCM and overall firm performance.

Despite these limitations, we believe that the assessment of relatively small groups of matched pairs of top SCM performer firms and their respective industry averages is appropriate for examining the efficacy of the ACSI score and EVA Momentum as metrics that differentiate firms on SCM competency. Moreover, our study findings are further validated because the hypothesis tests are consistent with each other, and with other studies that examine relationships between SCM competency and firm performance (e.g. Johnson and Templar, 2011).

Our successful incorporation of expert opinion data suggests that future research should identify other relevant secondary Delphi-based data related to SCM phenomena to further evaluate the usefulness of expert opinion data in SCM contexts. Reyes and Giachetti's (2010) recent use of experts to develop a supply chain maturity model is an example of such research. Alternatively, given the prevalence of third-party and self-service online survey web sites, primary data on hot topics (for example, collaboration, sustainable operational practices, risk management and the use of self-service technologies) could be collected by implementing polling processes similar to Gartner. Other related avenues for exploration include testing the relationship between SCM competency and firm performance with regional or industry samples to determine if the linkages found in this study are consistent in other contexts. Such future endeavors will be facilitated because Gartner already publishes several SCM Top 25 rankings for industries such as retail and healthcare and will shortly produce the first SCM Top 25 rankings for Asia and Europe.

6.2 Conclusion

This research study addresses the lack of metrics for quantifying the effects of SCM by evaluating two important firm performance metrics that may effectively differentiate top SCM performers from their industry competitors. The identification of potential relationships between SCM competency and customer satisfaction and shareholder value advances current understanding of the connection between SCM competency and firm performance and may help senior managers and managers from other functional areas to better appreciate the strategic, operational and financial advantages of developing SCM competency. The potential relationships identified in this study may also help supply chain management professionals to better convey the impact of SCM competency to non-supply chain managers whose support and cooperation are critical to the success of operational improvement initiatives. We hope the additional insight gained from this research study helps firms to more effectively direct scarce resources towards more effective management of the supply chain processes that consume the majority of firm revenue.

References

Adler, M. and Ziglio, E. (1996), *Gazing into the Oracle: the Delphi Method and Its Application to Social Policy and Public Health*, Jessica Kingsley Publishers, Bristol, PA.

Anderson, E.W. and Fornell, C. (2000), "Foundations of the American customer satisfaction index", *Journal of Total Quality Management*, Vol. 11 No. 7, pp. 869-82.

Anderson, E.W. and Sullivan, M.W. (1993), "The antecedents and consequences of customer satisfaction for firms", *Marketing Science*, Vol. 12 No. 2, pp. 125-43.

Anderson, E.W., Fornell, C. and Lehmann, D.R. (1994), "Customer satisfaction, market share, and profitability: findings from Sweden", *Journal of Marketing*, Vol. 58 No. 3, pp. 53-66.

Anderson, E.W., Fornell, C. and Mazvancheryl, S.K. (2004), "Customer satisfaction and shareholder values", *Journal of Marketing*, Vol. 68 No. 4, pp. 172-85.

Anderson, E.W., Fornell, C. and Rust, R.T. (1997), "Customer satisfaction, productivity, and profitability: differences between goods and services", *Marketing Science*, Vol. 16 No. 2, pp. 129-45.

Anderson, J.C., Rungtusanatham, M. and Schroeder, R.G. (1994), "A theory of quality management underlying the Deming management method", *Academy of Management Review*, Vol. 19 No. 3, pp. 472-509.

Aronsson, H., Abrahamsson, M. and Spens, K. (2011), "Developing lean and agile health care supply chains", *Supply Chain Management: An International Journal*, Vol. 16 No. 3, pp. 176-83.

Biddle, G.C., Bowen, R.M. and Wallace, J.S. (1999), "Evidence on EVA", *Journal of Applied Corporate Finance*, Vol. 12 No. 2, pp. 69-80.

Bowersox, D.J., Closs, D.J. and Stank, T.P. (2000), "Ten mega-trends that will revolutionize supply chain logistics", *Journal of Business Logistics*, Vol. 21 No. 2, pp. 1-16.

Brewer, P.C., Chandra, G. and Hock, C.A. (1999), "Economic value added (EVA): its uses and limitations", *SAM Advanced Management Journal*, Vol. 64 No. 2, pp. 4-8.

Calantone, R. and Vickery, S.K. (2010), "Introduction to the special topic forum: Using archival and secondary data sources in supply chain management research", *Journal of Supply Chain Management*, Vol. 46 No. 4, pp. 3-11.

Camerinelli, E. (2009), *Measuring the Value of the Supply Chain: Linking Financial Decisions with Supply Chain Performance*, Gower Publishing, Burlington, VT.

Carter, C.R., Sanders, N.R. and Dong, Y. (2008), "Paradigms, revolutions, and tipping points: the need for using multiple methodologies within the field of supply chain management", *Journal of Operations Management*, Vol. 26 No. 6, pp. 693-6.

Chen, H., Daugherty, P.J. and Landry, T.D. (2009), "Supply chain process integration: a theoretical framework", *Journal of Business Logistics*, Vol. 30 No. 2, pp. 27-46.

Chen, I.J. and Paulraj, A. (2004), "Towards a theory of supply chain management: the constructs and measurements", *Journal of Operations Management*, Vol. 22 No. 2, pp. 119-50.

Chen, I.J., Paulraj, A. and Lado, A.A. (2004), "Strategic purchasing, supply management, and firm performance", *Journal of Operations Management*, Vol. 22 No. 5, pp. 505-23.

Chen, H., Frank, M.Z. and Wu, O.Q. (2005), "What actually happened to the inventories of American companies between 1981 and 2000?", *Management Science*, Vol. 51 No. 7, pp. 1015-31.

Christopher, M. (2011), *Logistics and Supply Chain Management*, 4th ed, Financial Times Series, Prentice Hall, London.

Christopher, M. and Ryals, L. (1999), "Supply chain strategy: its impact on shareholder value", *International Journal of Logistics Management*, Vol. 10 No. 1, pp. 1-10.

Colvin, G. (2010), "A new financial checkup", *Fortune*, 11 January, available at: http://money.cnn.com/2010/01/08/news/economy/eva_momentum.fortune/index.htm (accessed 21 July 2011).

Cook, L.S., Heiser, D.R. and Sengupta, K. (2011), "The moderating effect of supply chain role on the relationship between supply chain practices and performance: an empirical analysis", *International Journal of Physical Distribution & Logistics Management*, Vol. 41 No. 2, pp. 104-34.

Croxton, K.L., Garcia-Dastugue, S.J., Lambert, D.M. and Rogers, D.S. (2001), "The supply chain management process", *International Journal of Logistics Management*, Vol. 12 No. 2, pp. 13-36.

Daugherty, P.J., Stank, T.P. and Ellinger, A.E. (1998), "Leveraging logistics/distribution capabilities: the impact of logistics service on market share", *Journal of Business Logistics*, Vol. 19 No. 2, pp. 35-51.

Day, G.S. (1994), "The capabilities of market-driven organizations", *Journal of Marketing*, Vol. 58 No. 4, pp. 37-52.

Defee, C.C., Esper, T. and Mollenkopf, D. (2009), "Leveraging closed-loop orientation and leadership for environmental sustainability", *Supply Chain Management: An International Journal*, Vol. 14 No. 2, pp. 87-98.

Ehrbar, A. (2009), "The first ever profitability performance ranking", available at: www.evadimensions.com (accessed 21 July 2011).

Ellinger, A.E., Natarajarathinam, M., Adams, F.G., Gray, B., Hofman, D. and O'Marah, K. (2011), "Supply chain management competency and firm financial success", *Journal of Business Logistics*, Vol. 32 No. 3, pp. 214-26.

Esper, T.L., Defee, C.C. and Mentzer, J.T. (2010b), "A framework of supply chain orientation", *International Journal of Logistics Management*, Vol. 21 No. 2, pp. 161-79.

Esper, T.L., Ellinger, A.E., Stank, T.P., Flint, D.J. and Moon, M. (2010a), "Demand and supply chain integration: a conceptual framework of value creation through knowledge management", *Journal of the Academy of Marketing Science*, Vol. 38 No. 1, pp. 5-18.

Farris, M.T. II and Hutchison, P.D. (2002), "Cash-to-cash: the new supply chain management metric", *International Journal of Physical Distribution & Logistics Management*, Vol. 32 No. 4, pp. 288-98.

Farris, M.T. II and Hutchison, P.D. (2003), "Measuring cash-to-cash performance", *International Journal of Logistics Management*, Vol. 14 No. 2, pp. 83-91.

Fawcett, S.E., Magnan, G.M. and McCarter, M.W. (2008), "Benefits, barriers, and bridges to effective supply chain management", *Supply Chain Management: An International Journal*, Vol. 13 No. 1, pp. 35-48.

Fornell, C. (1992), "A national customer satisfaction barometer: the Swedish experience", *Journal of Marketing*, Vol. 56 No. 1, pp. 6-21.

Fornell, C. (1995), "The quality of economic output: empirical generalizations about its distribution and relationship to market share", *Marketing Science*, Vol. 14 No. 3, pp. 203-11.

Fornell, C. (2001), "The score of satisfaction", *Harvard Business Review*, Vol. 79 No. 3, pp. 120-1.

Fornell, C., Rust, R.T. and Dekimpe, M.G. (2010), "The effect of customer satisfaction on consumer spending growth", *Journal of Marketing Research*, Vol. 47 No. 1, pp. 28-35.

Fornell, C., Mithas, S., Morgenson, F.V. III and Krishnan, M.S. (2006), "Customer satisfaction and stock prices: high returns, low risk", *Journal of Marketing*, Vol. 70 No. 1, pp. 3-14.

Fornell, C., Johnson, M.D., Anderson, E.W., Cha, J. and Bryant, B.E. (1996), "The American customer satisfaction index: nature, purpose and findings", *Journal of Marketing*, Vol. 60 No. 4, pp. 7-18.

Frankel, R., Naslund, D. and Bolumole, Y. (2005), "The white space of logistics research: a look at the role of methods usage", *Journal of Business Logistics*, Vol. 26 No. 2, pp. 185-210.

Frankel, R., Bolumole, Y.A., Eltantawy, R.A., Paulraj, A. and Gundlach, G.T. (2008), "The domain and scope of SCM's foundational disciplines – insights and issues to advance research", *Journal of Business Logistics*, Vol. 29 No. 1, pp. 1-30.

Friscia, T., O'Marah, K., Hofman, D. and Souza, D. (2009a), "AMR Research supply chain top 25", available at: www.amrresearch.com/supplychaintop25 (accessed 21 November 2009).

Friscia, T., O'Marah, K., Hofman, D. and Souza, D. (2009b), "AMR Research supply chain top 25 methodology", available at: www.amrresearch.com/content/view.aspx?compURI=tcm:7-43469&title=The+AMR+Research+Supply+Chain+Top+25+for+2009 (accessed 21 November 2009).

Fugate, B., Sahin, F. and Mentzer, J.T. (2006), "Supply chain management coordination mechanisms", *Journal of Business Logistics*, Vol. 27 No. 2, pp. 129-61.

Fullerton, R.R., McWatters, C.S. and Fawson, C. (2003), "An examination of the relationships between JIT and financial performance", *Journal of Operations Management*, Vol. 21 No. 4, pp. 383-404.

Gadde, L.-E., Huemer, L. and Håkansson, H. (2003), "Strategizing in industrial networks", *Industrial Marketing Management*, Vol. 32 No. 5, pp. 357-64.

Green, K.W. Jr, McGaughey, R. and Casey, K.M. (2006), "Does supply chain management strategy mediate the association between market orientation and organizational performance?", *Supply Chain Management: An International Journal*, Vol. 11 No. 5, pp. 407-14.

Green, K.W. Jr, Whitten, D. and Inman, R.A. (2008), "The impact of logistics performance on organizational performance in a supply chain context", *Supply Chain Management: An International Journal*, Vol. 13 No. 4, pp. 317-27.

Gruca, T.S. and Rego, L.L. (2005), "Customer satisfaction, cash flow and shareholder value", *Journal of Marketing*, Vol. 69 No. 3, pp. 115-30.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2006), *Multivariate Data Analysis*, 6th ed., Prentice Hall, Upper Saddle River, NJ.

Halley, A. and Beaulieu, M. (2009), "Mastery of operational competencies in the context of supply chain management", *Supply Chain Management: An International Journal*, Vol. 14 No. 1, pp. 49-63.

Hammer, M. (2004), "Deep change: how operational innovation can transform your company", *Harvard Business Review*, Vol. 82 No. 4, pp. 84-93.

Hansen, D.R. and Mowen, M.M. (1997), *Cost Management*, 2nd ed., South-Western College Publications, Cincinnati, OH.

Helmer, O. and Rescher, N. (1959), "On the epistemology of the inexact sciences", *Management Science*, Vol. 6 No. 1, pp. 25-52.

Hendricks, K.B. and Singhal, V.R. (2003), "The effect of supply chain glitches on shareholder wealth", *Journal of Operations Management*, Vol. 2 No. 5, pp. 501-22.

Hendricks, K.B. and Singhal, V.R. (2005a), "An empirical analysis of the effect of supply chain disruptions on long-run stock price and performance and equity risk of the firm", *Production and Operations Management*, Vol. 14 No. 1, pp. 35-52.

Hendricks, K.B. and Singhal, V.R. (2005b), "Association between supply chain glitches and operating performance", *Management Science*, Vol. 51 No. 5, pp. 695-711.

Hendricks, K.B., Singhal, V.R. and Stratman, J.K. (2007), "The impact of enterprise systems on corporate performance: a study of ERP, SCM and CRM system implementations", *Journal of Operations Management*, Vol. 25 No. 1, pp. 65-82.

Horngren, C.T., Foster, G., Datar, S.M., Rajan, M. and Ittner, C. (1997), *Cost Accounting a Managerial Emphasis*, 9th ed., Prentice Hall International Editions, Englewood Cliffs, NJ.

Hult, G.T.M., Ketchen, D.J. Jr and Nichols, E.L. Jr (2002), "examination of cultural competitiveness and order fulfillment cycle time within supply chains", *The Academy of Management Journal*, Vol. 45 No. 3, pp. 577-86.

Innis, D.E. and La Londe, B.J. (1994), "Customer service: the key to customer satisfaction, loyalty and market share", *Journal of Business Logistics*, Vol. 15 No. 1, pp. 1-27.

Ittner, C.D. and Larcker, D.F. (1996), "Measuring the impact of quality initiatives on firm financial performance", in Ghosh, S. and Fedor, D. (Eds), *Advances in the Management of Organizational Quality*, Vol. 1, JAI Press, Greenwich, CT, pp. 1-37.

Johnson, M. and Templar, S. (2011), "The relationships between supply chain and firm performance: The development and testing of a unified proxy", *International Journal of Physical Distribution & Logistics Management*, Vol. 41 No. 2, pp. 88-103.

Jüttner, U., Christopher, M. and Godsell, J. (2010), "A strategic framework for integrating marketing and supply chain strategies", *International Journal of Logistics Management*, Vol. 21 No. 1, pp. 104-26.

Keller, S.B., Savitskie, K., Stank, T.P., Lynch, D. and Ellinger, A.E. (2002), "A summary and analysis of multi-item scales used in logistics research", *Journal of Business Logistics*, Vol. 23 No. 2, pp. 83-119.

Ketchen, D.J. Jr and Hult, G.T.M. (2007), "Bridging organizational theory and supply chain management: the case of best value supply chains", *Journal of Operations Management*, Vol. 25 No. 2, pp. 573-80.

Ketchen, D.J. Jr, Rebarick, W., Hult, G.T.M. and Meyer, D. (2008), "Best value supply chains: a key competitive weapon for the 21st century", *Business Horizons*, Vol. 51 No. 3, pp. 235-43.

Kim, S.W. (2006), "Effects of supply chain management practices, integration and competition capability on performance", *Supply Chain Management: An International Journal*, Vol. 11 No. 3, pp. 241-8.

Lambert, D.M. and Burduroglu, R. (2000), "Measuring and selling the value of logistics", *International Journal of Logistics Management*, Vol. 11 No. 1, pp. 1-17.

Lambert, D.M. and Cooper, M.C. (2000), "Issues in supply chain management", *Industrial Marketing Management*, Vol. 29 No. 1, pp. 65-83.

Lambert, D.M. and Pohlen, T.L. (2001), "Supply chain metrics", *International Journal of Logistics Management*, Vol. 12 No. 1, pp. 1-19.

Lee, H.L. (2004), "The triple a supply chain", *Harvard Business Review*, Vol. 82 No. 10, pp. 102-12.

Melnyk, S.A., Stewart, D.M. and Swink, M. (2004), "Metrics and performance measurement in operations management: dealing with the metrics maze", *Journal of Operations Management*, Vol. 22 No. 4, pp. 209-18.

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*, Vol. 22 No. 2, pp. 1-25.

Michigan State University Global Logistics Research Team (1995), *World Class Logistics: The Challenge of Managing Continuous Change*, The Council of Logistics Management, Oak Brook, IL.

Min, S., Mentzer, J.T. and Ladd, R.T. (2007), "A market orientation in supply chain management", *Journal of the Academy of Marketing Science*, Vol. 35 No. 4, pp. 507-22.

Moberg, C.R., Vitasek, K., Stank, T.P. and Pienaar, A. (2008), "Time to remodel", *CSCMP's Supply Chain Quarterly*, Vol. 2 No. 3, pp. 36-48.

Mollenkopf, D., Russo, I. and Frankel, R. (2007), "The returns management process in supply chain strategy", *International Journal of Physical Distribution & Logistics Management*, Vol. 37 No. 7, pp. 568-92.

Narayanan, V.G. and Raman, A. (2004), "Aligning incentives in supply chains", *Harvard Business Review*, Vol. 82 No. 11, pp. 94-102.

Olavarrieta, S. and Ellinger, A.E. (1997), "Resource-based theory and strategic logistics research", *International Journal of Physical Distribution & Logistics Management*, Vol. 27 Nos 9/10, pp. 559-87.

Oliva, T.A., Oliver, R.L. and MacMillan, I.C. (1992), "A catastrophe model for developing service satisfaction strategies", *Journal of Marketing*, Vol. 56 No. 3, pp. 83-95.

Olsen, L.L. and Johnson, M.D. (2003), "Service equity, satisfaction, and loyalty: from transaction specific to cumulative evaluations", *Journal of Service Research*, Vol. 5 No. 3, pp. 184-95.

O'Marah, K. and Hofman, D. (2010), "The AMR supply chain top 25 for 2010", available at: www.gartner.com/resources/201200/201212/the_amr_supply_chain_top_25_201212.pdf (accessed 21 July 2011).

Porter, M.E. (1985), *Competitive Advantage*, Free Press, New York, NY.

Prahalad, C.K. and Hamel, G. (1990), "The core competence of the corporation", *Harvard Business Review*, Vol. 68 No. 5, pp. 79-91.

Reichheld, F.F. and Sasser, W.E. (1990), "Zero defections: quality comes to customer service", *Harvard Business Review*, Vol. 68 No. 5, pp. 105-11.

Reichheld, F.F. and Teal, T. (2001), *The Loyalty Effect: The Hidden Force behind Growth, Profits and Lasting Value*, Harvard Business Press, Boston, MA.

Reyes, H.G. and Giachetti, R. (2010), "Using experts to develop a supply chain maturity model in Mexico", *Supply Chain Management: An International Journal*, Vol. 15 No. 6, pp. 415-24.

Rungtusanatham, M., Salvador, F., Forza, C. and Choi, T.Y. (2003), "Supply-chain linkages and operational performance: a resource-based-view perspective", *International Journal of Operations & Production Management*, Vol. 23 No. 9, pp. 1084-99.

Sezen, B. (2008), "Relative effects of design, integration and information sharing on supply chain performance", *Supply Chain Management: An International Journal*, Vol. 13 No. 3, pp. 233-40.

Shapiro, B.P., Rangan, V.K. and Sviokla, J.J. (1992), "Staple yourself to an order", *Harvard Business Review*, Vol. 70 No. 4, pp. 113-22.

Slone, R.E., Mentzer, J.T. and Dittman, J.P. (2007), "Are you the weakest link in your company's supply chain?", *Harvard Business Review*, Vol. 85 No. 9, pp. 116-27.

Spekman, R.E., Spear, J. and Kamauff, J. (2002), "Supply chain competency: learning as a key component", *Supply Chain Management: An International Journal*, Vol. 7 No. 1, pp. 41-55.

Srivastava, R.K., Shervani, T.A. and Fahey, L. (1999), "Marketing, business processes, and shareholder value: an organizationally embedded view of marketing activities and the discipline of marketing", *Journal of Marketing*, Vol. 63, special issue, pp. 168-79.

Stank, T.P., Davis, B.R. and Fugate, B.S. (2005), "A strategic framework for supply chain oriented logistics", *Journal of Business Logistics*, Vol. 26 No. 2, pp. 27-45.

Stank, T.P., Goldsby, T.J., Vickery, S.K. and Savitskie, K. (2003), "Logistics service performance; estimating its influence on market share", *Journal of Business Logistics*, Vol. 24 No. 1, pp. 27-55.

Stewart, B. (2009), "EVA momentum: the one ratio that tells the whole story", *Journal of Applied Corporate Finance*, Vol. 21 No. 2, pp. 74-86.

Stewart, G.B. III (1994), "EVATM: fact and fantasy", *Journal of Applied Corporate Finance*, Vol. 7 No. 2, pp. 71-84.

Stock, J.R., Boyer, S.L. and Harmon, T. (2010), "Research opportunities in supply chain management", *Journal of the Academy of Marketing Science*, Vol. 38 No. 1, pp. 32-41.

Surowiecki, J. (2004), *The Wisdom of Crowds: Why the Many Are Smarter than the Few and How Collective Wisdom Shapes Business, Economics, Societies and Nations*, Little Brown, London.

Timme, S.G. and Williams-Timme, C. (2000), "The financial-SCM connection", *Supply Chain Management Review*, Vol. 7 No. 4, pp. 30-7.

Tracey, M., Lim, J.-S. and Vonderembse, M.A. (2005), "The impact of supply-chain management capabilities on business performance", *Supply Chain Management: An International Journal*, Vol. 10 No. 3, pp. 179-91.

Trent, R.J. (2004), "What everyone needs to know about SCM", *Supply Chain Management Review*, Vol. 8 No. 2, pp. 52-9.

Tully, S. (1993), "The real key to creating wealth", *Fortune Education Collection*, Vol. 128 No. 6, pp. 38-50.

van Hoek, R.I. (1998), "'Measuring the unmeasurable' – measuring and improving performance in the supply chain", *Supply Chain Management: An International Journal*, Vol. 3 No. 4, pp. 187-92.

Young, S.D. and O'Byrne, S.F. (2001), *EVA and Value Based Management: A Practical Guide to Implementation*, McGraw-Hill, New York, NY.

Appendix 1

Table AI Gartner supply chain group demand driven supply network ideal criteria

Supply	
Supply chain execution	Community alignment of processes for new product rollout, promotions, etc
	Multiple options for inventory allocation, deployment
	Dedicated service provider personnel
	Explicit value proposition for each member of community to follow business model
	Real time or near real time multi-tier visibility to status, activity, and performance
	Rules-based processes to respond to plan deviations
Supply management	Identification of opportunities and capabilities to create value, improve agility, and mitigate risk
	Shared service organization with a network focus that senses and responds
	Indirect material focus of cycle time, and waste reduction and overhead cost reductions
	Direct materials supplier and buyer collaboration development, tie of supplier scorecards to events, execution of risk strategies
	Supplier settlement tied to supply chain financial management strategies
Manufacturing	Short and predictable cycle times exploited by changes to supply network
	Active demand-shaping to level load on manufacturing lines/sites
	Supply (manufacturing constraints/opportunities) sensing for closed-loop schedule optimization
	Manufacturing demand-driven metrics, such as schedule adherence and profit velocity
	Design for manufacturing-NPDI exploits common manufacturing processes and platforms
Information	
Sales and operations planning (S&OP)	Shared ownership and metrics
	Scenario analysis
	Balance risk and complexity
	Outwardly focused, 3-36 month view
	Evolved into the integrated business planning forum
Application tech and infrastructure	Collaborative commerce used to coordinate multiple tiers of supply network
	Ability to compose unique business processes over standard software for competitive advantage
Performance management	Metrics are outside in and reflect cross-value-chain activities
	Network of metric portfolios are coordinated across the different parts of the business
	Measurement program is active; governance is at senior levels
	Dashboard and tools enable near-constant monitoring and active management of supply chain health
	Scenario modeling tools are used
Demand	
Service management	Service technicians actively involved in the product development
	Service parts optimization based on system/product availability or uptime requirements
	Real-time dashboard updating with feedback to design
	Ability to price and create SLAs by time to fix and investment of assets, parts inventory, and network design
	Integration and visibility to partners
Demand sensing	Demand is units and margin dollars
	Demand insight multimodal: market and POS-driven insights
	Specialist career track with premium placed on analytical acumen
	Demand forecast is a range, not a number
	Demand signal repository captures, cleanses, harmonizes, and segments multiple streams of demand insight
	Forecast is attribute based, identifying causal factors
Demand shaping	Measure market share gain as well as cash flow and working capital impact
	Measure promotion effectiveness at point of consumption
	Cross-functional incentives for product line profitability and relative market share
	Market-basket analysis to identify tactical cross-selling opportunities
	Causal factors drive optimization
	Technical support for rapid simulation of alternate price/profit scenarios
Product	
Lifecycle management	Products or brands introduced intentionally as platforms to deliver extended features and services
Launch	Simulation of process and supply chain to optimize design for supply tradeoffs
	Post-launch evaluation for continuous improvement
	Sales and operations planning embedded in NPDI
Innovation	Open innovation combining customer, partner, and internal insights to identify innovations that address true market needs
	Innovation success measured for continuous improvement

Source: gartner.com/supplychaintop25

Appendix 2

Table AII Measurement variables used in the ACSI model

	Latent variable	Measurement variable
Drivers of satisfaction	Customer expectations	Overall expectation of quality (prepurchase)
		Expectation regarding customization, or how well the product fits the customer's personal requirements (prepurchase)
		Expectation regarding reliability, or how often things would go wrong (prepurchase)
	Perceived quality	Overall evaluation of quality experience (postpurchase)
		Evaluation of customization experience, or how well the product fit the customer's personal requirements (postpurchase)
		Evaluation of reliability experience, or how often things have gone wrong (postpurchase)
	Perceived value	Rating of quality given price
		Rating of price given quality
Customer satisfaction	*ACSI score*	*Overall satisfaction*
		Expectancy disconfirmation (performance that falls short of or exceeds expectations)
		Performance versus the customer's ideal product or service in the category
Outcomes of satisfaction	Customer complaints	Has the customer complained either formally or informally about product or service?
	Customer loyalty	Repurchase likelihood rating
		Price tolerance (increase) given repurchase
		Price tolerance (decrease) to induce repurchase

Source: www.theacsi.org/index.php?option=com_content&view=article&id=48&Itemid=122

Corresponding author

Alexander Ellinger can be contacted at: aellinge@cba.ua.edu