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The State of Logistics Performance Measurement: A Comparison of Literature and Practice

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The State of Logistics Performance Measurement: A Comparison of Literature and Practice

An Honors Thesis submitted in partial fulfillment of the requirements for Honors in Logistics & Supply Chain Management.

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ABSTRACT

In the increasingly global and complex environment in which modern business operate, business leaders are being forced to squeeze competitive advantage from every facet of their operations. Research in the field of logistics performance measurement establishes the link between success in performance measurement and improved organizational performance. Through the lens of management fashion theory, this research effort assesses to what extent logistics academic discourse addresses the performance measurement requirements and practices of industry practitioners. This research effort represents the first such application of the management fashion theory within the logistics field. Consistencies between logistics performance measurement emphases within the investigated body of literature and those practices represented by the annual metrics study conducted by the Warehousing Education and Research Council (WERC) reveal that logistics scholars are playing a fashion setting role and, in some instances, are leading industry performance measurement practices. Aligning with the principles of the management fashion theory, the results of this study suggest that academic institutions are succeeding as fashion setters not only through the education of future leaders but by developing the logistics performance measures that industry needs.

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INTRODUCTION

Measurement is the first step that leads to control and eventually improvement. If you cannot measure something, you can't understand it. If you can't understand it, you cannot control it. If you cannot control it, you cannot improve it," –H. James Harrington

Performance measures play an important role in the management of any organization (Griffis, Goldsby, Cooper, and Closs, 2007) and are of particular value to logistics managers. Performance measurement is seen as an avenue for logistics mangers to achieve sustainable competitive advantage (Gunasekaran and Kobu, 2007) by providing timely, reliable indications of both performance successes and shortcomings (Griffis, Cooper, Goldsby, and Closs, 2004). Research in the area of logistics performance measurement supports this vital role of performance measures, and, furthermore, has concluded that success in the performance of logistics activities and capabilities is linked to improved organizational performance (Fugate, Mentzer, and Stank, 2010). The Global Logistics Research Team at MSU went so far as to name performance measurement as one of four key competencies in an enterprise's achievement of world class performance (Gunasekaran et. al., 2007). Thus, as logisticians are faced with managing increasingly complex and competitive operations, they must continually evaluate exiting metrics or even create a completely new set (Dittman, 2010).

The purpose of this research effort is to assess what, if any, role logistics scholars are playing in this necessary evolution and creation of logistics performance metrics. To guide this assessment, this research utilizes Abrahamson's (1991) management fashion theory. While efforts to extend the management fashion theory beyond the management

field have been made by Baskerville and Myers (2009) it has yet to be adopted within the field of logistics.

In the sections that follow, management fashion theory is introduced, the methodology is described, and results are presented along with a discussion of their implications for managers and scholars.

Management Fashion Theory

Research in the field of management as well as in others such as information systems (Baskerville and Myers, 2009) can be described as fashions (Abrahamson 1991, Abrahamson and Fairchild, 1999). The management fashion theory purports that in settings of uncertainty organizations adopt or mimic innovations practiced by certain trend-setting parties within a respective industry (Abrahamson, 1996). Management fashion setting is defined as, "The process by which management fashion setters continuously redefine both theirs and fashion followers' collective beliefs about which management techniques lead rational management progress," (Abrahamson, 1996, p.257). Management fashions are described as consisting of two distinct but related life cycles: the discourse life cycle and diffusion life cycle (Abrahamson et. al., 1999; Baskersville et. al., 2009). The discourse life cycle consists of what is published in articles, delivered in speeches, company documents, and vendor literature. The diffusion life cycle speaks to the actual application of the managerial fashion in industry (1999). Practicality and merit of the respective fashion determines the amount of chatter (discourse) it creates as well as the rate and level at which the fashion diffuses into organizational practice.

The role of management fashion setting is one, in large part, held by academic communities through the publication of literature and the education of current and future business leaders. Abrahamson emphasizes that business schools and academic communities are meant to be among the frontrunners in the management fashion setting race, and those who do not set fashions successfully run the risk of being characterized as non-essential and out-of-touch with actual practice in their respective fields (1996).

This study analyzes to what extent research in the field of logistics performance measurement is influencing industry practices by first examining the scholarly discourse related to logistics performance measures. These findings are then compared to ten years of industry reported performance metrics to assess their diffusion and application within industry.

METHODOLOGY

To assess the discourse related to logistics metrics, this study considers logistics performance literature published within the past fifteen years (1999-2014) in the leading logistics focused journals identified by Peterson and Autry (2014). The literature review method used in this study was systematic and adhered to guidelines set forth by Newbert (2007). The steps of the search process are highlighted below.

1. Search for articles published in the following journals: *Journal of Business Logistics, International Journal of Physical Distribution & Logistics Management, International Journal of Logistics Management,* and *Transportation Journal* (Peterson et. al., 2014).
2. Restrict search results to articles published within the past fifteen years (since 1999).

3. Restrict search results to articles containing at least one of four author-provided keywords: measurement, metric, measure, performance.
4. Perform a secondary search with "performance measurement" as an all fields search term to capture potentially relevant articles outside the scope of the initial search described in Step 3.
5. Eliminate duplicate articles.
6. Eliminate articles without mention of specific logistics measurement areas, metrics, or systems.

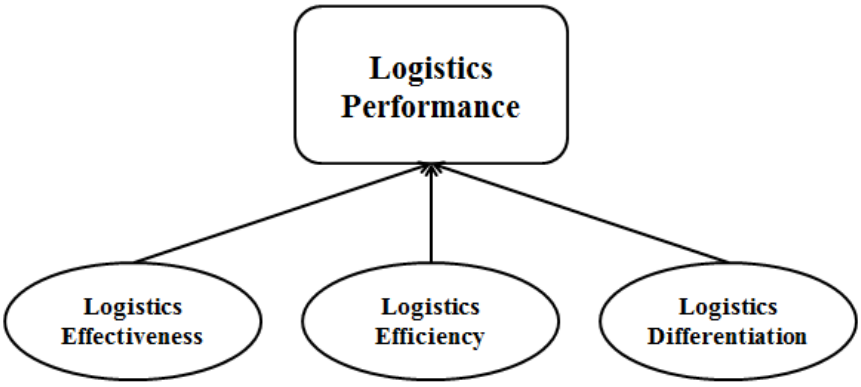
This process led to the identification of 18 articles. Each of these articles was further analyzed and coded using categories of logistics performance measurement drawn from literature.

Logistics Performance Measurement

Noted previously, the importance and complexity of logistics performance measurement has led to the development of numerous performance measurement frameworks and models by scholars (Brewer and Speh 2000; Griffis, Goldsby, Cooper, and Closs, 2004). One such model developed by Fugate, Mentzer, and Stank (2010), depicted in Figure 1, reflects the interdependence of logistics efficiency, effectiveness, and differentiation within logistics performance and overall organizational performance. This model and view of logistics performance is supported by several other scholars who agree logistics performance is a multidimensional function of efficiency, effectiveness, and differentiation (Bobbit, 2004; Cameron, 1986; Fugate, 2010) and that all can and should be "pursued simultaneously," (Fugate et. al., 2010, p.52). Thus, the model provides a useful lens from which to compare the identified body of literature (discourse)

to the industry data (diffusion) in order to assess the fashion setting role of logistics scholars.

(Figure 1, A Model for Logistics Performance, Fugate et. al., 2010, p. 45)



Assessing Logistics Measurement Discourse

To gain insights into the level of discourse related to logistics performance measurement, each article was reviewed and coded to reflect its area(s) of focus (i.e. logistics efficiency, effectiveness, and/or differentiation) according to definitions provided by Fugate, Mentzer, and Stank (2010) shown in Table 1.

Table 1: Metric Category Definitions

Efficiency
I. The ratio of resources utilized against the result derived (Mentzer and Konrad, 1991).
II. The internal functioning of logistics and generally is considered bestrepresented through some ratio of the normal level of inputs to the real level of outputs (Chamberlain 1968; Van der Meulen and Spijkerman, 1985).
III. The measure of how well the resources expended are utilized (Fugate et. al. 2010).
Effectiveness
I. The extent to which the logistics function's goals are accomplished (Mentzer and Konrad, 1991).
II. The ability to achieve pre-defined objectives, for example, in meeting customer requirements in critical (e.g. product guarantee, in-stock availability, fulfillment time, convenience) (Langley and Holcomb, 1992).
Differentiation
I. Comparing results of logistics activities to competitors (Langley and Holcomb, 1992).
II. Superiority when compared to competitors (Fugate et. al. 2010).

In cases where individual articles addressed multiple dimensions of logistics performance the article was placed within both or all of the categories in order to account for the amount of discourse in each area. There were also a number of articles addressing areas of logistics performance that were not clearly addressed by any of the three performance based categories. For example, scholars had investigated metrics focused on supply chain resilience, green supply chain management (GSCM), and reverse logistics operations. These articles were coded as examples of potentially fashion setting discourse and are discussed later in this paper.

All of the articles were coded by two supporting faculty members with extensive industry experience and logistics measurement related research interests. To assess the level of agreement and reliability of the content analysis, the inter-coder reliability was calculated using ReCal (http://dfreelon.org/utils/recalfront/) which indicated a Krippendorff's Alpha of .833, suggesting a high level of agreement and reliability(Freelon, 2013; Krippendorff, 2012). The article codings are shown in Table 2 and discussed in the sections that follow.

(Table 2, Article Categorization)

Article	Differentiation	Effectiveness	Efficiency	Fashion Setting	Year
Ballou (1999)	1	1			1999
Kiefer & Novack (1999)	1	1	1		1999
Brewer &Speh (2000)	1	1	1		2000
Holmberg (2000)				1	2000
Kallio, Sarrinen, Tinnila, & Vepsalainen (2000)	1		1		2000
Lambert & Pohlen (2001)				1	2001
Farris II & Hutchison (2002)		1			2002
Stapleton, Hanna, Yagla, Johnson,& Markussen (2002)	1				2002
Simatupand & Sridharan (2002)				1	2002
Tan, Yu, &Arun (2003)				1	2003
Farris II & Hutchison (2003)		1			2003
Griffis, Goldsby, Cooper, & Closs (2004)	1	1	1		2004
Griffis, Goldsby, Cooper, & Closs (2007)	1	1	1		2007
Barber (2008)	1	1	1		2008
Nyaga & Whipple (2011)	1				2011
Forslund (2011)	1				2011
Perotti, Zorzini, Cagno, & Micheli (2012)				1	2012
Pettit, Croxton, & Fiksel (2013)				1	2013
Count	10	8	6	6	18

Efficiency

The coded articles represented six examples of scholarly discourse related to the measurement of logistics efficiency. Efficiency is one of several common operational measurement areas used in the measuring processes (Kallio, Sarrinen, Tinnila, and Vepsalainen, 2000) and is applied at multiple levels, from specific processes measuring the performance of entire supply chains. Kiefer and Novack (1999) discuss logistics efficiency measurement within the context of warehouse measurement systems (providing parallels with the industry data presented later in this study). Kallio et al., 2000 analyzes firms' achievement of efficiency within varying delivery processes, determining that companies employing routine delivery processes should place greater value on efficient, low-cost operations than those that provide custom delivery processes to meet specific needs of the receiving party. Griffis et al. (2004 & 2007) further emphasize the need for firms to align performance measures to their specific goals and information reporting needs. They suggest that a firm that fails to capture measures that

reflect its strategic goals, at the right organizational level and with appropriate frequency falls short in delivering optimal customer value.

A number of the identified articles include adoptions of Kaplan and Norton's famous Balanced Scorecard (BSC) approach to performance measurement. The BSC assists managers in obtaining balance between performance measures capturing the customer, innovation and learning, financial and internal business perspectives. In tune with the assertions of Griffis et al., (2007), the implementation of a BSC begins with a clear definition of a firm's overall strategy to insure that, "Each measure ultimately incorporated into the scorecard emanates from a firm's strategic goals and subsequently drives the realization of those goals," (Brewer et. al., 2000, p.82). Brewer et. al., 2000 expands the Balanced Scorecard to incorporate the goals of the overall supply chain. For example, within the customer perspective, the goal of providing customer view of timeliness is assessed by the measure relative customer order response time. The rapid change and risky environment of supply chains necessitates metrics that span across processes and across the value chain (Barber, 2008). Akin to Brewer et. al., 2000, Barber (2008) revises the BSC to measure multiple value adding areas of the entire supply chain, both tangible and intangible. Barber illustrates how the BSC can be used to measure overall customer satisfaction and total value chain participant satisfaction. Efficiency is represented in the strategic management perspective along with effectiveness, growth, and environmental risk as intangible measurement areas reflective of total value chain participant satisfaction. Overall, these works communicate that efficiency measures should continue to be present throughout the decision-making levels of an organization and should drive behaviors consistent with the firm's overall strategy.

Effectiveness

The reviewed literature provided eight examples of scholarly discourse related to logistics effectiveness. Several of these articles incorporated efficiency measures as well (Griffis et al., 2004; Griffis et. al., 2007; Brewer et. al., 2000; Barber et. al., 2008; Kiefer et. al., 1999) and were expanded upon in the previous section. One such article includes that authored by Kiefer on warehouse measurement systems. In addition to reporting various WMS effectiveness measures, Kiefer concludes that firms that implement a supply chain strategy perceive their measurement system as being more effective than firms that do not implement a supply chain strategy. Though it was the most dated article identified, Kiefer's work highlights the relationship between measurement effectiveness and the achievement of a supply chain orientation developed in more recent research such as efforts conducted by Brewer (2000) and Barber (2008). The adoption of supply chain metrics is identified as a fashion setting measurement area and is further expanded upon later in this paper. Defined broadly as the extent to which logistics function's goals are accomplished (Mentzer et. al., 1991), logistics effectiveness measures present themselves within each of the four BSC perspectives (Brewer et. al. 2000; Barber et. al., 2008). One such measure, incorporated within the financial perspective of the BSC, is the cash-to-cash cycle. Farris II and Hutchison (2002) crown cash-to-cash "The new supply chain metric," (p.288). Though numerous definitions exist, Farris II (2002) adopts this description of cash-to cash as "the average days required to turn a dollar invested in raw material into a dollar collected from a customer," (Stewart, 1995). C2C was included amongst other newly developed supply chain metrics as accurately describing a world class supply chain (Stewart et. al., 1995; Farris II et. al., 2002). C2C is not only useful as

an accounting measure but is also a valuable indicator of supply chain performance. This is because C2C (characterized at times as the cash conversion cycle) spans across the four functional walls of individual firms to include entire procurement, fulfillment, and delivery processes. Included in the retuned body of literature as well, Farris and Hutchison (2003) further strengthens the case for the C2C concept as an ultimate measure of supply chain effectiveness while providing logistics managers with optimal ways of capturing the metric completely. Spanning across multiple firms, the inventory turnover curve is cited as being an accurate way of measuring inventory management performance of a supply chain (Ballou, 2000). The inventory turnover curve measures total network inventory as a function of the number of points and annual stocking point throughput (2000). Its ability to be developed from readily available and accessible data and its representation of inventory management performance at multiple points within a supply chain validate the inventory turnover curve as a valuable supply chain effectiveness metric. The returned body of literature provided both quantitative and qualitative means of auditing logistics effectiveness and highlights it importance overall supply chain success.

Differentiation

Ten of the reviewed articles represented scholarly discourse of logistics differentiation focused metrics making differentiation the most represented measurement category in the literature sample. The body of logistics differentiation literature contains several commonalities with the logistics efficiency and effectiveness literature. Griffis (2004, 2007), Brewer (2000), Barber (2008), and Kiefer (1999) are all represented throughout the three measurement areas. In adherence with definitions laid out by Fugate

et. al., 2010, the discrimination between the measurement of differentiation and the other measurement areas occurs when metrics are used to compare one firm's or supply chain's performance to that of a competing firm or supply chain. Brewer (2000) and Barber (2008) provide several examples of differentiation measurement, again, within the context of the balanced scorecard. Ballou (1999) discusses how an inventory turnover curve can be used to gauge inventory management performance and minimization of associated costs against respective practices of competing firms, while Kiefer (1999) compares a firm's differential performance of warehouse management operations in relation with their level of supply chain management. A yet to be mentioned logistics differentiation area is one of an intangible nature. Nyaga and Whipple (2011) explore "The overall caliber of relationship ties and their overall impact on outcomes," (Palmatier, 2008, p.85; Nyaga and Whipple, 2011, p. 347). The benefits of relationship quality are numerous, intangible, and tangible. Relationship quality leads to increased operational performance, improved market and financial performance, and increased customer loyalty in both B2C and B2B environments (Nyaga et. al., 2011; Autry, Skinner, and Lamb, 2008; Fynes and Voss, 2005; Fynes, Bu´rca, and Magnan, 2008; Crosby, Evans, and Cowles, 1990; Auh and Shih, 2005). In analysis of both buyer and supplier samples, Nyaga and Whipple provide evidence that relationship quality positively contributes to supply chain operational performance.

Another article captured in the logistics differentiation section of this study further develops the supply chain management concept within the scope of LSP performance management practices. Forslund (2011) identifies the selection of performance variables as one of many obstacles logistics service providers face when

attempting to adopt a supply chain scope. Specifically, Forslund identifies lack of understanding, failure to adopt effective performance metric definitions, and IT solutions that fail to meet performance reporting needs as obstacles experienced by the investigated LSPs. Forslund findings include that several of the empirically investigated LSPs report CO2 emissions as an essential performance variable. Green logistics performance metrics such as this are identified and expanded upon in the findings section of this study.

Achievement of logistics differentiation is highlighted by Stapleton, Hanna, Tagla, Johnson, and Markussen (2002) through the strategic profit model. The authors identify five activities heavily influenced by a firm's logistics decisions that affect return on net worth. These consist of increasing sales, reducing cost of goods sold, reducing variable expenses, reducing inventories, and reducing accounts receivable. Application of the SPM to six firms within the volatile athletic footwear industry yields the conclusion that logistics (especially inventory and COGS) play an important role in a firm's financial performance. The finding that the greatest level of discourse focused on logistics differentiation is not surprising given the desire of all types of organizations to differentiate themselves from competitors.

Fashion Setting Measurement Opportunities

In review of the returned body of literature, several measurement areas were not clearly assignable to one of the three measurement categories and thus represent opportunities for further development. These are discussed in greater detail in the "Fashion Setting Measurement Areas" section of this study.

INDUSTRY DATA

The literature review provided unique insight into the level of scholarly discourse related to logistics performance metrics. To determine the impact of this discourse on practice, it was necessary to assess the use of logistics performance metrics in industry. More specifically, to assess the fashion setting impact of logistics scholars on the use of logistics metrics in industry required a longitudinal review of industry metric use.

Thus, this analysis relied upon data collected as part of the Warehousing Education and Research Council's (WERC) annual metric study. Each year WERC collects logistics performance measurement data from its members and the readers of *DC Velocity*, a leading logistics magazine publication. The annual WERC survey is based upon hundreds of responses from managers from a variety of industries including manufacturing, retail, third-party warehouse, food distribution, and transportation service providers (Manrodt, Vitasek, and Tillman, 2013). This data represents the most comprehensive set of performance measurement data known to the author with more than 6400 responses over the last ten years and provides a unique opportunity to gain insights into measurement practices in the industry.

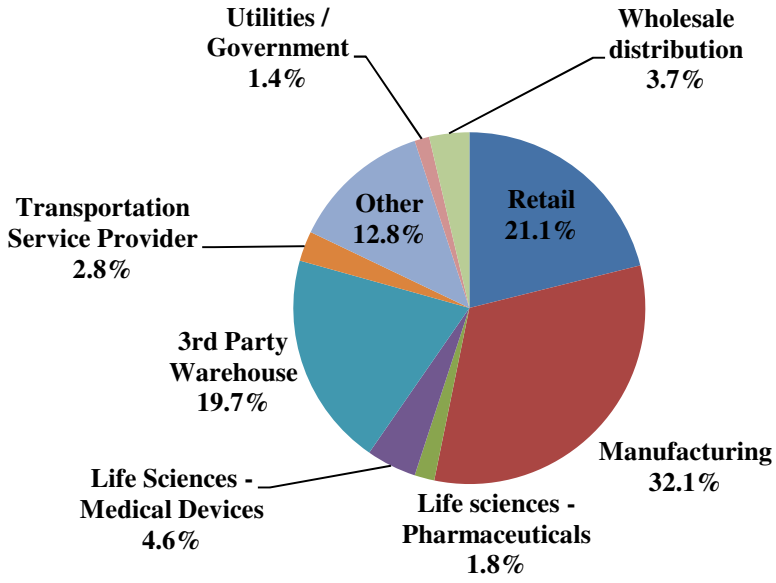
WERC's Top 10 Most Popular Measures Used

Each year, WERC publishes an overview of the survey results in the WERCwatch. A staple of the annual WERCwatch publication is their report of the Top 10 Most Popular Measures Used by WERC survey respondents and *DC Velocity* magazine subscribers. This list may subsequently be referred to as the "WERC list."

The WERC list consists of a ranking of metrics based on the percentage of respondents who report using the metric. While WERC does not rank metrics based on level of importance directly, researchers can garner insights from percentage of use as to which metrics are valued the most. Provided consistently over the past ten years, this top ten list represents an ample source of logistics performance measurement industry data for comparison with academic research.

Strengthening WERC's representation of overall industry practices, each publication provides statistics representing type of operation, type of customer, respondent title, business strategy, company size of survey respondents. Representativeness is further strengthened by the range of industries represented in the WERC survey. The graph provided below denotes the various industries represented by WERC's most recent metrics publication, "WERC Measures 2014" which is consistent with previous years.

(Figure 2, Respondants by Industry, "DC Measures 2014")



Over the past ten years, 25 different metrics have been included on WERC's Top Ten Most Popular Measures illustrating the agility of logistics performance measures and their constant re-evaluation by logistics managers. (A comprehensive compilation of the WERC Top Ten Most Popular Measures list is provided in the Appendix.)

(Table 3, Metrics Specifically Referenced by Fugate et. al. 2010)

Referenced by Fugate, Mentzer, Stank (2010)	**Count**	**%**
Yes	4	16%
No	21	84%
Total	25	100%

In order to assess the relationship between the metric focused discourse identified in the scholarly research and industry practice, it was necessary to first identify the WERC metrics specifically addressed in the Fugate, Mantzer, Stank (2010) article. Table

3 highlights the small proportion of industry metrics included in the WERC list that were directly mentioned and categorized in the Fugate et. al. (2010) study. As depicted, 84% of WERC metrics were not mentioned by Fugate, Mentzer, and Stank (2010).

Thus, to effectively compare the two data points, each WERC reported metric was coded according to the Fugate, Mentzer, & Stank (2010) model. Three researchers combined efforts in coding these individual metrics as efficiency, effectiveness, or differentiation metrics.

Table 4, Industry Metric Categories

Metric Categories	**Count**	**%**	**Average**
Efficiency	20	80%	6.3
Effectiveness	1	4%	3.5
Differentiation	4	16%	6.5

Table 4 depicts the results of this coding effort. Viewing the WERC metrics from this perspective provides the opportunity to compare industry practices with scholarly discourse and to begin assessing the fashion setting role of logistics scholars.

Insights from WERC Metrics

One of the first observations made from the analysis of the WERC metrics was the disproportionate amount of metrics appearing in the WERC Top Ten over the last ten years that were focused on efficiency. As is shown above, 80% of the metrics reviewed were focused on the efficiency of logistics operations. This comparative overemphasis is not necessarily a surprising finding given that the WERC study targets warehouse and

distribution center managers who strive for efficiency in their operations. It does, however, reveal a potential opportunity for scholars to engage in research that assists managers with measuring the efficiency of their operations. Though efficiency metrics accounted for nearly 80% of the metrics reviewed, which points to the level of importance to managers, none of the metrics identified appeared consistently within the WERC list (see Appendix) which suggests an ongoing managerial challenge of identifying the most useful efficiency based metrics.

This lack of consistency across all of the metrics was itself an interesting observation. In fact, only one metric (on time shipments) was found to be included among the Top Ten every year (see Appendix). On time shipments was also listed as the most popular metric in all but one of those years (2009) when it was briefly dethroned by order picking accuracy. The outbound cousin of on time receipts, an on time shipment represents the successful internal efforts of an entire DC. Unlike those focused on on-time receipts and on time delivery, managers tracking on time shipments are capturing processes they directly control. This fact, more than any other, explains the longevity of this metric and its consistent ranking as the most popular metric measured by logistics managers. For scholars, this too represents an opportunity to aid managers by identifying and suggesting methods for improving areas of continued managerial importance such as on-time shipments.

The review of the metric data revealed that the discourse of logistics scholars is consistent with industry practices. The review of ten years of industry reported metrics highlighted consistencies between the ideas discussed in literature over the last 15 years.

Also worth noting are examples of metric related concepts identified in scholarly research for which no industry examples were found. These measurement areas, while represented in scholarly discourse, have yet to substantially diffuse into industry practice as represented by their absence from the WERC Top Ten Most Popular Measures list. These instances are potentially the most telling indicators of logistics scholars as fashion setters. In the paragraphs that follow, a number of these topics are highlighted and discussed.

Fashion Setting Measurement Areas

Supply Chain Resilience

One fashion-setting measurement area discovered amongst returned academic literature is the concept of supply chain resilience. Pettit, Fiksel, and Croxton (2010) develop a framework in which firms can increase their respective level of resilience to unexpected supply disruptions. Resilience is defined as "The capacity for an enterprise to survive, adapt, and grow in the face of turbulent change (Pettit et. al., 2010, p. 1). Research notes that the increasingly global, complex environment in which of modern supply chains operate increases respective firm's vulnerability to disruption within their supply chains. While yet to experience substantial levels of diffusion within industry practice, Pettit et. al., 2010 contributes a framework that assists logistics managers and supply chain leaders in filling the often unrealized gaps in their traditional risk management programs. The researchers caution that the framework is to be wielded by practitioners in coordination with a continual process of reviewing and evaluating environmental risk factors. While complete protection from vulnerability is impossible,

when implemented effectively, the proposed framework succeeds in proactively equipping firms against unforeseen disruptions. Such protection provides firms with a competitive advantage. Pettit, Croxton, and Fiksel (2013) builds upon the preceding scholarly effort by creating an instrument that assists managers in implementing the previously developed Supply Chain Resilience Framework. The instrument aligns firm capabilities with associated vulnerability factors, allowing managers to identify what may have been unforeseen susceptibilities as well as strengthen their resilience to future operational disruptions. Included in the study, corporate sponsors reviewing their performance within the Supply Chain Resilience Framework were "compelled to improve their resilience," (p. 57) providing further support that resilience as a measurement area is deserving of increased attention from scholarly discourse and industry practitioners (diffusion).

Reverse Logistics

Another boundary-spanning measurement area that provides scholars an opportunity to set an industry fashion is in the measurement of reverse logistics operations. Reverse logistics has received increased attention from manufacturers, third-party specialists, and literature as it is increasingly being viewed as an opportunity for firms re-capture value rather than a necessarily evil faction of customer service (Tan, Yu, Arun, 2003). Shortened product life cycles, introduction of new and varied distribution channels, and the growingly demanding consumer are among forces increasing the level of attention reverse logistics has received from academic discourse. However, reverse logistics metrics remain unrepresented within the representative industry metric data set.

Through an empirical analysis of reverse logistics practices of technology companies in the Asia-Pacific region, Tan et. al., 2003 illustrates the untapped benefits effective reverse logistics practices can provide firms. The researchers suggest that the benefits can be realized by firms that appreciate and understand the complexity of reverse logistics processes and develop action programs to implement reverse logistics strategies. The rate and level of diffusion within industry practice often hinges on the ability and willingness of managers to change their mindsets in regards to reverse logistics. Managers who view the reverse logistics process as a value-adding process that can increase profitability will reap financial and customer service rewards.

Supply Chain Performance

Value creation is derived, in part, by leveraging relationships among supply chain members as ‘‘individual businesses no longer compete as stand-alone entities’’ such that firms ‘‘who can better structure, coordinate, and manage the relationships,’’ with supply chain partners can achieve a competitive advantage (Christopher 2000, p.39; (Nyaga and Whipple, 2011). Lack of communication, trust, and understanding of supply chain partners’ processes inhibit the adoption of supply chain metrics (Lambert and Pohlen, 2001). Several articles from the investigated literature discuss how firms can develop and implement metrics that effectively reflect the performance of their respective supply chains. Lambert et. al., 2001 develops a framework managers can use to transform their existing logistics performance metrics into those that measure supply chain logistics performance. Lambert and Pohlen (2001) implore firms to take the following steps when initially adopting supply chain metrics over previous, inward-focused logistics metrics:

Map the supply chain, analyze each link, develop profit and loss statements, realign profit and loss statements, align non-financial measures with profit and loss measures, and compare results across firms and replicate. The last step in the framework requires significant collaboration between supply chain partners, the focus of research discussed by Simatupand and Sridharan (2002). This scholarly effort stresses the importance of aligning corporate financial measures with those that capture inter-organizational processes. The article provides examples of specific supply chain performance metrics firms may use to determine their level of collaboration defined as the extent to which "mutual objectives have been accomplished," (p. 22) across multiple performance areas and at multiple levels within the "hierarchy of performance," (p.23).

Green Logistics Metrics

Competitive pressure and the complexity of modern supply chains have driven logistics practitioners and researchers to develop competitive advantages in previously untapped areas. One result of these environmental forces discussed in the returned body of literature, as well as an increasingly environmentally-conscious consumer, is a heightened attention towards green supply chain management (GSCM) practices (Perotti, Zorzini, Cagno, and Micheli, 2012). Perotti et. al., 2012 determines that while GSCM and green supply chain practices (GSCP) have experienced increased attention from logistics managers, the "average level of GSCP adoption is still considerably limited," (p.659). In essence, the current level of GSCM discourse greatly exceeds actually diffusion of GSCM principles into industry practice. It is in these instances especially, that logistics scholars have an opportunity to act as fashion setters.

IMPLICATIONS

The recent call for papers in the *Journal of Business Logistics*, the numerous logistics measurement focused research efforts published within the past fifteen years, and increasing participation in studies such as the annual WERCwatch metrics publication exemplify the continued importance of logistics performance metrics from the view of industry managers and scholars. Competitive pressures, a growingly global and complex business environment, and rapid changes and rise in consumer expectations have increased the need for firms to capture industry performance measurement practices and academic leaders to obtain actionable knowledge of where they are succeeding or falling short of meeting customer demand. This paper contributes to the body of extant industry knowledge and guides future research efforts by auditing the extent to which academic research represents practice in industry. More specifically, this research applies Abrahamson's management fashion theory to the field of logistics performance measurement in assessing how academic discourse has led to diffusion within industry.

Investigation of the returned body of literature and industry metric data provides evidence that a consistent perspective of metrics has been maintained between scholars and industry. However, the distribution of metrics within the logistics efficiency, effectiveness, and differentiation measurement areas did not exhibit the same balance suggested by scholars. While Fugate et. al., 2010 states that firms should pursue the three measurement areas equally and simultaneously, the WERC data illustrates that managers place greater importance on logistics efficiency than they do differentiation and effectiveness. This result, however, may have been influenced by the nature of the

industry data. While the annual WERCwatch metric publication gathers responses from upper level managers in a variety of industry, the responses are representative primarily of parties interested in warehouse and distribution center performance where efficiency is of top priority.

Analysis of extant literature has identified research opportunities within the three measurement areas. These identified focuses, though they represent legitimate opportunities for firms to increase profitability and achieve competitive advantages, have largely flown underneath the industry radar. These fashion setting measurement areas include supply chain resilience, green supply chain management and green supply chain practices, reverse logistics operations, the performance of entire supply chains.

As emphasized by Abrahamson's management fashion theory, academic institutions play a major role in establishing fashions that guide practices in the field. When practicality and added value reach a profitable threshold, the discourse of these fashions diffuse into industry practice. Comparison of the investigated logistics literature against industry measurement practices reveals that logistics scholars are playing a fashion setting role. While focuses in the investigated logistics performance measurement literature are largely consistent with industry practice evidence that academic interests are leading industry measurement practices is especially illustrated through the identified fashion setting measurement areas as well as through the emphasis of coordination between logistics differentiation, efficiency, and effectiveness.

Limitations of this study lie primarily in the breadth of industry metric data and academic literature analyzed. Though distribution and warehousing are major

operational areas encompassed within the logistics field, targeting measurement practices in other areas may yield additional insights and strengthen representativeness of findings. Academic interests in logistics performance measurement were limited to those published within the past fifteen years and in four leading logistics journals. Researchers attempting to recreate methods used in this study should note that, during this enactment, access to *Transportation Journal* was limited to publications released prior to 2010. Broader analysis of journals within and outside the logistics field as well as extending the study beyond the scope of fifteen years may spur additional insights into performance measurement trends and fashions established by literature. Future research is needed to determine correlation between performance in key metrics and overall performance of the firm, a contribution that may be possible through analysis of the same WERC dataset. Drawing this correlation will help scholars further identify not only which metrics firms are measuring but which measures firms should be measuring. Comparing industry and literature measurement focuses within a different framework, such as the Balanced Scorecard or the measurement space developed by Griffis et. al., 2004, may yield additional insights as well.

Long-term prosperity of academic institutions is contingent, in part, on their ability to improve overall industry performance through development of ideas (and pupils) that influence industry parties to operate efficiently and effectively while differentiating them from non-adopting competition. As Harrington states, "Measurement is the first step that leads to control and eventually improvement." This study concludes that in the field of logistics performance measurement scholars are

playing a fashion setting role in emphasizing performance measurement practices consistent with and, in identified cases, leading industry standard practices.

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APPENDIX

Metric Title	2005	2006	2007	2008	2009	2010
s	1	1	1	1	2	1
uracy	6		3	2	1	2
e Capacity Used	10		4	7	3	3
le Time, in Hours			9	9	9	8
apacity Used			7	6	8	6
	9	7	10	5	4	10
		6	6	4	6	7
e Turnover	7		8	3	5	4
ccuracy	3	8	2	8		9
le Time						
hipped per Hour						
Time						
l Put Away per Hour						
r Orders Received Damage Free						
e Hours	2	2				
pped Complete	5	4				
Ship					7	5
	4	3				
plier Orders Received with Correct Documents					10	
n Order Placement to Order Shipment		5				
			5			
hipped Without Errors	8					
our		9				
		10				
as a % of Sales				10		