



# Logistics performance measurement in the supply chain: a benchmark

Logistics  
performance  
measurement

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James S. Keebler

*Clayton State University, Morrow, Georgia, USA, and*

Richard E. Plank

*University of South Florida-Lakeland, Lakeland, Florida, USA*

## Abstract

**Purpose** – The purpose of this paper is to describe the state of logistics performance measurement in corporations based in the USA.

**Design/methodology/approach** – A triangulation approach is used, including, a Delphi study involving more than 100 practitioners, academics, and consultants identified as logistics experts; personal interviews conducted with 55 executives of 20 firms identified by the Delphi study; and a questionnaire mailed to supply chain and logistics executives at over 3,300 firms in 25 industries.

**Findings** – Most US firms do not comprehensively measure logistics performance. The focus continues to be on performance within the organization and not on performance between and across firms.

**Research limitations/implications** – Self-report surveys completed by a single respondent from each firm introduce subjectivity and bias to the study. The sample frame of organizations may not represent the universe of US companies, nor can findings be generalized to other countries.

**Practical implications** – There are great opportunities for logistics cost reduction and performance improvement within firms and across the supply chain. Firms can and should collaborate with their trading partners to implement appropriate measures of logistics and supply chain performance.

**Originality/value** – This paper provides a benchmark for organizations assessing the quality of their logistics performance measurement practices and helps identify opportunities for significant improvement.

**Keywords** Performance measures, Benchmarking, Supply chain management, United States of America

**Paper type** Research paper

## 1. Introduction and background

The Council of Supply Chain Management Professionals (CSCMP), formerly the Council of Logistics Management, has published a number of studies on logistics performance measurement (Kearney, A.T. 1984; Bowersox *et al.*, 1989; Byrne and Markham, 1991; Global Logistics Research Team at Michigan State, 1995; Keebler *et al.*, 1999). This body of research has suggested four significant common findings:

- (1) Most US firms do not comprehensively measure logistics performance.
- (2) Even the best performing firms appear that they do not realize full productivity and service benefits resulting from performance measurement.

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- (3) Logistics competency will increasingly be viewed as a competitive differentiator in industries and thus potentially a key competency for the firm.
- (4) Logistics measurement at a supply chain level is limited at best.

There are at least three basic reasons why a firm would want to measure logistics performance. Firms can reduce operating costs, use these measures to drive revenue growth, and hence to enhance shareholder value. When we measure operating costs we can identify whether, when and where to make operational changes to control expenses and this also, and very importantly, points out areas for improved asset management. We can attract and retain valuable customers by improving the price value relationship of products offered through cost reductions and service improvements. Finally, returns to stockholder investments and the market value of the firm can be significantly impacted by logistics performance improvements working through the processes that lead to share price and dividend policy.

Research described above has provided some insights, but there is a need for a comprehensive study to define exactly what we mean by logistics performance and then to examine more thoroughly the state of logistics performance measurement in US industry both internal to the company and from a supply chain perspective. Accordingly, the aim of this paper is to describe a research project that was undertaken to more explicitly define aspects of logistics performance measurement and then to describe the current state of practice. More specifically, we will answer the following research questions:

- RQ1.* What do we mean by logistics measurement?
- RQ2.* What is the current state of logistics performance measurement?
- RQ3.* What are the perceived specific enablers and barriers to improving logistics performance measurement and, hence, actual performance both with the firm and across the supply chain?
- RQ4.* How does management in general view logistics as a function within the firm?
- RQ5.* What is the relative importance of logistics measurement as a management issue?
- RQ6.* What is the perceived quality of the measures captured by the firm?

We will begin with a comprehensive review of the literature, which is somewhat limited. We will then outline the various facets of our research methodology, which included a Delphi study and in-depth interview case studies, which then led to a comprehensive mail survey. We will direct our analysis of that research toward answering the above questions and then supply both managerial implications as well as future research directions.

## 2. Literature review

To put the logistics performance literature in perspective it is necessary to briefly review the work done in supply chain performance measurement. The work of the supply chain council with their supply chain operations reference (SCOR) model dominates the practice of supply chain management and its performance measurement

(Field, 2006). However, this model, while dominant in supply chain practice, has had little impact on academic research with limited exceptions (Wang, 2001; Huan *et al.*, 2004; Lockamy and McCormick, 2004; Wang *et al.*, 2004; Sofer and Wand, 2005; Mathews, 2006; Roder and Tibken, 2006; Yilmaz and Bititci, 2006). More recently, increasing attention has been given to benchmarking logistics and supply chain performance measures (Anand and Kodali, 2008; Wong and Wong, 2008; Punniyamoorthy and Murali, 2008).

AMR Research is another firm providing services to supply chain practitioners who have reported on their work on supply chain metrics (Hoffman, 2004, 2006). This group notes not only differences on the ability to measure, but more importantly, even those that do have the ability to measure don't always have the ability to act upon those measurements in a meaningful way. It should be noted that most of the AMR work is highly related to SCOR.

Academic research both conceptual and empirical has been very broad and includes attempts to model the supply chain in its entirety (Tracey *et al.*, 2004) to very specific studies such as Ho *et al.* (2005) who develop an approach to measuring uncertainty in the supply chain. A number of interesting ideas and empirical applications exist. For example, Tracey *et al.* (2005) examined specific supply chain activities and noted which capabilities of firms impact more definitively on business performance. Pohlen and Coleman (2005) describe how both economic value added and activity-based costing can be used to evaluate supply chain performance. Chan *et al.* (2006) review measurement in the supply chain and describe several ideas on measuring supply chain performance. Shepherd and Gunter (2006) also provides a review, which is broader in scope. Park *et al.* (2005) adopt the idea of the balanced scorecard and develop a framework for a supply chain measurement performance system that incorporates balanced scorecard notions. In an interesting project, Angerhofer and Angelides (2006) model a collaborative supply chain and use simulation in a case study environment to show how performance can be improved. Other applications exist and it appears that performance measurement in supply chains is moving forward. Both academic work and the SCOR model, which is now in version 8.0, are making progress. However, as noted above, the SCOR model, which is pre-eminent in practice, has had limited application in the academic sector.

There have been a number of empirical research papers which have examined logistics performance measurement. Beginning with Kearney, A.T. (1978, 1984) attempts were made to examine how logistics performance was measured and highlighted successful case studies. Byrne and Markham (1991) described quality and productivity improvement activities within the firm. Bowersox *et al.* (1989), and to a greater extent the Global Logistics Research Team at Michigan State (1995), documented measurement practices across a wide variety of businesses and found that many asset management and other investment measures were not available in a wide variety of firms. Specifically, they identified 17-key cost measures and only five were available and used in 90 percent of the firms surveyed. In a similar study Novack *et al.* (1995) found that while measures were used, logistics executives were in general unable to quantify the value of the logistics function to the firm. Caplice and Sheffi (1995) provided a foundation for selecting and maintaining logistics performance measures as a system. Fawcett and Clinton (1996) examined what impacts logistics performance within the firm and found seven factors that had demonstrable impact for manufacturing firms. Keebler (2000) found that leading firms were not capturing

specific measures of logistics performance of importance to their customers. Rafele (2004) has suggested a framework for logistics service measurement within more of a supply chain perspective, rather than an individual firm. Research has been done to explore the benefits of collaboration with trading partners in developing collaborative supply chain performance measures (Simatupang and Sridharan, 2004; Choy *et al.*, 2007). Germain and Iyer (2006) have examined both internal and downstream integration in logistics operations and found that firms that were more integrated internally were also more integrated downstream. Niemi and Huiskonen (2008) proposed an approach for internal, cross-unit benchmarking. Finally, Gleich *et al.* (2008) investigated logistics process benchmarking.

Based on these studies one can come to the following conclusions:

- There is a great opportunity for logistics cost reduction across the supply chain.
- Data collection, information, and measurement is insufficient.
- Articulating cost-benefit of supply chain management logistics opportunities is not easily done.
- Many savings are likely to cross supply chain boundaries and there is limited research that examines this aspect of logistics performance measurement.

### 3. Research design

The complex research design utilized in this study consisted of three separate parts, a Delphi study, a series of case studies and finally a cross-sectional survey. This complexity was necessitated by the minimal research that had previously been done, the perception of the researchers that there was a lack of definitive conceptual clarity of the phenomena being studied, and the need to further explicate the research dimensions so as to lead to the realization of the benefits that appear to be possible for both individual firms and the supply chains within which they operate.

#### 3.1 Delphi study

The Delphi study was done in two stages, with 103 practitioners, consultants and academics that were considered experts in supply chain and logistics being queried the first time. Seven broad questions were asked relating to business and market factors leading to supply chain orientations, process and activity measures being used, supply chain measures being used, the impact of electronic commerce, and who are perceived as leaders in performance measurement. This study generated 25 responses. The original group of 103 was then asked to react to the findings from the first round. The second round generated 27 responses. The second round delved into key processes of logistics activity, key processes or activities within the supply chain, the process of measurement development by firms internally and from a supply chain perspective and an attempt at classifying firms as to where they were in the process. The two exercises provided a great deal of critical information that ultimately was utilized in the cross-sectional study and also led to the identification of firms for case studies.

#### 3.2 Case studies

A total of 60 companies were identified and contacted for the case study portion of the research design. These were identified in the Delphi study as firms who had advanced along the logistics measurement process and had for the most part adapted a supply

chain mentality to some degree. A total of 55 personal interviews were conducted with 20 companies. The organizations included 19 for-profit firms and one government agency. The companies included five in consumer electronics, six in food manufacturing, distribution, and retailing, two in industrial supplies, two in office products, and one each in paper goods manufacturing, services, medical supplies, and specialty products retailing.

The purpose of the case studies was to get more in-depth discussions of the measurement of logistical processes, better define enablers and barriers to measurement implementation, and discover tools used to achieve success in the area that might be usable by other companies. While these interviews again indicated some disparity, a number of conclusions can be drawn:

- A number of firms used process mapping and process reengineering techniques to achieve more efficient and effective processes.
- Activity based costing was an important enabler for some firms.
- Data warehousing was also an important enabler for some firms.
- Sharing databases and other information via the internet with both customers and suppliers improved communication and coordination between firms.
- Providing performance scorecards to customers was considered essential.
- Tying individual employee incentives to key performance measures created ownership and responsibility for performance.
- Collaboration with customers and suppliers on key interface processes is the first step in building trust based on jointly defined and shared measures.
- Some companies are bringing key suppliers or customers into the company to mobilize internal functions to address changes, and this has been more successful in getting change than purely internal efforts.
- Attention to the supply chain partner's cultural compatibility and understanding their business can also facilitate supply chain improvements.
- Top management support is critical to successfully implement successful logistics measurement initiative and programs.

### *3.3 Mail survey*

Based on these findings, as well as previous research, a questionnaire was developed. The mailing list came from the membership list of CSCMP, but was augmented from several sources to provide for a broader list. The list was edited so that each company received only one questionnaire, addressed to its highest ranking logistics or supply chain executive. The final list represented manufacturers, distributors, retailers, transportation firms, public warehouse companies, and third party logistics providers. Specifically, excluded were financial, insurance, government, software, and consulting sectors as these did not fit the profile of firms with heavy logistics and supply chain activities. The final list included 3,185 professionals in the USA and 179 from abroad for a total of 3,364. A one wave mailing with a post card follow up was utilized. A total of 28 surveys were undeliverable for a net mailing of 3,338 and with 355 returns; the net response rate was just under 11 percent. While the response rate was lower than hoped for, the fact that the list contained many potential respondents with executive

titles such as vice president or senior vice president worked against getting higher response rates.

Non-response bias was examined using the methodology suggested by Armstrong and Overton (1977). We examined the first and last quartiles of respondents with regards to the demographics and all of the other over 60 variables reported in the study. We found three statistically different responses within the variables tested which leads us to suggest that non response bias has minimal, if any, impact on these findings.

#### 4. Findings

The sample respondents exhibited a broad range of characteristics.

Over 25 industries were represented. Food and beverage (21 percent), chemicals and plastics (9 percent), automotive (7 percent), pharmaceuticals (6 percent) and paper and related products (6 percent) were the most represented. Manufacturing represented 56 percent, whereas distribution/wholesaling (11 percent), retailing (10 percent), third party logistics suppliers (7 percent), transportation carriers (5 percent), and public warehousing (3 percent) were also represented. Of the 355 responses, 51 percent were from executives with titles of vice president or senior vice president of logistics, operations, or supply chain management suggesting the importance of the function of the firm. Finally, the firms represented by the respondents had a wide mix of annual sales volume. Almost 31 percent were from firms under \$250 million, whereas 21 percent were between \$250 million and \$500 million, 17 percent between \$500 million and \$1 billion, 21 percent between \$1 billion and \$5 billion, and 10 percent over \$5 billion. Thus, there was a good mix of smaller and larger firms. A cursory examination of the general membership data of CSCMP suggests that the respondents are closely aligned to the overall membership of the group.

##### *Question 1*

The first question to be addressed is what do we mean by logistics performance measurement? Different authors in previous research have measured different aspects of logistics. For example, the Michigan State Global Logistics Study (1995) found and measured 17 different cost measures. Based on previous research, the Delphi study noted above and the case studies noted above, we found 37 specific measures that can be captured (measured) and relate to logistics performance. These measures can be categorized into five categories, effectiveness measures involving a trading partner (supply chain partner), effectiveness measures having an internal focus, and efficiency measures having either a cost, productivity, or utilization focus. Each measure is a hard measure of performance and depending on the nature of the information system of the company or across the supply chain is readily measured. In many cases these measures are identical to those measured by the supply chain council using their SCOR model of supply chain operations.

##### *Question 2*

The second question addressed the capture of the current state of logistics performance measurement. Table I provides information on the 37 measures as identified in *RQ1* and whether or not they were measured by the respondent.

As the table describes, while respondents noted that some measures are widely used, up to 87.3 percent, the range of measurement was from 21.8 percent and the average was

		Logistics performance measurement
<i>Effectiveness measures involving trading partner (%)</i>		
Customer complaints	75.6	
On-time delivery	78.6	
Over/short/damaged	72.3	
Returns and allowances	69.1	
Order cycle time	62.3	
Overall customer satisfaction	60.8	
Days sales outstanding	58.7	
Forecast accuracy	54.4	
Invoice accuracy	52.1	
Perfect order fulfillment	39.5	
Inquiry response time	29.6	
Average	59.5	
<i>Effectiveness measures internal focus (%)</i>		
Inventory count accuracy	85.8	
Order fill	80.8	
Out of stock	70.5	
Line item fill	68.5	
Back orders	64.4	
Inventory obsolescence	62.7	
Incoming material quality	61.6	
Processing accuracy	45.0	
Case fill	39.1	
Cash/cash cycle time	32.2	
Average	61.1	
<i>Efficiency measures (%)</i>		
<i>Cost</i>		
Outbound freight cost	87.3	
Inbound freight cost	68.9	
Inventory carrying cost	60.4	
Third party storage cost	58.6	
Logistics cost/unit/budget	52.4	
Cost to serve	37.4	
Average	60.8	
<i>Productivity</i>		
Finished good inventory turn	80.2	
Orders processed/labor unit	43.3	
Product units processed per Warehouse labor unit	47.6	
Units processed/time unit	37.2	
Orders processed/time unit	36.1	
Product units processed/transportation unit	21.8	
Average	44.4	
<i>Utilization</i>		
Space utilization/capacity	46.5	
Equipment downtime	46.0	
Equipment utilization/capacity	40.4	
Labor utilization/capacity	35.8	
Average	42.2	
		<b>791</b>
		<b>Table I.</b>
		Performance measures utilized, percentage of respondents

55.8 percent. In general, effectiveness and cost measures are captured more often and productivity and utilization measures much less often. Thus, the capture rate is mixed, but clearly many more firms could be measuring things they are not. However, the data itself does not provide a rationale.



Question 3

The third question was about specific enablers and barriers to measurement, both within the firm and within the supply chain. Based on the Delphi study and the case studies a total of 19 factors were identified as being either enablers or barriers or both. Based on these findings we asked two sets of questions. In each case we listed the 12 appropriate factors and asked the respondent to indicate if this was an enabler, a barrier or neutral in terms of driving performance measurement, within their company and across companies, their supply chain partners. Seven of these factors were internal measures only, seven of the factors were for supply chain measures and five were for both. Thus, each list had 12 appropriate factors. Table II provides those responses.

For internal logistics measures, the biggest enablers in the sample are upper management support and resource availability in the department. This was not surprising. The case studies and Delphi research both indicated that we would find this result. The major barriers are resource availability in the information technology (IT) function and availability of information in general. Another important barrier is the perception of the accuracy of the information. Some variables are split almost equally with the same number of respondents reporting something as an enabler while another set of respondents reports it as a barrier. This included budgets and the impact of other departments.

For external logistics measures, the biggest enabler is upper management support followed by trust of the significant other supply chain partner and general availability of information. Again, the Delphi study and the case studies suggested these responses. Major barriers include compatibility of company IT systems, again not unexpected, multiple definitions across the supply chain, and resource availability to maintain measures. Accuracy of information exchanged is viewed as a frequent enabler, but almost as frequently as a barrier.

Factors	Within the firm (%)		Between firms (%)	
	Enabler	Barrier	Enabler	Barrier
Upper management support	74	11	57	16
Resource availability in my function/department	60	24	NA	NA
Skill set of employees	50	24	NA	NA
Ability to obtain priority for logistics projects	46	29	NA	NA
Resource availability in IT function	43	46	NA	NA
Accuracy of information available	43	39	NA	NA
Timeliness of information	42	29	36	36
Acceptance/resistance to change	40	34	26	39
Organizational culture	39	33	28	36
Availability of information	37	43	44	45
Budget	32	33	NA	NA
Other departments	27	27	NA	NA
Trust	NA	NA	45	27
Trade associations	NA	NA	25	5
Industry standards	NA	NA	31	15
Resource availability to maintain measures	NA	NA	31	50
Accuracy of information exchanged	NA	NA	38	34
Multiple definitions among customers	NA	NA	17	51
Compatibility of IT systems	NA	NA	26	52

**Table II.**  
Enablers and barriers to  
logistics performance  
measurement



#### Question 4

The fourth question addressed the management view of logistics within the firm. A single question asking the respondent to indicate whether s/he thought logistics was viewed by their firm primarily as a cost center, a profit center, a service center, or something different. Table III provides an analysis of those responses, segregated by the type of business firm, manufacturer, distributor, retailer, or outsourced logistics service provider.

While the table is relatively balanced, a chi-square analysis indicates that distributors are more likely to view logistics as a profit center than do the other two groups. As would be expected, logistics service providers view logistics as a profit or service center.

#### Question 5

The fifth question attempted to place logistics performance measurement in the firm in terms of the perceived importance by the firm as opposed to other logistics issues. The respondents were given 13 logistics issues facing their organization and asked to rank the top three they thought were considered most important by their firms. Table IV provides those results.

The results are interesting. It is not surprising that cost control/reduction was in the top three for 55 percent of the respondents. The same is true of technology utilization with the continuing issues that make that a concern. But what is surprising is that logistics measurement within the company was ranked in the top three only 16 percent of the time. Even more surprising, given the movement toward supply chain management, was that logistics measurement between the company and its suppliers/customers was ranked in

Viewpoint	Manufacturers (%)	Distributors (%)	Retailers (%)	Logistics suppliers (%)
Cost center	55	31	54	6
Profit center	3	36	11	58
Service center	40	31	31	22
Other	2	2	4	14

**Table III.**  
Management viewpoint  
of the logistics function in  
the organization

Logistics issue	Percentage in top three in importance
Cost control/reduction	55
IT utilization	48
Improving customer service processes	38
Cycle time reduction	28
Strategic alliances with suppliers/customers	28
Changing organizational structure	17
Internal logistics measurement	16
Expanding distribution	15
Quality improvement	12
External logistics measurement	11
Outsourcing	10
Integrating with internet customer systems	9
Logistics support for global expansion	8

**Table IV.**  
Relative importance  
of logistics measurement

the top three by only 11 percent of the respondents. This finding does not indicate a priority on logistics performance measurement between firms.

Question 6

The sixth question concerns itself with perceptions of the quality of the measures that are being done in terms of a number of attributes of the measures. We constructed 12 Likert-like questions anchored by “strongly agree” to “strongly disagree” with the center point being labeled neither/nor. The attributes for quality came from a variety of sources including the Delphi study, the case studies and the literature. Table V provides the results of that analysis, providing the frequency of responses, as well as the mean and standard deviation for each question.

The sample clearly has mixed perceptions on the quality of the data. In no case is the overall mean under 2.0, or moderately agree, but in three cases it is over 3.0 which means the mean perceptions are slightly negative as all questions were worded so that a lower number indicates higher quality perceptions. The actual means range from 2.31 to 3.19 and the standard deviations are between 1.0 and 1.16 and are thus very consistent.

5. Discussion and managerial implications

Based on the findings of what is being measured, most of the emphasis in logistics measurement is directed at activities internal to the firm. Still, many firms are not even capturing key measures of internal logistics performance. Many firms that are capturing logistics measures perceive their quality to be deficient. The lack of availability of accurate, timely, and actionable information seems to be blamed on the absence or incompatibility of IT systems and lack of organizational resources. Perhaps, in those firms, a strong case has not yet been made for the business value of improved

Attribute	Number of responses/category					Mean value	SD
	1 SA	2 MA	3 N/N	4 MD	5 SD		
Measure is accurate	58	181	26	61	18	2.42	1.12
Is interpreted similarly by internal users	64	163	33	59	21	2.44	1.16
Is interpreted similarly by external users	26	91	106	85	34	3.03	1.10
Is understandable by decision makers	54	168	47	56	18	2.46	1.10
Is inclusive of all relevant aspects	21	95	68	115	43	3.19	1.16
Internal measure benefits outweigh costs to collect	98	125	59	39	22	2.31	1.18
External measure benefits outweigh costs to collect	46	114	110	48	21	2.66	1.08
Measures are compatible with existing internal information and systems	39	164	54	61	22	2.60	1.11
Measures are compatible with existing external information and systems	10	105	109	91	26	3.05	1.00
Measures are compatible with existing cash flow measures used	22	107	123	61	25	2.88	1.02
Measures provide sufficient degree of detail for users	30	143	61	78	25	2.78	1.12
Measures used minimize the incentives for counterproductive behaviors	24	132	88	68	25	2.82	1.07

Notes: Total responses range from 337 to 343 due to missing values; actual population was 355

Table V.  
Perceived attribute  
quality of logistics  
measures

logistics measurement. A case, or mandate, needs to be made to elevate the priority of logistics measurement capability within the firm, and between firms, to achieve organizational goals. Logistics planning and control systems cannot be effective without measurement. The firm's attention on internal utilization, productivity, and cost measures is necessary but not sufficient for improved supply chain performance. The firm needs to define the appropriate measures of its inter-firm processes. Trading parties need to work together to define terms and processes of importance to the relationship, and jointly agree on what is measured for comparison to desirable targets for performance. The research suggests that this is not being widely done, but those trading partners that do it enjoy mutual benefits.

It was evident from the case studies that two capabilities distinguished those firms who were more advanced in logistics measurement, both internally and with trading partners. These capabilities were the use of activity-based costing and data warehousing. Having these capabilities permits the development of cost-to-serve measures, which, when compared to the customer's value of service, points to more profitably engineered activities and services.

## 6. Conclusions

This research has provided a unique contribution in that it has provided a benchmark for the state of logistics performance measurement in the USA. Several conclusions from the research can be made. Logistics measurement can improve firm performance. Most firms represented by respondents to the survey do not comprehensively measure logistics performance. Even the best firms fail to realize their service and profit potential available from logistics performance measurement. There is a need for collaboration between trading partners on definitions of linking activities and processes and their measures of performance. Those firms that understand the value creation character of high-performance logistics are more likely to invest in enhancing its capability, thus making it more valuable as a trading partner.

### 6.1 *Limitations of the research*

As with all self-report surveys, this one has limitations. Only a single respondent from each firm did the evaluations. While that respondent was in most cases a very senior person in the supply chain/logistics function (51 percent held titles of vice president or senior vice president), they represent only a single perception of a member within the firm and is not necessarily indicative of other firm member's perceptions.

The sample frame, while slightly broader than a single professional association, is still primarily from organizations that do not necessarily represent the universe of companies/logistics-supply chain employees in the USA, and are not representative of what happens in other parts of the world.

### 6.2 *Future research directions*

As this was an exploratory study meant to primarily discover and define constructs of interest, there is a great deal of future research possible based on the findings. First, simple replications of part of this study three to five years after the initial data collection are in order, as the pace of change in this area appears high and thus being able to compare samples from a longitudinal perspective will begin to help us understand which issues are moving forward and which are not.

The notion of enablers and barriers is a very important research arena. Based on the comprehensiveness of our work prior to the questionnaire, a good set of both enablers and barriers has been identified. Several important issues need to be addressed. Which enablers or barriers seem to actually have the most negative or positive impact? Second, it would be useful to understand why a specific determinant is an enabler in one situation/company and a barrier in another. How can one turn a barrier into an enabler, which we learned from both case studies and the Delphi study to having been done in many firms? Finally, as comprehensive as this list is, over time some new issues influencing logistics measurement are likely to appear. We need to be able to identify when that happens, especially barriers, and learn how to deal with them.

Since a big issue today is return on investments, research on what measures link to behaviors and activities that result in better financial returns is a priority. A theme in both the Delphi study and the case studies is the problem of actionability of the measures. Having the measure is one thing, but being able to use it to direct specific actions and then getting a return on those actions is a big issue. Are there any particular measures that have led to successful actions that provide greater potential returns? Tracey *et al.* (2005), Lockamy and McCormick (2004), and Hofman (2004, 2006) have already provided some insights into this problem.

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**Corresponding author**

James S. Keebler can be contacted at: [JamesKeebler@clayton.edu](mailto:JamesKeebler@clayton.edu)