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Editorial Policy

The primary purpose of the JTM is to publish managerial and policy articles that are relevant to academics, policymakers, and practitioners in the transportation, logistics and supply chain fields. Acceptable articles could include conceptual, theoretical, legal, case, and applied research that contributes to better understanding and management of transportation and logistics. Saying that, our policy requires that articles be of interest to both academics and practitioners, and that they specifically address the managerial or policy implications of the subject matter. Articles that are strictly theoretical in nature, with no direct application to transportation and logistics activities, or to related policy matters, would be inappropriate for the JTM. Articles related to any and all types of organizations, and of local to global scope, will be considered for publication.

Acceptable topics for submission include, but are not limited to, broad logistics topics, logistics and transportation related legal issues, carrier management, shipper management of transportation functions, modal and intermodal transportation, international transportation issues, transportation safety, marketing of transportation services, transportation operations, domestic and international transportation policy, transportation economics, customer service, and the changing technology of transportation. Articles from related areas, such as third party logistics, purchasing and materials management, and supply chain management, are acceptable as long as they are related to transportation and logistics activities.

Submissions from practitioners, attorneys or policymakers, co-authoring with academicians, are particularly encouraged in order to increase the interaction between groups. Authors considering the submission of an article to the JTM are encouraged to contact the editor for help in determining relevance of the topic and material.

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Publishing Data

Manuscripts. Submit manuscripts to the editor by email attachment at taylorjohn@wayne.edu. Manuscripts should be no longer than 30 double-spaced pages and 7000 words. Guidelines for manuscript submission and publication can be found in the back of this issue.

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From the Editor…

Welcome to the Summer/Fall, 2016 issue of the Journal of Transportation Management, being Vol. 27 No 1! This issue of the Journal starts with an article on keys to successful balanced scorecard implementation, includes an article on an automotive industry SCM case competition in its 6th year, moves on to an article reporting on an empirically derived framework of logistics management strategy, and concludes with an article on critical skills for logistics professionals.

However, before describing this issue’s articles in more detail, I must sadly report to you on the passing of Michael A. McGinnis, our Associate Editor and a prolific author and contributor to this and other journals. Michael was a Professor of Business at the Penn State New Kensington Campus. In addition to his contributions to the Journal as an author, he was an invaluable Associate Editor and I deeply appreciated his editorial support, advice, and wisdom. He will be deeply missed and I know the entire Journal of Transportation Management community offers its condolences to his family and friends.

For this first issue after Michael’s passing, our first article examines balanced scorecard implementation. The authors report on a meta-synthesis approach that was used to examine qualitative BSC data available in the literature that suggested eleven keys to successful BSC implementation and use. The second article reports on the auto industry SCM case competition run by Wayne State University. The authors describe the benefits of the competition, and the issues involved in putting on an event that draws 20 plus universities from around the world each year. The third manuscript, with Michael A. McGinnis as the lead author, develops a framework of logistics management strategy. The authors integrate previous research and thought domains to develop a generalized framework that guides our understanding of the role of logistics management and its consequences for organizational competitiveness. The fourth article examines the topic of critical skills for logistics professionals. The study uses survey research, means tests, and importance analysis to explore a multi-factor framework that identifies critical logistics skills as perceived by 176 experienced supply chain professionals.

At the Journal, we are continuing to make a number of changes that will improve the visibility of JTM, and improve its position in the supply chain publishing world. These include registering and updating journal information with several publishing guides, placing the journal content with the EBSCO, Gale and JSTOR databases faculty have access to, and placing abstracts of all past journal articles on an open area of the Wayne State University Journal web page. Full journal article PDF’s continue to be available to subscribers on the web page at www.business.wayne.edu/gscm.

I look forward to hearing from you our readers with questions, comments and article submissions. The submission guidelines are included at the end of this issue’s articles and I encourage both academics and practitioners to consider submitting an article to the Journal. Also included in this issue is a subscription form and I hope you will subscribe personally, and/or encourage your libraries to subscribe.

John C. Taylor, Ph.D.
Editor, Journal of Transportation Management
ABSTRACT

In recent years many companies have evolved from being centrally located and managed to decentralized, multi-national companies consisting of many separate entities to be strategically managed. In response to this and other changes, such as the need for better measurement of performance, a strategic management tool was developed called the Balanced Scorecard (BSC). This research provides a tool to guide and evaluate BSC implementation. A meta-synthesis approach was used to examine qualitative BSC data available in the literature that suggested eleven keys to successful BSC implementation and use. These keys are then used to benchmark an implementation in a government logistics organization.

INTRODUCTION

“If you’re not keeping score, you’re only practicing” (Schneiderman, 1999). This statement is meant to emphasize the rationale and need for the strategic management method known as Balance Scorecard (BSC) that was developed by Professor Robert Kaplan, an accounting professor at Harvard University, and Doctor David Norton, a consultant from the Boston area (Niven, 2003). These researchers led a study of a dozen companies to explore new methods of performance measurement with the hypothesis that traditional financial measures of performance were ineffective for successful management. From this study, the BSC was born, with a scorecard balanced through careful selection and implementation of four perspectives: financial, customer, internal-business-process, and learning and growth.

Over the last 15 years, the Balanced Scorecard methodology has matured. It was sharpened by its developers through such books as The Strategy Focused Organization, Strategy Maps, and Alignment (Kaplan & Norton, 2000, 2004, 2006). Operational experience has also been accumulated through a number of BSC implementations, so that organizations have information available to implement and/or analyze BSCs. Now businesses around the world are asking: “What are the key areas of BSC implementation that an organization must address in order succeed?” The most important implication of this research is to ensure the BSC methodology is understood and properly implemented to “inspire and motivate all employees, set direction for the organization, and encourage alignment from top to bottom” (Niven, 2003).

BACKGROUND

In 1992, Kaplan and Norton published their article “The Balanced Scorecard—Measures That Drive Performance.” Harvard Weekly Review hailed it as one of the 75 most influential ideas of the
twentieth century (Niven, 2003). Shortly after its introduction, companies around the world started implementing their own BSC and proving its success, such as Mobil, Best Buy, BMW Financial Services, Canon USA, Wells Fargo and many, many more. One example of the BSC’s success is Mobil. In 1992, Mobil needed a $500 million infusion from their parent company to sustain operations. By 1994, it was the least profitable company in its sector. Executives knew things needed to change and decided to roll out the BSC. Within a year, Mobil had the top profitability rating with profits 56 percent higher than the industry average, and it was suggested that this was due in part to the BCS. Mobil’s success continued to reach new heights, reflecting the number one ranking in profits in 1997—for a third consecutive year. (Kaplan and Norton, 2002) Since its inception, over half of the Fortune 1000 organizations have adopted the BSC (Marr and Schiuma, 2003). It has matured through numerous publications with lessons learned and critical focus areas which should be addressed to improve.

The BSC was developed as a management system using performance measurement to assist decision makers in understanding and accomplishing strategic goals (Kaplan and Norton, 1996). This is accomplished by building and balancing causal-linked objectives into a “balanced scorecard,” through which an organization provides a framework that tells the story of the organization’s strategy (Niven, 2003). The BSC methodology recognizes the fallacy of relying on just financial measures. Therefore, it integrates those financial measures with three critical operational measures into a structure or “balanced scorecard” with four perspectives: financial, customers, internal business processes, and learning and growth (Kaplan and Norton, 1996). Companies can use this balanced scorecard framework to select a balanced set of objectives and measures to effectively manage their organizations.

The BSC retains financial measures and introduces drivers of future performance. Financial measures are measures of past performance, where the organization has gone, and not necessarily where it is going. These are lagging indicators. They may have been adequate for industrial-age companies for which investments, long-term capabilities and customer relationships were not as critical for success, but financial measures alone are inadequate in today’s age of future value through investment in customers, supplies, employees, processes, technology, and innovation (Kaplan and Norton, 1996). By combining financial and performance measures, the BSC provides insight into organizations’ operations and assists in implementing strategy.

Since the conception of the Balanced Scorecard (BSC), companies have succeeded and failed at its implementation. Researchers have analyzed and published these results. A review of these results suggests eleven keys to successfully implement and use a BSC, which when followed, will improve the probability of a company’s BSC success.

**Methodology**

A meta-synthesis approach was used to identify and develop the list of key areas for BSC implementation and use. A meta-synthesis is the synthesis or aggregation of qualitative studies. According to Marshall and Rossman (1989) the process of meta-synthesis of qualitative data within this research was based on data reduction and interpretation. This is accomplished by taking “voluminous amounts of information and reducing it to certain patterns, categories, or themes and then interpreting this information by using some schema” (Creswell, 2003).

Data were primarily collected in the format of case studies which evaluated a company’s BSC implementation and use. Additionally, data provided through books and articles were also included. Before data reduction commenced, inclusion criteria were established to focus and guide research efforts. First, the inclusion criteria loosely stipulated that data were collected through case studies which analyzed and provided results from a company’s BSC implementation and use. Secondly, with the fairly new nature of the BSC concept, no time
stipulations were imposed—a lesson learned immediately following the BSC conception would be just as important as a more recent lesson learned. Finally, all case studies that met the above inclusion criteria were included regardless of geographic region in which studied organizations were located. Advice and guidance published through books and articles from the BSC originators and associates were also utilized only if they met the following inclusion criteria. Inclusion of books and articles were utilized only when the author’s research was supported through case studies. Identifying case studies which validated the author’s advice and guidance proved to be a simple task since the format for their publications were an expansion of lessons learned throughout BSC implementation and use.

Once the above inclusion criteria on case studies, books and articles had been established for data collection, we followed Tesch’s (1990) eight steps for developing an organizing system for unstructured qualitative data.

Qualitative analysis contains questions of feasibility, validity, study selection, mechanism and interpretation. To combat these issues, keys were only identified as keys upon finding confirming evidence from multiple sources through multiple researchers. Banning (2001) describes that the act “of looking at phenomenon from a variety of vantage points” improves the validity of a researcher’s findings. Simply stated, a key to successful BSC implementation and use did not become a key unless it was supported by more than one document.

FINDINGS AND DISCUSSION

The meta-synthesis resulted in eleven keys to successful BSC implementation in a logical progression of 8 steps for BSC development and use (Table 1).

The sources of these findings are shown in Table 2, which lists case studies that contributed to one or more keys to successful BSC implementation and use by topic(s) addressed. The keys numbered 4 through 7 are listed under implementation step 4, as they should be established in concert with each other. Implementing them together is needed so that objectives and performance measures are quantified and present causal relationships derived through the implementation of a strategy map. The keys to successful implementation are now described in detail.

Deploy BSC from the Top Down (Step 1)

The BSC is designed to be a strategic management tool, and it requires top-level development, support and involvement. The BSC has primarily proven successful in studies showing it was deployed from the top of the organization. Some BSC consulting agencies even have a standard operating instruction

<table>
<thead>
<tr>
<th>Implementation Order</th>
<th>Key to Successful BSC Implementation and Use</th>
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<tr>
<td>1</td>
<td>Deploy BSC from the Top Down</td>
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<td>3</td>
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<td>Implement Strategy Maps</td>
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<td>9</td>
<td>Select BSC Goals and Timelines for Their Completion</td>
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<td>10</td>
<td>Simplify Management Systems—Do Not Just Add To Existing Framework</td>
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<td>11</td>
<td>Cascade the BSC</td>
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TABLE 1
KEYS TO SUCCESSFUL BSC IMPLEMENTATION AND USE
<table>
<thead>
<tr>
<th>Source</th>
<th>Year</th>
<th>Title</th>
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to decline consultation service to companies that do not have this top-level involvement. First, top-level involvement provides benefits by building consensus on the direction in which the company should focus, strengthens commitment towards selected objectives and goals, and simultaneously facilitates team building. Secondly, by having top-level involvement, the execution of the company’s initiatives will be supported and financial backing provided. Case studies have shown that top-level involvement and deployment does indeed provide positive results (UNUM Corporation, 1999; Active Strategy, 2007b; Antarakar, Cobbold, and 2GC Active Management, 2001; Cuganesan, Ford, and Khan, 2006; Schneiderman, 1999).

Ultimately, BSCs should be deployed from the top-down for two main reasons. The first reason is to ensure management has come to a consensus on their strategic goals, objectives and measures. The second reason the BSC is deployed from the top-down is so it will be formulated to best fit the corporation as a whole and carry with it support and financial backing.

Establish BSC Framework (Step 2) Implementing a BSC can be a slow, laborious process and requires a strong implementation framework, as well as vehicles to aid in monitoring and continually improving the BSC’s performance. Without these, implementation efforts may fail, or if a BSC is successfully implemented and not continuously improved, it could become stagnant.

The UNUM Corporation utilized innovative vehicles to motivate employees and monitor the company’s performance and direction. One way UNUM ensured their BSC met the needs of their customers was through a benchmark survey. This survey measured employees’ perceptions of how the company was doing at meeting its vision of “...having the mind of a customer and the pride of an owner;” and by having employees evaluate eleven different areas, such as “live by our word” and “strive together towards goals.” Ultimately, the company’s goal was to increase the number of employees who believed these behaviors were being practiced and decrease the number of those who did not.

Secondly, UNUM created trust workshops and a 360 degree appraisal system to help further ensure that managers were aligned to the corporate BSC. A third motivator, which UNUM agreed was one of their biggest successes, was the 1998 Goals Stock Option Plan. This plan provided employees with a stock option grant and was believed to motivate employees because their actions now affected themselves fiscally. UNUM also incorporated an annual bonus for meeting company goals. The combination of the stock option plan and the bonus for meeting the annual goals provided the motivation for the employees to reach both short and long-term goals. Another key part of UNUM’s BSC development was a continuous improvement processes. These processes included development of best practices, regular reviews to evaluate the company’s BSC, obtaining feedback from their managers, and publishing questions. Evidence of the improvement in the company through these innovative vehicles was presented in UNUM’s 1997 Annual Report, which stated that the company was “closer than ever to its vision...of world leadership in disability and special risk insurance.” (UNUM Corporation, 1999)

Standardize Within the BSC—But Do Not Standardize Content (Step 3)

Prior to developing a BSC, standards should be established. In addition to identifying areas to standardize, this key also identifies what not to standardize when cascading the BSC.

Standardizing within a BSC can be accomplished in different areas such as standardizing vocabulary to define BSC components to increase communication as well as understanding (i.e. what exactly do the terms vision, objectives, measures, initiatives, etc. mean?) and standardizing design process and review cycles to promote continuous improvement. However, standardizing BSC content in cascaded scorecards, in the form of mandatory objectives and measures, risks diminishing employee buy-in and potentially reduces the ability to further optimize the cascaded scorecard through its individualization.
Nivenfelt felt so strongly on the topic of standard vocabulary that he wrote an entire article titled “The Importance of Terminology to Your Balanced Scorecard.” In his introduction, he quoted Karl von Clausewitz, a German General:

“The first task of any theory is to clarify terms and concepts that are confused… Only after agreement has been reached regarding terms and concepts can we hope to consider the issues easily and clearly, and expect others to share the same viewpoint…” (Niven, 2006a).

The importance of a standard vocabulary extends into determining a set of BSC standards. Niven explained that “what passes for measures in your shop, may be a key performance in another,” and having differences such as these “can have a profound impact on the success of your BSC.” He concluded by stating that an organizational team should invest in a terminology exercise, so they can “agree on specifically [what the common terms] mean..., construct a solid foundation from which to launch both their Scorecard building efforts and educational initiatives..., and finally and possibly most importantly, give team members insight into unique perspectives held by their colleagues...leading to a stronger team.” (Niven, 2006a)

Two case studies completed by 2GC Active Management on companies disguised as “Crosshouse” and “TRURO” evaluated the area of standardization. (Crosshouse is a multi-national fast-moving consumer goods company and TRURO is a multi-divisional oil firm based in the Middle East.) Through their study of Crosshouse, 2GC concluded that a standardized approach “facilitated auditing of BSC design work, and also built a common vocabulary within the organization.... This helped promote internal discussions concerning strategy, and also made it easier for units to learn about their new unit’s strategy and performance.” (Lawrie, Cobbold, and 2GC Active Management, 2001)

Conversely, the case study on TRURO found that a less standardized “default design approach” was set in place for cascading the BSC to ensure consistency throughout the project. They found that using a common design helped with “communication and performance issues both during and after the design project.” However, with this benefit, the company also incorporated a standardized “objective based BSC architecture,” which bordered on the negative aspect of standardized content. Because of this, 2GC Active Management concluded TRURO “reduced the availability of the developers of the...BSC...to ensure alignment with the overall goals of the business.” (Antarkar et al., 2001).

Select the Right Objectives and Performance Measures (Step 4)

The selection of the “right” objectives is crucial to a company’s BSC success (Schneiderman, 1999). Commonly, executives, who have historical knowledge and know what areas their company must succeed in to be profitable, meet to discuss and select their BSC objectives and performance measures. But there are scientific methods available to also make these selections. One such way is through the use of a quality function deployment (QFD) (Schneiderman, 1999). QFD was introduced in 1972 by Yoji Akao to aid in physical design. Since then, it has also been shown to be valuable in non-physical designs. Literature revealed a small study where QFD was used on the systematic selection of textbooks, as well as a more applicable, larger study where QFD was used in developing a BSC for an air cargo terminal. By applying a scientific method for selection, such as the QFD, users could “concurrently engineer towards the goal of ensuring the satisfaction of shareholders, employees and external customers” (Chen and Chou, 2006).

Quantify Objectives or Their Performance Measures (Step 4)

A company should also take care to measure what they want to manage and to not manage what they currently measure (Excitant, 2005b; Kaplan and Norton, 2004). There were two important areas noted in this section when selecting BSC objectives or their performance measures. First, they need to be quantified to clearly relay the priorities of the
company to their employees and permit statistical analyses about a BSC’s success to stay the course, change directions or simply convince sponsors of the BSC’s success. Secondly, when numerous measures are identified to represent a single objective, those measures should be weighted to reflect each measure’s importance on the objective. This permits organizations to prioritize their efforts and resources as well as properly analyze hypothesized relationships.

Under the BSC framework, there are two reasons why objectives or performance measures require quantification. First, managers sometimes choose “vague and nebulous terms” to identify an objective (Niven, 2003). Selecting quantifiable objectives (or performance measures when a vague objective is named) provides employees at all levels with the ability to clearly understand the objective. This permits “all employees [to] focus their energies and day-to-day activities on the [now] crystal clear goal” (Niven, 2003). Secondly, quantified objectives (or performance measures) permit management to question and test their hypothesized cause and affect relationships.

### Ensure Objectives Present a Causal Pattern (Step 4)

Objectives should be selected in such a fashion that they are all linked through cause-and-effect (Kaplan and Norton, 1996). The rationale behind this relationship is that a properly constructed scorecard should tell the story of the business unit’s strategy through a sequence of relationships. According to Drucker, “The most common source of mistakes in management decisions is the emphasis on finding the right answer rather than the right question” and BSC is no exception (Schneiderman, 1999). It is not enough to simply select objectives that meet the criteria within each of the BSC’s perspectives. Emphasis should be placed on selecting objectives which “…identify and make explicit the sequence of hypotheses about the cause-and-effect relationships so that they can be managed and validated” (Kaplan and Norton, 1996). This philosophy of the obligatory cause-and-effect relationship throughout the BSC should link all objectives, from the bottom of the strategy map to the top.

“The failure to develop a causal model of the strategy will cause organizations to develop performance measures that are not tied to how the organization intends to compete. The outcome is a collection of measures that is fragmented and adds little value add to the organization. The BSC ends up becoming an exercise in developing more paper work and information collection that does not have a strategic impact.” (Othman 2006).

### Implement Strategy Maps (Step 4)

Another critical part of the BSC, a strategy map, is a necessary tool used to “align priorities of different domains and to help balance the tangible and intangible elements in the overall strategic plan” (Kaplan and Norton, 2004). In 1982, Brookings Institute showed that the majority of an organization’s value was tangible—62 percent (Blair, 1995). Lev estimated that by the end of the twentieth century, tangibles would account for only 10 to 15 percent of a company’s value (Webber, 2000). While the developers identified the strategy map to assist in the balance of tangibles and intangibles, it has also proven to be a globally recognized form of understanding the user’s strategy and causal objective measures.

Kaplan and Norton explained how a strategy map can help organizations align their strategy and its characteristics:

“Physically, a strategy map is a single page split into four horizontal bands or rows – one for each perspective, plus information listing areas of alignment, such as strategic change. Each band displays its area’s priorities with the names circled. These priorities range from long-term shareholder value on the financial band to the customer value proposition on the customer band. Arrows link related subjects, up and down, from one band to another. The result is one page that describes the company’s value proposition and growth strategy, plus the linkages that explain how those objectives will be achieved.” (Kaplan and Norton, 2004)
Prior to using a strategy map as a part of the BSC, organizations experienced negative side effects. “Organizations went overboard with the number of measures they adopted.” Furthermore, “not only were there too many to measure and manage, they were often only marginally relevant or conflicted with other measures.” The absence of scorecards also contributed to a lack of required linkage between the strategy and objectives. (Armitage and Scholey, 2004) These effects could still hold true for organizations that do not apply them today.

Select Software to Help— Not Hinder (Step 5)
Software should help—not hinder—the efforts to manage business processes. This concept is especially important when implementing and using a BSC, which has structural roots in a company’s ability to capture and monitor measurement data with appropriate software. Should software become a roadblock to success rather than an enabler, discouragement and non-productivity becomes inevitable.

South Florida Miami-Dade County’s Office of Strategic Management apparently knew software was a key to strategic success when they selected Active Strategy Enterprise™ software. This software permitted drilldown capability starting with top-tier objectives and ending with the supporting measures. (Active Strategy, 2007b) In addition to the ease of data review throughout the different levels and data collection, this system also facilitated “deeper and more beneficial reviews of performance, allowing key managers to focus not only on how they have been performing to date, but much more importantly on where performance levels need to be and how they will get there.” (Active Strategy, 2007b)

The literature showed that helpful software is required to help mitigate difficulties in BSC implementation and use. It provides the capability to capture and utilize all BSC data. Helpful BSC software also increases employee buy-in and moral which could lead to increased productivity.

Select BSC Goals and Timelines for their Completion (Step 6)
Like objectives, goals and their timelines are commonly selected subjectively. Arthur M. Schneiderman, independent consultant on process management, contended that: “...rather than negotiating scorecard goals, they should be based on knowledge of the required corrective actions, or absent that knowledge the capabilities of the improvement process as captured in an empirical model such as the half-life method” (Schneiderman, 1999). Schneiderman also expanded this reasoning stating that if a goal is too low, the company will underperform relative to its potential; if the goal is too high, the company will underperform according to others’ expectations. In either circumstance, a non-desirable outcome will be the result.” (Schneiderman 1999)

In the case study of UNUM Corporation, goals were believed to have a strong impact on obtaining desired results. UNUM selected and referred to their goals as ‘Goals 1998.’ Farrar commented, “Specifying a year by which we reach our goals worked well...because it gave employees something definite to aim for...” (UNUM Corporation, 1999). The case study on UNUM Corporation showed the benefit of establishing goals which were met by a corresponding timeline, but it also demonstrated that they may have also been doing themselves an injustice if those goals were established below the company’s potential.

Operating without the establishment of goals would lead to organizations just going through the motions. To maximize potential and results, not only do goals need to be set and worked towards, the “right” goals need selected.

Simplify Management System — Do Not Just Add To Existing Framework (Step 7)
This step is important in managing precious resources and obtaining employee buy-in. Niven wrote that “the key to BSC success lies in selecting, and measuring, just those processes that lead to
improved outcomes for customers, and ultimately allow you to work toward your mission” (Niven, 2002). The BSC was designed to operate as the central management system within an organization. Maintaining current measures until the new BSC is online could prevent a management gap. However, a decision to add the BSC to the existing framework with no intention of making it the primary management system ultimately increases the number of measures which must be tracked. This increase could lead to reduced employee buy in and diluted results to the decision makers.

2GC Active Management echoed the viewpoint that the BSC should be the central management system by stating the “BSC...is designed to improve focus on what is important.... This increases clarity and reduces ambiguity.” TRURO chose not to replace their current management system with their BSC, and “the introduction of additional processes [without reduction in current measures] did not lead to simpler or more effective business processes.” (Antarkar et al., 2001) In a rare case where a company identified through implementation of a BSC that they were in fact not using enough measures to monitor operations, measures could be added. For Crosshouse “new information was relevant and valuable. This offset resistance to [the] increase...” (Lawrie et al., 2001).

Only measures that lead to improved outcomes for customers, and ultimately allow an organization to work toward their mission, should be utilized. By focusing on other than these measures, companies consume precious resources and may decrease moral.

**Cascade the BSC (Step 8)**

Without cascading the BSC, the executives would not know where the company is trying to go and what it is trying to achieve. By cascading we mean translating the corporate-wide scorecard down to first business units, support units or departments and then teams or individuals. Without this translation of corporate-wide strategy down to the lowest tier, workers would be left in the dark and unable to direct their efforts accordingly. Niven opened his commentary on cascading the BSC to create alignment by describing a story about former President Johnson’s tour of Cape Canaveral during the space race to the moon. Niven says that:

> “During his visit, the president came across a man mopping the floor and asked him, “What’s your position here?” The gentleman looked up from his pail and proudly replied, “I’m sending a man to the moon.” Such is the power of alignment, when every person, regardless of role or rank, possesses a clear line of sight between his or her job and the organization’s loftiest goals.” (Niven, 2003)

Niven quantified this point by including the results presented by consulting firm Watson Wyatt that only 49 percent of employees understood their company’s goals, a 20 percent decrease from a study completed just three years earlier (Niven, 2003).

Cascading scorecards down to the team and even the individual level provides employees the understanding as to the critical nature of their contributions towards the company’s strategic vision. Furthermore, this understanding could even encourage employees to develop personal measures to assist the company in achieving their strategy. Without establishing goals, even at the lowest levels, companies could fail to reach their potential.

**How to Use the Eleven Keys**

Table 1 suggests an ordering to be used with implementing a BSC. Using this ordering scheme is important in BSC implementation, as each sequential step relies on success in the previous step to be most effective. For example, if you don’t deploy the BSC from the top down with the full support of leadership, it’s unlikely adequate resources will be allocated for steps 2 through 11 to be successful. The keys numbered 4 through 7 are listed under implementation step 4, as they should be established in concert with each other. Implementing them together is crucial so that objectives and performance measures are adequately quantified and present causal...
relationships derived through the implementation of an organization-wide strategy map.

IMPLEMENTATION

Determining the key BSC areas an organization must address and succeed in to optimize its use was the first of two goals of this research. The second goal was to assess an organization with these key areas. This was done for Headquarters Air Force Materiel Command (AFMC) to determine if their BSC implementation and use aligns with what the literature indicates is required to obtain optimal results.

This assessment was done through an analysis of both historical and perceived differences between their implementation and the eleven keys to successful implementation. The historical approach identified specifics within each key area based on data provided by the organization that oversees AFMC’s BSC and data obtained from their strategic organizational web page. Data was obtained in the form of presentations, meeting minutes, and instructions. Perceived differences were identified by comparing the guidance developed within each of the eleven key area with AFMC’s specifics for each of those key areas. Recommendations were provided to AFMC by identifying gaps or perceived differences between AFMC’s BSC and the literature’s guidance.

To provide a specific assessment, AFMC was assigned one of three ratings within each of the eleven key areas. The three possible ratings were:
1. Low - critical area within a key was missed
2. Medium - met the basic intent of the key
3. High - fully met the intent of the key

Specific instances of both high and low performance were identified within each of the key areas in order to highlight successes, as well as elements upon which improvement could yet improve the existing BSC program. This assessment with recommendations was provided in a formal report to AFMC for actions they deem most appropriate. Although specific results of AFMC’s assessment can’t be shown, we’ll discuss significant general results that showed the greatest impact on their BSC program. Although AFMC established a BSC infrastructure which developed governance and processes, the BSC program was not cascaded down to the lower tiers. This alone is enough to result in implementation failure. However, combine this with failing to ensure that objectives present a causal pattern while chasing an ever-changing array of metrics and the result becomes clear. This AFMC BSC implementation effort was doomed to failure because significant dimensions were never completed. This effort eventually lost funding support, due to lack of progress.

CONCLUSION

We identified 11 keys for BSC success, based on reviewing cases found in the literature. Understanding the BSC concept and its key areas to successful implementation and use are critical in developing or evaluating a company’s BSC. The contribution of this research is based on a meta-synthesis of several implementations of the BSC within firms. A list of BSC implementation and evaluation key focus areas has not been previously compiled, to our knowledge. The managerial implications of using these key focus areas can be seen in this research through the successful and unsuccessful examples depicted in the development and description of the eleven BSC keys, as well as the consistent outcome shown in the implementation case.

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THE AUTOMOTIVE INDUSTRY SUPPLY CHAIN CASE COMPETITION: A UNIVERSITY AND INDUSTRY PARTNERSHIP

Timothy W. Butler
John C. Taylor
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ABSTRACT

The importance of business schools collaborating with industry, and especially local companies, is self-evident. One way that the Global Supply Chain Management Program in the Mike Ilitch School of Business at Wayne State University has collaborated with General Motors and several major suppliers, and potential employers of students, is through an automotive industry supply chain management (SCM) case competition. In 2016, the Global Supply Chain Management Program, along with General Motors, will host the 6th annual General Motors/Wayne State University Supply Chain Case Competition. Supply Chain Management students from universities around the world travel to Detroit, MI to participate in the competition and learn about the global automotive industry. In addition to the competition, students tour an automotive assembly plant and network with industry executives and young managers. General Motors and other sponsoring companies utilize the competition to recruit top talent for entry level supply chain management positions, and to help with the education of students. Wayne State and its students benefit from increased exposure to companies with benefits relating to research, faculty recruiting, placement of students, and general development of the Wayne State SCM brand name. This article discusses the nature of the competition and the competitors, issues involved in producing such an event, the costs, and other benefits and challenges related to hosting such a competition.

INTRODUCTION

In early 2011, faculty from the Global Supply Chain Program at the Mike Ilitch School of Business presented General Motors with a proposal for a case competition that would bring students from between 10 and 20 universities to Detroit to learn about the automotive industry and about career opportunities in the field. General Motors executives realized the benefit of the competition, and worked with Wayne State to help the university secure additional sponsors. Each of these suppliers; Delphi, Lear, and Ryder, has significant operational interests in Detroit. Since 2011, the General Motors/Wayne State Supply Chain Case Competition has expanded to as many as 23 universities spanning the globe. In 2015, international universities participating in the competition were Wuhan University (China), Monterrey Technological University (Mexico), and the International University of Logistics and Transport in Wroclaw (Poland). United States universities participating in the competition ranged from Rutgers University in the east to Weber State University in the west. See Table 1 for the complete list of universities participating in 2015.

In this article we discuss the nature of the competition and the competitors, other competitions, issues involved in producing such an event, the costs, and other benefits and challenges related to hosting such a competition.

OTHER CASE COMPETITIONS

There are many business competitions offered around the world, and a good number focusing on supply chain management.

One of the oldest supply chain management competitions currently existing is “Operation Stimulus”, held by the Denver Transportation Club of Denver, CO (Operation Stimulus, 2016). The Operation Stimulus Case Competition began in 1992, and approximately sixteen schools compete. The students receive the case about a month prior to the event. Universities are divided into four
groups of schools – which are called “regionals”. The four schools in each regional compete against each other by analyzing and solving a “real world” supply chain case and presenting their case analysis to industry executives. Students receive the case approximately one month prior to the competition to analyze and prepare the presentation. One winner is selected from each regional and the finals are held the next day with a slight modification to the case, which they call a “twist”. The twist is a disruption such as a storm or strike or government regulation that disrupts the current system. The twist tests which team of students can respond to uncertainty and how robust the initial proposal is to uncertainty. Judges evaluate the student’s presentations and make a determination of the winner.

An alternative approach to a competition, hosted by the Broad Business School of Michigan State University, is a simulation game where teams of students make operational decisions for businesses which are in competition with other businesses in the simulation game (Bowersox, 2016). This competition is held for MBA and undergraduate students, though they attend the competition during different weeks in October. Unlike case competitions, the teams accrue points in the simulation game and the winner is determined by the final accumulated game points.

The Big Ten Supply Chain Case Competition held at Rutgers University hosts undergraduates and MBAs together during March (Big Ten, 2016). The undergraduates and MBAs compete separately, as they do at the Michigan State Simulation challenge, although they attend at the same time. Teams receive the case about one week prior to the event to prepare their presentations.

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Other notable case competitions (National, 2016) are at Arizona State, at Ohio State University, the University of Minnesota, Weber State University (Weber State, 2016), and at Pennsylvania State University.

OBJECTIVES, IMPACT AND DIFFERENTIATION

In order to secure support from businesses for the case competition, the purpose and expected benefits needed to be spelled out to them. Goals for Wayne State – the host university, supporting businesses and the city of Detroit were identified as follows:

- **For WSU** - The goal of the Global Supply Chain Management Program at the School of Business Administration is to become recognized as one of the top Supply Chain Programs in the United States. The Program is focusing on complex manufacturing and the automotive industry in particular as a major target market, and is trying to differentiate its program with offerings that uniquely cater to this type of industry. The competition is one of the initiatives that we are undertaking to give us the exposure and prominence to help us achieve that goal. The Global Supply Chain Program has made unique and strong connections and relationships with General Motors and the other supplier sponsors. This aids in placing students in jobs and in initiating other joint programs, such as visits to facilities in foreign countries for our study abroad students. The competition has been one major factor in helping the Wayne State Global SCM Program grow to a size of 450 undergrad majors, and 215 MBA SCM Concentrators, with 8 full time SCM faculty, many of whom have automotive experience and/or undergrad engineering degrees.

- **For WSU and Supporting Businesses** - A goal of this competition is to build stronger relations between the School of Business and Southeast Michigan businesses.

- **For WSU Students** - The Goal for students is to showcase WSU Supply Chain Management students with major businesses, and to help develop internship and full time position placements.

- **For General Motors and Supplier Sponsors**
  - The goal for Detroit regional businesses is to network with top students from across the United States. They will have a captive audience of top SCM business talent. General Motors and sponsoring suppliers interview students for internships and full time jobs.

- **For Detroit** — Students from all over North America and the world have heard about Detroit’s problems and circumstances. This competition allows students and faculty to visit Detroit and see for themselves the positive opportunities and lifestyle offered by Detroit and Southeast Michigan.
  - Students will stay at the Marriott Renaissance Center in downtown Detroit. The Hotel has a beautiful vista of the City, the Detroit River, Canada across the river, and Lake St. Clair. They can ride the People Mover to Comerica Park for a Tiger game or go to the Greektown area of restaurants and nightclubs. This area is in the heart of the only downtown in the country with a soon to be four professional sports facilities (Detroit Tigers, Pistons, Lions and Red Wings) within a few blocks of each other with prospects for a fifth stadium for major league soccer.
  - Students will be taken to The Henry Ford (or another top venue) to see one of America’s most unique and spectacular museums focused on the Industrial Revolution, the brad
vehicle industry, and of course the automotive industry.

- A grand finale dinner will be hosted on one of the cruise boats on the Detroit River.

- For Visiting University Students - Students will have the opportunity to network with peers from universities around the United States and to network with top executives from sponsoring businesses. Both students and businesses will be benefitted in several ways, such as:
  - Improving their understanding of the global automotive industry, and learning more about SCM as it related to this industry.
  - Students will be able to benchmark their abilities and academic progress with top students from other universities. In the Finals of the competition, all students will be attending and see the presentation and analysis of the finalist schools.
  - Students will have the opportunity to meet with executives in an informal environment and discuss business issues and what life is like as a supply chain professional.
  - Business executives will have access to interview the top supply chain students from around the country — an outstanding opportunity to recruit the best talent.
  - Students will learn a great deal about supply chains in complex manufacturing environments and about the tradeoffs and issues involved in running these supply chains. The case will also help them improve their teamwork and ability to work together on a complex problem.

While there are many SCM competitions, this one is differentiated from the others in several ways. First, this competition has intense industry backing, both in terms of involvement in writing the case and in terms of the industry focus of the case, and the very major financial support across five companies in the tens and tens of thousands of dollars. It is also important to note that the case is one of the only ones in the country that relates to complex manufacturing, and more specifically the auto industry. Other competitions are not as focused on a specific industry. Complex manufacturing SCM issues are very different than those found in most industries, in that complex manufacturing involves more intense purchasing relationships leading to innovation from suppliers, more supplier development, complex quality issues, more global flows of components, and logistics flows that are inbound to a few assembly plants as opposed to flows that are from one plant to hundreds of thousands of retailers. This competition is also unique in that it deals with multiple functional areas across the broad reach of SCM, as opposed to focusing on just purchasing, operations, or logistics.

Secondly, this case competition is unique in its global nature. The actual case deals with very critical global sourcing and logistics issues every year. The case also is unique in drawing students from schools around the world. For instance, in the last two years this competition has drawn schools from China, Poland, Mexico, and Brazil. In fact, this competition led to GM Brazil organizing its own similar competition for a number of Brazilian SCM programs, with the winner coming to our competition in Detroit. The number of students from around the world is an outstanding experience for both the foreign and U.S. students.

The sheer size of this competition also makes it unique. With 23 schools it is the largest competition in the world to the best of our knowledge. Given 4 students per school, and one faculty member, we have some 115 participants each year, and have
served approximately 500 students since our first year. The size of the program also makes this competition the most strongly funded of any SCM competition in the world. Unlike most competitions, the schools at this event need to pay just their transportation costs, with our sponsors paying for hotel rooms, meals, buses, events, and the like.

Fourth, we believe this competition is unique in providing students with unparalleled opportunities to interview with Fortune 500 firms. For instance every student has an opportunity to interview with General Motors, one of the largest firms in the world, one of the most global, and one of the most high tech in the world.

THE CASE COMPETITION

Business students are presented a case developed by experienced and high level automotive industry purchasing and supply chain executives. This “real world” case has breadth and depth that will challenge the participating students on many levels, such as:

- Advanced technology - in this dynamic world, today’s advanced technology can be obsolete tomorrow. Students grapple with the economic risks associated with advanced technology.
- Green supply chain - students are confronted with consumer’s demand for economically efficient business processes and the economic benefits and challenges of a green supply chain.
- Globalization - students will examine sourcing issues and choices related to domestic or global sourcing. Students may need to consider NAFTA or CAFTA or other U.S. trade agreements in their analysis. Students must understand rules, culture and trade-offs for conducting business in Asia, Europe, or Latin America versus sourcing domestically. Transport costs, production costs, culture, laws, and currency risk together pose enormous threat and opportunity for supply chain managers. This dimension of the case has become more important today, and will potentially grow in importance if trade restrictions are increased and multinational trade blocks are eliminated. Such barriers to trade will increase the complexity of the issues and need for analysis. The case will need to reflect these types of issues going forward.
- Production and Logistics - students will be required to evaluate alternatives, and make the appropriate decision based on short term and long term benefits. They will make decisions regarding short term vs. long term issues regarding quality, plant location, start of production, and production ramp-up. They will be required to make a presentation to a judging panel composed of business executives on their recommendation.

While a variety of topics and issues are incorporated into the case and there are many possible answers, there is no one “right answer.” The winning case presentation must provide a supportable numerical solution, but also address a variety of “soft” issues. Overall, the assumptions made must be defensible, and the proposed solution must make sense to the panel of industry judges. In addition, the winning team must be able to “sell the proposal,” just like in the real world. So the winning team can be hard to select, and often there are just small differences between the teams at the regional level and in the overall finals competition.
The General Motors / Wayne State Supply Chain Case Competition is a four day event with students arriving on Thursday afternoon and departing on Sunday morning. The sponsors of the GM / WSU Case Competition cover the charges for the hotel rooms for all the teams. That would be three (3) rooms for each school for three evenings (See Table 3 for budget layout for 16 team competition from 2011) which totaled approximately $79,000. Two additional rooms per night are reserved for WSU university staff that stay at the hotel during the competition. Competition rooms for holding the case presentation must also be rented - on Friday four rooms host the competition with judges and a small audience. On Saturday, one large room for the “Finals” must be rented plus a holding room for the competitors. The competition room rent totaled $800. Note that in more recent years the competition has been expanded to as many as 23 teams.

As noted earlier, during 2015 and 2016 the competition became a global one with the addition of teams from China, Brazil, Mexico and Poland across those two years. The foreign teams are brought in 3 nights early to allow them to adjust to time differences. This of course results in additional room, meal and other costs for these teams but the global nature of the competition is thought to be well worth the additional cost.

Bus “coaches” are rented to transport the students to business and cultural activities. 100 participants were budgeted for every activity to account for all students (16 universities), advisors, judges, sponsors, and other guests of the competition. On Friday of the 2011 competition, after the “regional” presentations and lunch, coaches transported students and their advisors to the Detroit-Hamtramck Assembly Plant. On Saturday morning of the first competition in 2011, Coaches transported students and advisors to the Henry Ford Museum in Dearborn, MI. The cost of these coaches was $2800 and tickets to the Henry Ford museum totaled $2,000.

The hosting and organization of a collegiate case competition entails its share of complexities. Below is a summary of many complexities that challenge the hosting of a case competition.

The General Motors / Wayne State Competition is held in late September / early October for a number of reasons including:

- **Timing**
  - Start of school / Exams - for a case presented to students prior to the competition, there must be time for participating advisors to assemble a team and for the team to prepare their solution and presentation. Hosting a competition in early fall avoids major exams, but since many students are out of touch during the summer, assembling a team is challenging. Also, students have campus extracurricular activities that compete with case competitions (e.g. football season). Later in the semester, important class assignments are due (midterms), and later, final exams are a concern. The GM/WSU competition, in early October, allows students to get settled in classes, but precedes (hopefully) major assignments and exams.
  - Weather - Fall weather in Michigan is arguably the best season of the year for our region. Later in October gets cold, and March / April can be very unpredictable.
  - Conflicts with Academic Conferences - academic conferences occur throughout the year and faculty must attend those to remain current on research and teaching, and maintain networking contacts for research. Two conferences that occur near the time of the GM/WSU conference are Council of Supply Chain Management Professionals (CSCMP) and American
Conflicts with other Case Competitions - this is not presently a serious challenge, as other competitions are not scheduled as early in the academic year as ours. Our competition, being specialized in automotive supply chain, will likely attract schools with interest in that area. Also, our competition is inexpensive in that the sponsors pay for the hotel, meals, and activities as opposed to other competition, where schools must pay for rooms and activities.

Conflicts with Detroit events - possible challenges are Lions football games and Detroit Tigers games, causing hotel rooms to be in high demand.

Other challenges relate to team size and case development as follows:

- **Team Size**
  - Competitions range team sizes between 3 and 4. The team size for the GM/WSU competition is four. Ideally, two male students and two female students represent each school, and then the hotel rooms can be shared by two students. Occasionally teams come with three males or three females and one of the other gender. Sometimes all four team members are the same gender.
• Immigration Restrictions
  o Given the number of foreign teams the recent trend towards nationalism and restrictions on the free flow of people and goods presents a challenge. This challenge can be seen in the already complex issues involved in getting foreign teams visas in time to attend the competition. These overseas teams may have students not just from their home country but from several other countries as well. In addition to the foreign teams, many of the U.S. based universities may have foreign born students on a team and they may be nervous about travelling through airports and subjecting themselves to intrusive questioning and searches.

• Case Development and Publication
  o For the General Motors / Wayne State Competition, the case is fictional, yet based on an actual or potential problem. The case must be composed, edited, solved, and delivered to the students approximately one month prior to the competition. General Motors supply chain managers write the case with the assistance of Wayne State faculty. The case must also be distributed to judges who need to read and understand the case. As a part of judge training, notes and guidelines are provided to them (think Cliff's Notes), in order to give them a notion of what general answers are expected from the competitors.

While these challenges have presented a number of problems, so far the sponsors and Wayne State have been able to overcome the potential obstacles. One of the biggest issues has been when to hold the competition. Determining the date requires juggling issues related to weather in Michigan in the Fall, the short time between the return to classes (especially for east coast schools) and the date when the case goes out to students a month in advance of the competition date, other case competitions, and various professional association meetings in the Fall such as CSCMP. That is not to mention other issues such as the availability of the hotel, plant operations related to holding a tour, and availability of the various rooms and reception facilities. However, by planning carefully every year, and working early with schools to make sure they are on top of the competition dates, we have been able to come up with a viable date for the vent. Saying that, the weather can be a bigger challenge!

One of the other critical issues involves case development. This is a joint effort by Wayne State, GM and the other sponsors. The case preparation begins months in advance. A large team of GM personnel lead the case development, from a wide range of functions, so developing a case that is understandable, solvable, and not too hard or too easy is a difficult challenge. But again, by having multiple reviews and working together we believe we have achieved a good balance. Another issue is that we must and do create a firewall between the Wayne State case administration team, and the Wayne State faculty/students that are participating as one of the teams. This is of course necessary to make sure the Wayne State does not have an unfair advantage. We believe we have achieved this by really keeping the Wayne State team faculty member picking and overseeing our team from any information whatsoever about the case.

CONCLUSIONS

Bill Hurles, former Executive Director of Supply Chain for General Motors and GM’s Champion for the Case Competition has stated that “The WSU/GM Supply Chain Case Competition, now in its 6th year, has been an incredible opportunity to help challenge Supply Chain Students with real business situations requiring teamwork, rapid research, and presentation skills. It helps expose them to the Automotive Industry and complexities of managing a fast paced global supply chain enterprise. The format of the competition also broadens each
participant’s network to industry leaders and fellow students, while also touring one of GM’s most complex automotive assembly plants and time for fun/relaxation in Detroit’s growing downtown district [8].”

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Weber State University Supply Chain Case Competition http://www.weber.edu/WSUToday/021816_SupplyChainComp.html - 2016.

BIOGRAPHY

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AN EMPIRICALLY DERIVED FRAMEWORK OF LOGISTICS MANAGEMENT STRATEGY

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ABSTRACT

The purpose of this paper is to present an empirically derived framework for Logistics Management and discuss how it integrates organization’s short-term objectives with the need to respond to the complex external environment. Organizational theory, strategic planning and logistics management literature were reviewed carefully in identifying the conceptual support for the derived framework of logistics management and organizational competitiveness. The proposed generalized framework demonstrates that Logistics Management Strategy has the strongest positive effect on Organizational Competitiveness when it is mediated by Logistics Coordination Effectiveness and Customer Service Commitment. Overall Logistics Strategy is a necessary, but not sufficient, condition for increased organizational competitiveness. If the Overall Logistics Strategy is accompanied by (a) effective logistics coordination and (b) customer service commitment then organization competitiveness is likely to be greater. This conceptual study contributes to the field by presenting a generalized framework to improve researcher and practitioner understanding of the role Logistics Management in Organizational Competitiveness. This study integrates previous research and thought domains to develop a generalized framework that guides our understanding of the role of Logistics Management and its consequences on Organizational Competitiveness.

INTRODUCTION

There has been a modest effort in the literature that attempts to develop a generalizable framework that addresses the role of logistics management in organizations. Much of this discussion focuses on the specific activities and relationships among organizational components. For example, Mentzer, et al. (2001) conducted an extensive examination of the literature and developed a model of inter-corporate and inter-functional (intra-corporate) collaborations that led to supply chain flows in products, services, information, financial resources, demand, and forecasts that resulted in customer satisfaction/value/profitability/competitive advantage. Although they provided some insights into supply chain management’s components, the model provided little explanation into the dynamics of logistics management.

Over time there has been a moderate level of debate among scholars regarding the meaning of business logistics and, later, supply chain management. However recent discussions have focused on examining the relationship of supply chain management with logistics, marketing, production, and operations management (Mentzer, Stank, and Esper, 2008). Their efforts contributed to the development of a hierarchy of research focus for future debate of the relationships of inter-firm supply chain phenomena, intra-firm functional phenomena, and functional level phenomena.

1 Deceased
Specifically, they proposed a hierarchy of research focus comprised of three levels. Level 1 research would examine functional level phenomena. The three areas of this level were Logistics (time and place transformation), Marketing (exchange transformation), and Production (physical transformation). At this level research would focus on the specific key elements of these three areas. Level 2 research would examine Operations Management. This level would focus on the relationships among intra-firm functional level phenomena of logistics, marketing, and production. Finally, Level 3 research would examine relationships among inter-firm supply chain phenomena.

The focus of this research is on the role of logistics in contributing to organizational effectiveness. As described by Mentzer, et al (2008), the purpose of logistics is time and place transformation by planning, controlling, and executing activities associate with seven activities. They are Transport network design and management; Warehouse location, design, and management; Materials handling; System inventory management; Order management and fulfillment; Procurement; and Customer service. In this manuscript the authors focus on Overall Logistics Strategy (OLS), customer service, and its role in organizational effectiveness. The authors will integrate a seminal organizational theory with the empirical findings of twenty-five years of research into a generalized framework to guide logistics management strategy. This study is organized into several sections. We first provide an overview of an organizational theory construct. Next we present information about selected insights from several well-respected scholars in logistics. Third, we present the conceptualization and validation of the proposed empirically based framework of logistics management, and discuss the context of logistics management within the organization. Finally, we provide conclusions and discussion that include the significance of this manuscript for teachers, practitioners, and researchers of logistics management.

2 The authors appreciate the helpful comments provided by James R. Stock on an earlier draft of this manuscript.

THEORY AND CONSTRUCT

James D. Thompson (1967) postulated that an organization faces a dichotomy of (a) having to master its core technologies (the technological subsystem) while (b) responding to a dynamic and uncertain external environment. The technological subsystem attempts to isolate itself from the external environment by (in order of preference):

- Sealing—where core technologies are sealed from the external environment. Thompson (1967) mentions the continuous processing of chemicals as an example of a process where there is a high degree of control with little influence of outside influences.

- Buffering—where input and output “cushions” such as raw material safety stocks and finished goods inventories insulate the technological cores from fluctuation in supply and demand.

- Smoothing—where supply and demand are managed to reduce fluctuations in demand on the technological core. Examples of smoothing include peak and off peak pricing (of electric power usage; airline, hotel, and rental car pricing; early-bird pricing in restaurants; and the scheduling of non-emergencies in health care facilities.

- Adapting—where the technological core is adjusted in anticipation of changes in the external environment. Here forecasting, employee scheduling, and the use of casual (on call) employees are examples of adapting.

- Rationing—where an organization may set priorities (ABC analysis of products, customers, and markets), placing customers on allocation of scarce products, and setting of treatment priorities in health care organizations.
Core technologies are usually assessed on hard, objective measures of performance such as price per item, performance versus deadlines, output per unit time, service versus service standards, performance versus budget, and quality versus standards. The external environment is dynamic and is evaluated based on soft measures such as generalized norms, standards of good practice, elements expressing the public interest, and market dynamics. These measures of success are likely to be abstract or subjective.

The organization’s institutional layer or administrative subsystem mediates the technological and the external environment (In the Mentzer et al, (2008) article, Level 3 of Figure 4 is comparable to the concept of mediating between the internal and external supply chains). Attempts to mediate the relationship between organizational subsystems and the external environment result in a “paradox of administration,” where both flexibility from the technological core and certainty in the external environment are simultaneously sought. Therefore, the administrative subsystem seeks to obtain adequate commitment from the institutional subsystem to achieve technological core success in terms of hard measures of performance and from the technological subsystem enough capacity and slack to permit administrative discretion. This could be described as seeking order in schizophrenic surroundings.

The challenges of the administrative subsystem described in the previous paragraph are similar to the ideas summarized in Figure 4 of the Mentzer, et al (2008) article. Here Logistics, Marketing, and Production are considered as “functional areas” that Operations Management coordinates within the firm while Supply Chain Management is a coordinating concept that balances its supply chain with the supply chains of other organizations. However, Logistics, Marketing, and Production are not truly closed systems which operate in isolation. The following paragraphs provide a more holistic perspective of the nature of logistics in which short-term (technologically focused) and long-term (institutional level) objectives have to be simultaneously managed.

**PERSPECTIVES OF SHAPIRO AND HESKETT**

In a similar line of thinking, Shapiro and Heskett (1985) discussed a fundamental dichotomy of logistics management. On the one hand, the intricacies of the day-to-day operations of transportation, inventories, sourcing, network and location analysis, and control and coordination must be managed. On the other hand the broad, qualitative, long-term aspects of logistics must be recognized to insure that organizational objectives are achieved. This dichotomy was summarized by Shapiro and Heskett as the “The Two Faces of Logistics” where both (a) tactical, short-term, quantitative, and detailed analysis and (b) broad, qualitative, long-term, and strategic consideration have to be factored in simultaneously for effective logistics management.

The insights provided by Shapiro and Heskett (1985) and Thompson (1967) provide the foundations of a framework for understanding the environment in which logistics management operates. More specifically, while logistics management has to execute its role efficiently based on measurable performance outcomes (cost per item picked, customer service versus customer service standards, inventory levels, stock out frequencies, and a host of other evaluative criteria), it also has to help the organization to achieve its overall objectives (on-time new product introductions; quality standards; compliance with an array of local, state, national, multi-national, and international laws and regulations; and profitability goals). The following section presents an empirically derived framework that explains how logistics management balances the contradictions of the technological core and the external environment to contribute to organizational effectiveness.

**PROPOSED FRAMEWORK ON LOGISTICS STRATEGY**

In their original discussion of Process, Market, and Information Strategies, Bowersox and Daugherty (1987) recognized that classification of organizations based on strategic orientation was not absolute and...
that organizational forms (strategic orientation) overlapped. Further, they recognized that many firms combine more than one type of orientation and that no single type dominates within an industry. According to Wheelen and Hunger (2010), the basis for this theoretical structure lies within the framework of strategic management theory.

The process of classical strategic management begins with environmental scanning (identifying strategic factors) followed by strategy formulation (creating mission statement, objectives, strategies, and policies). The next stage is strategy implementation (developing programs, budgets, procedures) and finally evaluation and control (monitoring objectives). These activities proceed in a sequential, yet interactive, progression where previous steps may be modified based on feedback obtained from subsequent steps. For example, challenges in strategy implementation may cause an organization to rethink portions of strategy formation. Once in place, change spreads through the organization as it evolves over time. The overall objective of strategic management is to insure that an organization remains healthy in a business sense and can continue to advance its competitive advantage in the market place. The role of logistics management is to insure that its strategies support the overall strategy(ies) of the firm.

The strategy formulation phase also takes place at the functional level (Wheelen and Hunger, 2010). Here each business unit such as marketing, finance, R&D, operations, purchasing, logistics, human resource management, and information technology in turn must formulate their functional area strategies. The alignment of functional strategies with the overall corporate strategy is needed to achieve a unified effort working towards the common goal. A great deal of research in strategic management and related fields addresses how policies and objectives are developed and implemented within an organization.

Hult, Ketchen, and Arrfelt (2007) used theories of organizational learning and information processing to investigate how the culture of competitiveness and the knowledge base shape supply chain management strategy to meet the challenges of competing within a volatile market. The implication of this research is that maintaining competitive advantage is often driven by successful strategic management policies at the functional levels as well at the corporate level. Moreover, Defree and Stank (2005) studied how strategic management principles and processes impacted supply chain structural development and performance. The authors found an iterative relationship within the framework of strategy, structure and performance processes which suggested that supply chain management strategies needed to be aligned with their partners. This research illustrates a broader issue of the sequential nature of the strategic management process driving the functional areas within the business unit. Heskett (1977) emphasized that logistics considerations can play an important role in achieving strategic objectives, such as increased market share or increased profits. In traditional corporate structures, successful logistics strategy should result in increased effectiveness of business operations. Among the many functional areas affected, customer service is recognized as an area of primary concern for many organizations. Therefore, effective logistics can result in enhanced customer service operation.

Tseng (2009), proposed a conceptual framework to use a knowledge chain based on customer, supplier, and competitor information to support and improve the organization’s competitive advantage. Donaldson (1995) examined manufacturing companies and concluded that organizations which were more responsive to customer needs would be better able to improve their competitiveness. There has been a large body of research on many facets of customer service both from the empirical and theoretical perspectives. The overwhelming results leave little doubt that customer service at both the functional and corporate levels can provide a substantial competitive advantage. An examination of several selected published research articles shown in Table 1, indicates that logistics strategy affects logistics coordination effectiveness (LCE), customer service commitment (CSC), and company/division competitiveness (COMP).
## TABLE 1
### COMPARISON OF SELECTED LOGISTICS STRATEGY STUDIES

<table>
<thead>
<tr>
<th>Authors</th>
<th>Background</th>
<th>Methodology</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>McGinnis and Kohn (1990)</td>
<td>Authors began a review of alternate perspectives of logistics organization and logistics strategy.</td>
<td>Mail questionnaire to 523 logistics managers of USA manufacturing firms. Two hundred and twenty-two (42.4%) usable returns.</td>
<td>Logistics Coordination Effectiveness, Customer Service Effectiveness, and Competitive Responsiveness, among other variables, that varied p&lt;0.05 among identified strategies. No attempt to identify paths among significant variables.</td>
</tr>
<tr>
<td>McGinnis and Kohn (1993)</td>
<td>Builds on previous research to develop additional insights into logistics as a part of strategy.</td>
<td>Mail questionnaire to 146 subjects who had responded to a previous questionnaire. Fifty-nine (43.7%) usable returns.</td>
<td>Three logistics strategy clusters identified based on Process and Market strategies. Logistics Coordination Effectiveness, Customer Service Effectiveness, and Company/Division Competitiveness varied p&lt;0.05 among strategies. The need to explore linkages of logistics strategy was recognized.</td>
</tr>
<tr>
<td>Clinton, and Closs (1997)</td>
<td>Assess whether underlying factors could be identified for the Bowersox/ Daugherty typology.</td>
<td>Used survey data from 375 USA manufacturers and 103 Canadian Association of Logistics Management members.</td>
<td>Identified six of ten commonalities of advanced logistics organizations. Concluded Process, Market, and Channel (Information) strategies have a common objective of managing the logistics process. Process emphasizes internal integration; Market emphasizes external integration; and Channel (Information) focuses on integrated planning and operations. Further concluded that the richness of logistics strategy variables is not exhausted and that further research is warranted.</td>
</tr>
<tr>
<td>McGinnis and Kohn (2002)</td>
<td>Tested relationship of Bowersox/Daugherty variables with Logistics Coordination Effectiveness (LCE).</td>
<td>Mail questionnaire to 714 logistics managers in USA manufacturing firms. One hundred and seventy-two (24.1%) usable returns. Multiple regression analysis was used to assess independent variables that explain variance in LCE.</td>
<td>Factor analysis identified two independent variables, one comprised of Process and Information strategies (P&amp;IS) the other consisting of Market Strategy (MS). Both independent variables were significant and explained 46.5% of the variance in LCE. The authors concluded that process, market, and information strategies contribute to logistics coordination effectiveness. Recommended further research to identify interactions among process, market, and information strategies and how these strategies blend to further organizational objectives.</td>
</tr>
<tr>
<td>Autry, Zacharia, and Lamb (2008)</td>
<td>Empirically developed logistics strategy taxonomy.</td>
<td>Mail questionnaire to logistics managers from multiple industries. Two hundred and fifty-four (38.0%) usable surveys were received from 685 subjects.</td>
<td>Cluster analysis was used to identify two logistics strategies: Functional Logistics (FL) and Externally Oriented Logistics (EOL). Recommended that further research investigate logistics strategy.</td>
</tr>
</tbody>
</table>
However, these articles do not provide a clear understanding of the relationships among logistics strategy, LCE, CSC, and COMP. Further examination of results of additional research will provide additional insights into how logistics strategy integrates short-term objectives and responds to the external environment in order to achieve organizational competitiveness. For example, McGinnis and Kohn (1990) identified that LCE, CSC, and COMP varied among logistics strategies (Intensive, Integrated, Low Integration, and Low Effectiveness) but did not identify clear relationships among those variables. Again, McGinnis and Kohn (1993) identified logistics strategy clusters and found that LCE, CSC, and COMP varied among these clusters without identifying clear causal relationships. Clinton and Closs (1997) focused on the Bowersox/Daugherty typology to examine the roles of Process, Market, and Information strategies and concluded that each strategy had a unique emphasis (e.g., process strategy akin to internal integration, market strategy similar to external integration, and information strategy similar to integrated planning and operations). However, they were not successful at developing an integrated conceptual model of logistics strategy.

Autry, Zacharia, and Lamb (2008) identified two distinct logistics strategies, Functional Logistics Strategy (whose primary goal was maximum logistics efficiency) and Externally Oriented Logistics Strategy (whose main goal is to respond quickly and efficiently to changing customer needs, outbound delivery, and support and services). Their assumption was that these two strategies were mutually exclusive of each other, concluding that a blend of these two strategies in one organization was unlikely to be found. Finally, McGinnis, Kohn, and Spillan (2010) compared empirical data on logistics strategy collected over an eighteen year period and concluded that LCE and CSC would better measure logistics strategy outcomes. However, they did not develop a clear conceptual relationship between logistics strategy and the outcomes. Subsequently, the authors hypothesized that there may be relationships among logistics strategy, LCE, CSC, and COMP. The following paragraphs present the conceptual basis for the integrated framework. This framework proposes that logistics strategy and organizational competitiveness can be summarized using these interrelated components that influence one another. Table 2 provides brief description of each component based on the literature support.

**Structural Representation of the Conceptual Framework**

If we consider logistics strategy as a higher order latent construct consisting of Bowersox and Daugherty dimensions, then a conceptual model can be developed to validate this structure and investigate the linkages between logistics strategy and organizational outcomes. Bowersox and Daugherty (1987) suggested that process (PROCSTR), market (MKTGSTR), and information strategies (INFOSTR) have a common objective of managing the logistics process. There is a strong need to examine the interactions among PROCSTR, MKTGSTR, and INFOSTR and how they further organizational strategies. Literature listed in Table 1 support the argument that a possible course of inquiry would be to (a) examine the roles of PROCSTR, MKTGSTR, and INFOSTR in logistics strategy and (b) how LCE relates to overall logistics strategy, (c) how CSE relates to overall logistics strategy and organizational strategy, and (d) how logistics strategy relates to COMP.

Accordingly, the first component of this conceptual model is “Overall Logistics Strategy” which is comprised of three dimensions discussed by Bowersox and Daugherty (1987). They are “Process Strategy”, “Market Strategy”, and “Information Strategy”. Inspection of the components of these three constructs suggests that:

- Process Strategy corresponds well with Thompson’s (1967) “Technological Core” and the Shapiro and Heskett’s (1985) face of logistics that focuses on the near term. Summarizing Bowersox and Daugherty (1987), the process orientation seeks to maximize efficiency by managing cost through consolidating traditional SCM, operations and logistics functions including purchasing, manufacturing, scheduling, and...
physical distribution within the firm. Thompson (1967) summarizes the technological core as a sub-organization that is focused on the organization’ technical function. This sub-organization may focus on, for example, the processing and supervision of administrative data (medical claims or tax returns), handling customer service complaints, or transforming raw materials into finished products. Shapiro and Heskett (1985) describe the “two faces of logistics” where the logistics manager must simultaneously pay attention to detail (tactical, short-term, quantitative), while being able to see the big picture (broad, qualitative, long-term, and strategic). Here, the former of the two is comparable to Bowersox and Daugherty’s process strategy and Thompson’s technological core. The authors concluded that Process Strategy is one component of logistics strategy.

- Market Strategy is summarized by Bowersox and Daugherty as a limited group of traditional logistics activities that

### Table 2

<table>
<thead>
<tr>
<th>OVERALL LOGISTICS STRATEGY</th>
<th>LOGISTICS COORDINATION EFFECTIVENESS</th>
<th>CUSTOMER SERVICE COMMITMENT</th>
<th>ORGANIZATIONAL COMPETITIVENESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Strategy</td>
<td>- The need for closer coordination within the supply chain has fostered better working relationships among departments within the organization.</td>
<td>- Achieving increased levels of customer service has resulted in increased emphasis on employee development and training.</td>
<td>- Quick and effective responses to changing customer and supplier needs compared to our competitors.</td>
</tr>
<tr>
<td></td>
<td>- Logistics planning is well coordinated with the overall strategic planning process.</td>
<td>- The customer service program is effectively coordinated with other logistics activities.</td>
<td>- Quick and effective responses to changing competitor strategies compared to our competitors.</td>
</tr>
<tr>
<td></td>
<td>- Logistics activities are coordinated effectively with customers, suppliers, and other channel members.</td>
<td>- The customer service program gives us a competitive edge relative to our competition.</td>
<td>- Development and marketing of new products more quickly and effectively than our competitors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Is a strong competitor in most markets.</td>
</tr>
</tbody>
</table>

- Coordinated physical distribution to customers served by multiple business units
- Reduce complexity faced by customers
- Facilitation of coordination multiple business units to provide competitive customer service.

### Information Strategy

- Emphasis on coordination and control of channel member activities
- Manage information flows and inventory levels throughout the channel of distribution
- Facilitates the management of information flows and inventory levels throughout the channel of distribution
are managed across business units. Emphasis is on leveraging an array of activities (ordering, invoicing, delivery, and customer service) across business units to reduce complexities when doing business with the firm or organization. Market Strategy corresponds roughly with Thompson’s “Institutional Layer (Administrative Subsystem)” where this sub-organization mediates between the technical subsystem and those who use its products (customers, patients, and clients for example) and procures the resources needed for carrying out the technological activities. Again, Market Strategy and Shapiro and Heskett’s recognition of the need to blend the near-term (short-term tactical, short-term, quantitative, and detailed) with the big picture (broad, qualitative, long-term, and strategic) are similar. Here they also address the importance of maintaining the second portion, Market Strategy by recognizing that the “two faces of logistics” are comprised of issues included in both Process and Market strategies.

Information Strategy is summarized by Bowersox and Daugherty as activities (data processing, real estate, dealer services, and facilities) not typically in logistics. The emphasis of this strategy puts a high priority on external control and is highly sensitive to the needs of inter-organizational coordination. This corresponds roughly with Thompson’s “Institutional Subsystem” where the organization must interact with an external environment that is complex and dynamic. Finally, Mentzer, Stank, and Esper (2008) recognize the need to examine the relationships among inter-firm supply chains.

Taken overall, the three dimensions of Process, Market, and Information Strategies provide a framework for (a) examining logistics strategy and (b) develop a model to assess the roles of intervening variables on organizational competitiveness. Logistics Coordination Effectiveness (LCE), appears to blend the needs of logistics management to insure that (a) immediate needs within the organization are met, (b) the external environment is addressed through strategic planning coordination, and (c) the internal and external needs of the organization are coordinated. Here, the strategy blends Thompson’s “Core Technology” with the “Institutional Layer” and blends “The Two Faces of Logistics” of Shapiro and Heskett. The third component of the model, Customer Service Commitment (CSC), coordinates the organization (core technology) with the supply chain (external environment) to facilitate a competitive advantage. Customer Service Commitment, more than Process Strategy, Market Strategy, Information Strategy, and Logistics Coordination Effectiveness, relates to Thompson’s Institutional Layer and Shapiro’s framework. The final component of the model, the dependent variable Organizational Competitiveness (COMP), is an outcome which emphasizes the ability of the firm to quickly and effectively respond to Thompson’s external environment and achieve the outcome sought in Shapiro and Heskett’s “Two Faces of Logistics.”

**Constructing the Model**

The structural diagram presented in Figure 1 depicts that overall logistics strategy is linked to process, market, and information strategy as conceptualized by Bowersox and Daugherty (1987) and supported by the other organizational theories discussed earlier. Also, this model shows the link between overall logistics management strategy and company/division competitiveness. In this conceptualization, we emphasize that the hypothesized effect on competitiveness is through logistics coordination and customer service commitment. An alternate perspective is that logistics management contributes to organizational competitiveness through (a) the alignment of logistics with organizational strategy and (b) effective execution of Overall Logistics
Strategy, Logistics Effectiveness, and Customer Service Commitment. Figure 1 illustrates the conceptualized framework.

**TEST AND VALIDATION OF THE CONCEPTUAL FRAMEWORK**

To test and validate this conceptual framework, a series of empirical studies based on the work of Bowersox and Daugherty (1998) were conducted in the United States over the last twenty-five years and five different countries (China, Ghana, Guatemala, Peru, and Turkey) over the last five years. Using Structural Equation Modeling (SEM) in these various studies, we have empirically tested the applicability of the conceptualized model and the hypothesized relationships among model constructs and validated the structural robustness of the framework in different country contexts and time periods.

Each construct illustrated in the conceptual framework was modeled as a latent variable and measured by several items on a five-point Likert scale. All constructs identified in Figure 1 were used for the purposes of evaluating logistics strategy and its effect on organization competitiveness in U.S. manufacturing firms from 1990 to 2008 and from 2010 to 2013 in Guatemala, Turkey, China, Ghana, and Peru using the identical survey instrument (When used in Guatemala, China, Turkey, Ghana, and Peru the questionnaire was translated and back translated by native speakers). Each dimension identified consisted of multi-items scales that were used to measure constructs identified in Bowersox/Daugherty typology, namely Process, Market, and Information Strategy (PROCSTR, MKTGSTR and INFOSTR respectively). These scale items have been used in several studies reported in the literature, have sufficient content validity (Kohn and...
McGinnis, 1997b) and possess adequate levels of reliability (George and Mallery, 2003). We also selected three other constructs to represent the outcomes of logistics strategy, namely Logistics Coordination Effectiveness (LCE), Customer Service Commitment (CSC), and Company/Division Competitiveness (COMP). The scale items had been previously developed using factor analysis, have been replicated, appear to fit the construct name, and have relevant levels of reliability (Kohn and McGinnis, 1997b). Data for these multiple studies were collected using identically worded questions in the survey instruments. Logistics managers in manufacturing firms were used as subjects in the studies.

RESULTS OF EMPIRICAL TESTING

Validation of the model was conducted in two steps. To validate the proposed structure of the

<table>
<thead>
<tr>
<th>TABLE 3</th>
<th>FIRST ORDER CONFIRMATORY FACTOR ANALYSIS FOR OVERALL LOGISTICS STRATEGY (OLS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country &amp; Data Collection Date</td>
<td>Chi-square</td>
</tr>
<tr>
<td>United States 1990 data</td>
<td>48.05</td>
</tr>
<tr>
<td>United States 1994 data</td>
<td>25.39</td>
</tr>
<tr>
<td>United States 1999 data</td>
<td>31.06</td>
</tr>
<tr>
<td>United States 2008 data</td>
<td>32.28</td>
</tr>
<tr>
<td>Guatemala 2010 data</td>
<td>48.65</td>
</tr>
<tr>
<td>Turkey 2010 data</td>
<td>38.40</td>
</tr>
<tr>
<td>China 2011 data</td>
<td>25.61</td>
</tr>
<tr>
<td>Ghana 2012 data</td>
<td>73.991</td>
</tr>
<tr>
<td>Peru 2013 data</td>
<td>43.81</td>
</tr>
</tbody>
</table>

9Peru data has not been published.
conceptualized framework, various statistical analyses were performed. A number of model fit indices such as Chi-square, Root Mean Square Error of Approximation (RMSEA) Goodness of Fit Index (GFI), and Comparative Fit Index (CFI) are used to assess the model fit of the hypothesized structure for logistics strategy. The two-step approach suggested by Anderson and Gerbing (1988) was used to first examine the measurement model and then the structural model. In the measurement model, the hypothesized relationship between the 9 logistics strategic orientation statements and the three first order factors were examined to understand how well the relationships fit the data. As shown in Table 3, eight of nine data sets had Goodness of Fit (GFI) >0.9. Conformation Fit Index (CFI) for eight of nine data sets exceeded 0.9, and Root Mean Square Error of Approximation (RMSEA) was below 0.05 in three of the nine data sets and between 0.05 and 0.10 in five of the data sets, and above 0.10 in one data set.

In the structural model, we examined the relationship between the three first order factors and the Logistics Coordination Effectiveness (LCE), Customer Service Commitment (CSC) and Organizational Competitiveness (COMP). Table 4 provides the analytical structural equation results underpinning the generalized model. Inspection of Table 4 shows that GFI values in four datasets were more than 0.90; three datasets had GFI values between 0.85 and .90, and two datasets had GFI values between 0.75 and 0.80. The results for CFI show better model fit where seven datasets had CFI values greater than .90 and two datasets had CFI values between 0.795 and 0.874. Finally, four of the datasets had RMSEA values less than 0.05; four datasets with values between 0.05 and 0.10 and one dataset (United States 1990 data) had an RMSEA value of 0.96. These indices indicate strong model fit for the proposed conceptual structure.

Both the measurement model (illustrated in Table 3) and the structural model (illustrated in Table 4) provide strong statistical support for the conceptualized model of logistics management strategy in multiple time periods and in all countries where the empirical studies were conducted. These results validate the proposed causal structure and its robustness in different contexts. Accordingly, empirical results show that Overall Logistics Strategy (OLS) affects Company/Division Competitiveness through two intervening (or

<table>
<thead>
<tr>
<th>Country and Data Collection Date</th>
<th>Chi-square</th>
<th>p=</th>
<th>GFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States 1990 data</td>
<td>150.00</td>
<td>0.001</td>
<td>0.791</td>
<td>0.795</td>
<td>0.960</td>
<td>0.51</td>
</tr>
<tr>
<td>United States 1994 data</td>
<td>118.89</td>
<td>0.074</td>
<td>0.865</td>
<td>0.951</td>
<td>0.049</td>
<td>0.44</td>
</tr>
<tr>
<td>United States 1999 data</td>
<td>125.97</td>
<td>0.022</td>
<td>0.916</td>
<td>0.960</td>
<td>0.043</td>
<td>0.19</td>
</tr>
<tr>
<td>United States 2008 data</td>
<td>126.60</td>
<td>0.023</td>
<td>0.766</td>
<td>0.874</td>
<td>0.079</td>
<td>0.10</td>
</tr>
<tr>
<td>Guatemala 2010 data</td>
<td>192.60</td>
<td>0.000</td>
<td>0.867</td>
<td>0.910</td>
<td>0.081</td>
<td>0.75</td>
</tr>
<tr>
<td>Turkey 2010 data</td>
<td>170.72</td>
<td>0.000</td>
<td>0.912</td>
<td>0.962</td>
<td>0.061</td>
<td>0.26</td>
</tr>
<tr>
<td>China 2011 data</td>
<td>154.47</td>
<td>0.000</td>
<td>0.949</td>
<td>0.936</td>
<td>0.040</td>
<td>0.62</td>
</tr>
<tr>
<td>Ghana 2012 data</td>
<td>162.87</td>
<td>0.000</td>
<td>0.941</td>
<td>0.935</td>
<td>0.045</td>
<td>0.13</td>
</tr>
<tr>
<td>Peru 2013 data</td>
<td>166.51</td>
<td>0.000</td>
<td>0.875</td>
<td>0.904</td>
<td>0.072</td>
<td>0.46</td>
</tr>
</tbody>
</table>
moderating) variables (Tabachinick and Fidell, 2007), Logistics Coordination Effectiveness (LCE) and Customer Service Commitment (CSC). In other words, Overall Logistics Strategy is a necessary, but not sufficient, condition for it to lead to increased organizational competitiveness. If the Overall Logistics Strategy is accompanied by (a) effective logistics coordination and (b) customer service effectiveness then the organization competitiveness is likely to be greater.

CONCLUSION AND DISCUSSION

Based on the empirically tested conceptual model and the organizational thought discussed earlier, it is clear that the organizations must strive to perform well in terms of hard measures of performance (the technological core) while responding to an external environment that is complex and difficult to forecast. Mediation between the two is accomplished through the institutional subsystem (administrative level) which seeks flexibility from the technological core while seeking commitment from the external environment.

The model of logistics management described in this manuscript, and indicated by the results of Table 3, offers a reconciliation of a similar dichotomy where day to day execution of (Process Strategy) is combined with two other constructs (Market Strategy and Information Strategy) to achieve the efficiency, flexibility, intra-organizational coordination, and control needed to respond to other organization functions and the external environment. Stated another way, Logistics Coordination Effectiveness and Customer Service Commitment are mediating (or implementing) variables that further contribute to Organizational Competitiveness. The empirical results support this conceptualization that the impact of the OLS on COMP is strongest when it is mediated by LCE and CSC, as shown in Table 4.

While logistics management strategy is found to contribute to Organizational Competitiveness, it is not the contention of this manuscript that it is the sole determinant of organizational competitiveness. Our empirical results tested in various countries over time indicate that the explained variance by the model constructs ranges between $R^2=0.10$ to $R^2=0.75$. A number of other major factors are known to affect Organizational Competitiveness were not included in our conceptualized framework. For instance, product characteristics, marketing strength, organization strategy, manufacturing capabilities and flexibility, financial strength and decisions, human resource strategies, and the organization’s culture are known to influence competitiveness. However, it is clear that at least in some industries, in the absence of an effective Overall Logistics Strategy together with Logistics Coordination Effectiveness, and Customer Service Commitment, the potential of the other major factors discussed above may not be realized.

For teachers, this paper provides a context for understanding the conflicting roles of logistics management and the need to understand the importance of both the immediate and long term. So often the execution of logistics management activities must be conducted in the context of the organization’s overall strategy. For practitioners, the insights provided in this paper help put the role of logistics management in perspective. In addition, this paper helps practitioners appreciate the need to think both of day to day execution and long term strategy. Researchers may benefit from the insights provided in this paper to further pursue the roles of logistics/supply management in a variety of industries, cultures, and multi-national organizations. In addition, future research may validate, modify, or challenge the finding of the results presented in this paper.

REFERENCES


BIOGRAPHIES

**Michael A. McGinnis**, CPSM, C.P.M. is formerly Professor of Business at the Penn State New Kensington Campus. He recently passed away. Michael had been a major contributor to the journal as well as serving as its Associate Editor and will be missed by the JTM community and all of his colleagues. He held B.S. and M.S. degrees from Michigan State University and a D.B.A. degree from the University of Maryland. His research areas were in purchasing, logistics strategy, negotiations, and supply chain management. E-mail: mam47@psu.edu

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IDENTIFYING CRITICAL SKILLS FOR LOGISTICS PROFESSIONALS: ASSESSING SKILL IMPORTANCE, CAPABILITY, AND AVAILABILITY

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Central Michigan University

Zachary Williams  
Central Michigan University

Brian J. Gibson  
Auburn University

Michael S. Garver  
Central Michigan University

ABSTRACT

The purpose of this research is to identify critical skills needed in the logistics profession now and in the future. This study uses survey research, means tests, and importance analysis to explore a multi-factor framework that identifies critical supply chain skills perceived by 176 experienced supply chain professionals from manufacturing, transportation, and retail/wholesale segments. Results indicate significant differences exist between current and future needed skills, among current capabilities and current availability of skills, and among skill needs utilizing a multi-factor index. Identifying needed skills based on importance is common. Considering more factors than just importance offers a more thorough assessment that reduces potential oversights and inefficiencies that can occur if decision makers focus on one factor when planning key processes, such as recruiting, hiring, and training, in a talent management program.

INTRODUCTION

Collaborative consumption, globalization, outsourcing, and technological advances in business are serious challenges that have created a turbulent environment for supply chain managers, and more specifically for logistics managers that are the focus of this article (Christopher and Holweg, 2011; Margaritis, Anagnostopoulou, Tromaras, and Boile, 2016; Shaheen, Mallery, and Kingsley, 2012). These turbulent events resonate within supply chain organizations where they amplify other challenges such as talent management (Shi and Handfield, 2012). Many logistics and supply chain organizations are strained by the urgent need to attract and retain logistics talent (Keller and Ozment, 2009; Leon and Uddin, 2016; Partida, 2014). Unfortunately, these increased needs come at a time of increased retirements (Wolff et al., 2009) and shortages (Cotrill, 2010). As such, it is not surprising that a number of industry reports have shown many employers are experiencing significant challenges caused by talent shortages (Gibson et al, 2013 CSCMP; ManpowerGroup, 2013).

The importance of talent management in logistics cannot be overstated. For example, finding the “right talent” is the first major step to establishing an effective supply chain strategy (Sloan et al., 2013, p. 41). Moreover, Stank et al (2011) declared finding the right talent as one of five major “pillars” that form the foundation from which supply chain managers can enhance organizational performance (p. 941).

Identifying and acquiring talent with the skills necessary to perform the essential functions of a job is the foundation of any talent management program. Employees that lack the requisite skills to perform at acceptable levels in an organization may experience
a high level of incompatibility and decide to quit or they might discover a misalliance through negative performance appraisals that could lead to termination of employment. Employment separations create additional turbulence that manifest as disruptions with negative consequences on performance (Glebbeek and Bax, 2004; Kacmar, Andres, Van Rooy, Steilberg and Cerrone, 2006). It is critical that companies effectively assess talent needs to fill supply chain skill gaps in order to remain competitive (Daugherty et al., 2000; Leon and Uddin, 2016; Richey et. al., 2006), as it has been shown that SC disruptions impede performance and limit profitability (Hendricks and Singhal, 2005; Kacmar et al., 2006). One should not find it surprising that researchers have been calling for further research on supply chain talent management, and logistics in particular (e.g., Cotrill, 2010; Ellinger and Ellinger, 2013; Myers et al, 2004; Williams, Garver, and Taylor, 2011; Shi and Handfield, 2012; Thai, 2012). Before turbulent employment issues become more damaging to logistics, it is important to understand critical skills for supply chain professionals.

Resource-Based View of Skills and Capabilities
Cappelli (2008) asserts that failing to manage talent, from acquisition to retention, is no different than failing to manage the supply chain from beginning to end. Research suggests that an effectively managed supply chain with the right talent and human resources behind it can become a source of competitive advantage that enhances supply chain performance (Ellinger and Ellinger, 2013; Kim and Han, 2012; Schuler, Jackson, and Tarique, 2011). Such findings align with the Resource-based View (RBV) that is the theoretical basis under which an organization assesses the importance of various resources (e.g., processes, information, skills) that when managed effectively can enhance capabilities thereby resulting in greater competitiveness. (Barney, 1991; Wernerfelt, 1984; Wright, Snell, and Dunford, 2001). Organizations must be responsive in SCM talent management by developing strategies (Leon and Uddin, 2016) and taking appropriate steps (e.g., needs assessment, job analysis) to ensure that they have appropriately skilled people in place to facilitate high performance (Gibson et al 2013). Consequently, researchers and practitioners have increased the amount of attention directed at talent management in recent years (Ariss, Cascio, and Paauwe, 2014; Ellinger and Ellinger, 2013; Gibson et al SCQ, 2015; Langley et al 2015; Leon and Uddin, 2016). Understanding requisite foundational elements is important in order to facilitate even the most rudimentary talent management program, but ideally to achieve a sustainable talent pipeline. Thus, this study examines critical logistics skills as perceived by logistics professionals.

Talent Management
Talent can be summarized as the amount of experience, knowledge, skills, and abilities that is possessed and practiced by each employee in an organization. Talent management involves the various processes for identifying roles, responsibilities, and requisite skills, and establishing a pool of professionals to employ in each position.

LITERATURE REVIEW
This section provides the theoretical underpinning of the study, then defines talent management and describes a number of relevant and influential skills studies in logistics and supply chain management that pertain to the purpose of this research. The following synthesis of literature aims to further the understanding of critical skills for supply chain professionals.
It includes efforts to attract, onboard, develop, retain, and replace talent, in order to achieve top performance (Collings and Mellahi, 2009). Gibson et al. (2013) explore talent management and suggest that talent forecasts, roles, responsibilities, and critical capabilities and skills be established, as these foundational activities ensure that subsequent acquisition activities (onboarding, mentoring, and training) are focused on organizational needs necessary for an effective talent management program. Assessing needs and identifying requisite skills is an essential starting point.

**Supply Chain Skills**

The logistics literature does include a stream of research dedicated to talent, primarily focused on skills importance and identification. For example, the Council of Logistics Management (now the Council of Supply Chain Management Professionals) put forth a comprehensive study on this topic called The Growth and Development of Logistics Personnel (1999) that was primarily focused on using auditing gap analysis to identify skill deficiency and subsequent development plans.

Gibson and Cook (2001) collected data from interviews and surveys of executives and mid-level managers from 40 of the top 100 3PL firms that showed various skills that were important to entry level management positions. These included problem solving, oral communication, planning/organizing, ability to learn, decision making, teamwork, relationship management, creative thinking, written communication, and analytical (logistics analysis). This research was replicated and updated in (Cook, Gibson and Williams, 2009). The replicated research identified and highlighted the importance of leadership characteristics and abilities for SCM personnel.

Gammelgaard and Larson (2001) utilized relevant literature (e.g., Murphy and Poist, 1991) and executive interviews to derive forty-five basic skills to include in their research on the importance of logistics skills and competencies. The skills were categorized into three primary factors: interpersonal/managerial basic skills, quantitative/technological skills, and logistics core skills (p. 40). Teamwork, problem solving, listening, and communicating topped the list of highly important skills for logistics managers. Gammelgaard and Larson suggested further research that captures organizational situations within an industry.

Myers, Griffith, Daugherty, and Lusch (2004) surveyed entry-level and mid-level logistics and supply chain professionals to assess perceived relationships between 16 skills and job performance. The results suggest organizations should work to develop talent in four broad skill areas: social, decision-making, problem-solving, and time-management. The skills categories were significant predictors of job performance, while experience and education were not statistically significant. These authors further recommended future research that investigates how to identify critical skills.

In a longitudinal study that spanned more than a decade, Murphy and Poist (2007) updated their comprehensive Business-Logistics-Management (BLM) framework, which is composed of more than 80 skills, and examined the relative importance of each skill in senior-level logistics positions. Supply chain management and transportation and logistics business are important in senior-level positions, as are customer service, inventory management, motivating others, integrity, and communication. Managerial skills were found to be more important than other skills. They concluded that “logisticians should be managers first and a logistician second” (p. 423). Results indicate that essential or requisite skills can change over time.

Thai (2012) surveyed logistics executives in Australian firms using a shortened version of the BLM framework and found personal integrity, problem-solving, relationships, cost control, and planning to be among the top-ranking skills based on perceived importance now and in the future. All three skill groups in the BLM framework (Business, Logistics, and Management) were equally important. Research by Wu et al (2013) suggest that it is important for global supply chain personnel to possess communication, financial analysis, customer relationship management, and people
skills. Ellinger and Ellinger (2013) put forward a summarized list of requisite skills for supply chain managers that includes problem solving, communication, leadership, global orientation, change management, and coaching, which were drawn from four studies (i.e., Christopher, 2012; Cottrill, 2010; Fawcett et al, 2010; Slone et al, 2010).

In summary, the majority of studies in the logistics literature focus on the importance of each skill, where researchers aim to list or categorize items based largely on importance, as perceived by industry professionals, academics, or students. The body of work in this area falls short of examining skills in a greater context that ventures beyond current importance to include additional circumstance, such as current skill capabilities, future skill importance (skill forecasting) and current skill availability, when assessing skill needs for effective talent management.

**RESEARCH QUESTIONS AND METHODOLOGY**

**Research Questions/Purpose**
While it is imperative for an organization to know what skills are important for logistics and supply chain positions, it is equally crucial for organizations to understand its current internal skill capabilities and the current external skill availability in the labor market as this could dictate the most strategic and appropriate response, whether it means externally acquiring talent or internally developing talent. Thus, this research aims to answer three major questions:

1) What skills are currently important for logistics and supply chain management professionals (i.e., at time of completing survey) Current Interest (CI) and in the future (i.e., beyond five years from today) Future Interest (FI)?

2) What skills are perceived as Current Capabilities (CC) within the firm or are Currently Available (CA) in today’s labor market?

3) What skills are needed most considering Current Capabilities (CC), Current Importance (CI) and Future Importance (FI), and Current Availability (CA) in today’s labor market?

The following analysis and assessment identifies skills that are critical to logistics talent management based on the perceived importance (CI and FI) now and in the future. The research looks at the skills that employees need to possess and by the degree to which these skills are current capabilities (CC) internal to the firm and by the degree to which there is current availability (CA) external to the firm in the labor market for a given skill.

**Methods**
The present research used mixed methods to explore logistics skills. The study utilized a literature review, expert interviews, and an online questionnaire to provide added sources of data than what is ordinarily obtained using a single method. The first step involved a review of previous literature to frame the research question on skills. The second step included a series of focus groups and telephone interviews with logistics and human resources professionals with previous involvement in talent acquisition. The third step refined the findings from the previous actions into a questionnaire for online distribution. The primary areas of interest were to measure Current Importance (CI), Future Importance (FI), Current Capability (CC), and Current Availability (CA) of skills. A self-report questionnaire was selected to obtain the perceived importance that professionals in logistics place on select skills, for example. The resulting questions and corresponding responses were compiled into an online survey, which was pre-tested and refined for clarity and flow, then administered using Qualtrics software over a six-week period. Survey results were subjected to a series of analyses using means, standard deviations, $t$-tests, standardized $z$ scores, and rankings.

**Measures**
The decision as to which skills to include in this study for each respondent to rate Current Importance (CI), Future Importance (FI), Current
Capability (CC), and Current Availability (CA) was informed by previous skills research (e.g., Gibson and Cook, 2001) and expert input from interviews. Recent research has demonstrated a need for logistics to possess both “hard” (technical) and “soft” (behavioral) skills to meet the challenges in complex supply chains (Christopher, 2012; Cottrill, 2010). Thus, a parsimonious mix of hard and soft skills was included in the present study as shown in Table 1. Input from a small group of logistics researchers helped finalize the questionnaire that resulted in 19 single-item measures used as a representative range of hard and soft skills to be examined in this exploratory study.

Respondents were asked to assess importance as well as the current capability and current availability of each skill listed in Table 1. **Current Capability (CC)** is the extent to which a professional perceives that the firm in which he or she works currently has an internal competency in a given skill. **Current Importance (CI)** is the degree to which a professional perceives that a specified skill is important to logistics and supply chain professional(s) to be successful working in the current business environment. **Future Importance (FI)** is the degree to which a professional perceives that a specified skill is likely to be important to logistics professional(s) to be successful working in the future business environment. **Current Availability (CA)** is the extent to which a professional perceives that a given skill is available in the current labor market. All items were assessed on a 5-point scale ranging from 1 (not important, no internal capability, or very low availability) to 5 (very important, high internal capability or very high availability).

**Sample**
The pool of potential study participants was derived from the Council of Supply Chain Management Professionals membership list and logistics alumni.

**TABLE 1**

<table>
<thead>
<tr>
<th>Skill</th>
<th>Code</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical Skills</td>
<td>S1</td>
<td>Gibson and Cook 2001</td>
</tr>
<tr>
<td>Communication</td>
<td>S2</td>
<td>Gibson and Cook 2001</td>
</tr>
<tr>
<td>Change Management*</td>
<td>S3</td>
<td>Murphy and Poist 2007</td>
</tr>
<tr>
<td>Project Management</td>
<td>S4</td>
<td>Gibson and Cook 2001</td>
</tr>
<tr>
<td>Problem-solving</td>
<td>S5</td>
<td>Gibson and Cook 2001; Gammelgaard and Larson 2001; Murphy and Poist 2007</td>
</tr>
<tr>
<td>Leadership</td>
<td>S6</td>
<td>Gibson and Cook 2001</td>
</tr>
<tr>
<td>Ability to plan</td>
<td>S7</td>
<td>Gibson and Cook 2001; Murphy and Poist 2007</td>
</tr>
<tr>
<td>Decision-Making</td>
<td>S8</td>
<td>Gibson and Cook 2001; Murphy and Poist 2007</td>
</tr>
<tr>
<td>Creative thinking</td>
<td>S9</td>
<td>Gibson and Cook 2001</td>
</tr>
<tr>
<td>Relationship***</td>
<td>S10</td>
<td>Gibson and Cook 2001; Murphy and Poist 2007</td>
</tr>
<tr>
<td>Negotiation skills</td>
<td>S11</td>
<td>Gibson and Cook 2001</td>
</tr>
<tr>
<td>Financial analysis</td>
<td>S12</td>
<td>Gibson and Cook 2001; Murphy and Poist 2007</td>
</tr>
<tr>
<td>Technical capability</td>
<td>S13</td>
<td>Gibson and Cook 2001; Gammelgaard and Larson 2001; Murphy and Poist 2007</td>
</tr>
<tr>
<td>Big Picture</td>
<td>S14</td>
<td>Gammelgaard and Larson 2001</td>
</tr>
<tr>
<td>Active listening</td>
<td>S15</td>
<td>Gammelgaard and Larson 2001; Murphy and Poist 2007</td>
</tr>
<tr>
<td>Ability to learn quickly</td>
<td>S16</td>
<td>Gibson and Cook 2001</td>
</tr>
<tr>
<td>Ability to work in teams</td>
<td>S17</td>
<td>Gammelgaard and Larson 2001; Gibson and Cook 2001</td>
</tr>
<tr>
<td>Ability to handle high pressure</td>
<td>S18</td>
<td>Gammelgaard and Larson 2001</td>
</tr>
<tr>
<td>Measurement/assessment****</td>
<td>S19</td>
<td>Gibson and Cook 2001</td>
</tr>
</tbody>
</table>

*M&P 2007 adapt to change; **M&P 2007 motivate, mentor, supervise others. *** quality analysis, spreadsheet/database
contact lists from two universities in the United States. Given the focus of the research, the lists were culled to ensure that only individuals working in logistics industry roles would participate in the survey. Hence, educators, students, retirees, and professionals outside the SCM discipline were excluded. An electronic survey link was emailed to approximately 3,100 U.S. SCM professionals in the targeted segment. Email reminders were sent two weeks after the original survey release date.

The email campaign generated 358 total responses. However, not all respondents answered all the questions regarding skill importance (now and in the future), internal skill capabilities, and labor market availability of skill required for this analysis. After eliminating responses that skipped any of the questions regarding each of the 19 skills, the remaining 176 responses were analyzed in light of the three research questions.

**RESEARCH RESULTS**

**Demographic and Firmographics**

The respondents represented a diverse group of firms within the supply chain and in their own personal backgrounds as exhibited in Table 2. On average, the respondents yielded over 16 years of supply chain related experience. When asked about knowledge of talent management, respondents indicated a high-level, exceeding four on a five-point scale (1=Not knowledgeable at all; 5=Very knowledgeable).

<table>
<thead>
<tr>
<th>Role Within the Organization</th>
<th>3.4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-Level</td>
<td></td>
</tr>
<tr>
<td>VP</td>
<td>11.4%</td>
</tr>
<tr>
<td>Director</td>
<td>27.3%</td>
</tr>
<tr>
<td>Manager/Supervisor</td>
<td>36.4%</td>
</tr>
<tr>
<td>Analyst</td>
<td>18.2%</td>
</tr>
<tr>
<td>Other</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Corp. Role Within Supply Chain</th>
<th>31.3%</th>
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<tbody>
<tr>
<td>Carrier/3PL</td>
<td></td>
</tr>
<tr>
<td>Manufacturer</td>
<td>48.3%</td>
</tr>
<tr>
<td>Retailing/Wholesaling</td>
<td>20.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Employees</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1-499</td>
<td></td>
</tr>
<tr>
<td>500-999</td>
<td>5.7%</td>
</tr>
<tr>
<td>1,000-4,999</td>
<td>14.3%</td>
</tr>
<tr>
<td>5,000-9,999</td>
<td>20.0%</td>
</tr>
<tr>
<td>10,000+</td>
<td>44.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annual Revenue</th>
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</tr>
</thead>
<tbody>
<tr>
<td>$1 to $9.9 million</td>
<td></td>
</tr>
<tr>
<td>$100 million to $999.9 million</td>
<td>22.7%</td>
</tr>
<tr>
<td>$1 billion to $9.9 billion</td>
<td>33.5%</td>
</tr>
<tr>
<td>Over $10 billion</td>
<td>26.1%</td>
</tr>
</tbody>
</table>

**TABLE 2**

DEMOGRAPHIC AND FIRMOGRAPHIC CHARACTERISTICS OF RESPONDENTS
A number of analyses were conducted to explore the study’s three major research questions. First, a means analysis involving several individual t-tests was performed to identify, describe, and rank the current importance (CI) of each skill and a repeated measures means analysis was conducted to identify and rank the future importance (FI) of each skill and to test if a significant difference exists between CI and FI skill ratings, followed by a paired within-subjects t-test to test for a significant difference in ratings to determine if significant movement exists in the mean score rankings. Second, a means classification process was utilized to describe and categorize CC and CA ratings. Third, a final analysis of means was conducted using z scores and weighted factors that accounted for current capabilities (CC), current importance (CI) and future importance (FI), and current availability (CA) of skills in today’s labor market. Means were transformed into corresponding z scores to standardize the CC, CI, FI, and CA data that were measured using different Likert scale anchors so they could be combined into composite scores.

**Analysis 1: Current and Future Importance Ratings and Ranking Comparisons**

Mean scores were calculated for each of the 19 items and individual paired t-tests were performed for each pair of means to test differences between the importance ratings and to identify the skill ranking. At the 95% confidence level, significant differences were found between 73% of the pairs tested (124/171), as shown in Appendix A, with insignificant differences occurring mostly between items that are next to or immediately succeeding one another in rank.

Perceptions of the importance of logistics professionals (business) skills and perspectives on ranking, which are shown in Table 3, indicate that some of the more important skills needed today, in order of importance, are: 1) Problem-Solving, 2) Communication, 3) Analytical Skills, 4) Ability to Learn Quickly, and 5) Leadership.

To evaluate the Current Importance (CI) and Future Importance (FI) ratings of the skills and the overall skillsets, a paired within-subjects (repeated measures) t-test was performed on the data. This analysis was conducted in order to better understand skills important today in comparison to skills important for the future. The within-subjects test is beneficial because it helps to understand if a skillset is likely to become more or less important as deemed by the sample and whether or not a difference exists in the overall importance ratings of the skillsets. The overall importance rating was higher for the future skillset than for the skillset that was perceived as important today, as indicated by a statistically significant t-test, t(18) = 2.765, p < .05. This finding indicates that significant differences exist in importance ratings between the two periods (i.e., today versus in the future) that was not likely due to chance. The significant difference suggests that there were not only significant rating changes in the individual skills but also significant rank changes as a result of the rating changes that occurred within the analyzed skillset (i.e., the list of select skills). The within-subjects test has more power or a better likelihood to detect effects when effects exist because variation due to individual differences is eliminated in the paired within subjects design.

A post-hoc Wilcoxon rank sum test was used to analyze the resulting rankings (1 to 19) of the 19 skills in each skillset and confirmed a significant difference, p < .05, exists between the ranks of current and future importance of skills. Many of the top skills that are currently viewed as most important today remain nearly unchanged for what is deemed to be important skills for tomorrow or in the future. Some of the most notable differences were in Leadership which leaped three (3) positions to take the fifth spot, while Decision Making dropped to eighth, with both skills still showing above average importance. Another noticeable difference was Relationships moved up three (3) positions to the seventh spot. Interestingly, the least
important skills in the given skillset, from both current and future perspectives, were Financial Analysis, Technical Capability, and Negotiation.

**Analysis 2: Current Capability and Current Availability Categorization (Classification)**

A subsequent inquiry aimed to measure Current Capability (CC) and Current Availability (CA) to gain perspective on existing internal competencies reflected in the CC measures and on external accessibility of skill reflected in the CA measures. Table 4 lists the mean ratings perceived for the CC and CA for each skill and are categorized as high (above) or low (below) the grand means of 3.450 and 3.201 for CC and CA, respectively. Results show less than half of the included skills received LL (low-low) classification for having low CC and low CA, which indicates a scarcity for the given skills. Interestingly, many of the skills that were perceived as highly important were rated HH (high-high) for having high CC and high CA, which indicates a potential surplus for these skills. Leadership, however, was classified as LL and falls in the top ten for Current Importance (CI) skills and in the top five for Future Importance (FI) skills. Firms may judge their internal talent as capable in several skills and not capable in other skills, then discover that a number of the same skills may or may not be available in the labor market to fill any deficiencies. Thus, it appears useful to measure CC and CA to gain a broader view on potential skill shortages and potential skill surpluses by assessing what firms have internally and what firms believe is available externally.

While it is useful to measure and classify CC and CA, as it contrasts what resources a firm has internally and what resources are available externally, only assessing CC and CA may fall short of distinguishing how critical a resulting skill shortage or skill surplus in supply really is without factoring in some weight for importance of a skill to provide more precision in assessing overall skill needs. For example, a firm might express concern whenever they find a sizeable skill gap from having low CC (capability) and low CA (availability). However, the concern could be moot if it is discovered that a particular skill is perceived as having low Current Importance (CI), low Future Importance (FI), or both. A firm would likely face a similar paradox when making talent management decisions based solely on skill importance, as a highly important skill may be prevalent internally as a current capability.

**TABLE 3**

**INDUSTRY RATING & RANKING COMPARISONS OF CURRENT AND FUTURE SKILL IMPORTANCE**

<table>
<thead>
<tr>
<th>SKILL CODE</th>
<th>Current Importance</th>
<th>Future Importance</th>
<th>Mean difference</th>
<th>t</th>
<th>p-value</th>
<th>Rank Current Imp.</th>
<th>Rank Future Imp.</th>
<th>Δ RANK</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 = Analytical Skills</td>
<td>4.470 .6220</td>
<td>4.460 .6110</td>
<td>.0100</td>
<td>.249</td>
<td>.803</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>S2 = Communication</td>
<td>4.560 .6290</td>
<td>4.510 .5860</td>
<td>.0500</td>
<td>1.164</td>
<td>246</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S3 = Change Management</td>
<td>4.140 .7980</td>
<td>4.290 .6850</td>
<td>-.1500</td>
<td>-2.827</td>
<td>.005*</td>
<td>12</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>S4 = Project Management</td>
<td>3.970 .8580</td>
<td>4.110 .8170</td>
<td>-.1400</td>
<td>-2.384</td>
<td>.018*</td>
<td>15</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>S5 = Problem-solving</td>
<td>4.590 .5460</td>
<td>4.470 .5920</td>
<td>.1200</td>
<td>2.252</td>
<td>.026*</td>
<td>1</td>
<td>2</td>
<td>-1</td>
</tr>
<tr>
<td>S6 = Leadership</td>
<td>4.260 .7760</td>
<td>4.380 .6730</td>
<td>-.1200</td>
<td>-2.029</td>
<td>.044*</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>S7 = Ability to plan</td>
<td>4.190 .7070</td>
<td>4.170 .6940</td>
<td>.0200</td>
<td>.482</td>
<td>.630</td>
<td>11</td>
<td>12</td>
<td>-1</td>
</tr>
<tr>
<td>S9 = Creative thinking</td>
<td>4.010 .7960</td>
<td>4.130 .6930</td>
<td>-.1200</td>
<td>-2.159</td>
<td>.032*</td>
<td>14</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>S10 = Relationship</td>
<td>4.220 .7500</td>
<td>4.320 .6910</td>
<td>-.1000</td>
<td>-1.668</td>
<td>.097†</td>
<td>10</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>S11 = Negotiation skills</td>
<td>3.630 .10120</td>
<td>3.800 .9400</td>
<td>-.1700</td>
<td>-2.557</td>
<td>.011*</td>
<td>17</td>
<td>19</td>
<td>-2</td>
</tr>
<tr>
<td>S12 = Financial analysis</td>
<td>3.600 .9870</td>
<td>3.920 .8380</td>
<td>-.3200</td>
<td>-4.975</td>
<td>.000*</td>
<td>19</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>S13 = Technical capability</td>
<td>3.620 .8520</td>
<td>4.030 .7630</td>
<td>-.4100</td>
<td>-6.409</td>
<td>.000*</td>
<td>18</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>S14 = Big Picture</td>
<td>4.260 .7840</td>
<td>4.290 .6910</td>
<td>-.0300</td>
<td>-669</td>
<td>.504</td>
<td>9</td>
<td>11</td>
<td>-2</td>
</tr>
<tr>
<td>S15 = Active listening</td>
<td>4.100 .7150</td>
<td>4.130 .7140</td>
<td>-.0300</td>
<td>-1.464</td>
<td>.643</td>
<td>13</td>
<td>14</td>
<td>-1</td>
</tr>
<tr>
<td>S16 = Ability to learn quickly</td>
<td>4.400 .6830</td>
<td>4.390 .6380</td>
<td>.0100</td>
<td>218</td>
<td>.828</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>S17 = Ability to work in teams</td>
<td>4.340 .7690</td>
<td>4.370 .7050</td>
<td>-.0300</td>
<td>-507</td>
<td>.613</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>S18 = Ability to handle high pressure</td>
<td>4.300 .6970</td>
<td>4.310 .7080</td>
<td>-.0100</td>
<td>201</td>
<td>.841</td>
<td>7</td>
<td>9</td>
<td>-2</td>
</tr>
<tr>
<td>S19 = Measurement/assessment</td>
<td>3.850 .8080</td>
<td>4.060 .7260</td>
<td>-.2100</td>
<td>-3.354</td>
<td>.001*</td>
<td>16</td>
<td>16</td>
<td>0</td>
</tr>
</tbody>
</table>

* p < .05; † p < .10
and widely accessible in terms of CA in the labor market, thus presenting less reason for concern given the forecasted skill surplus in periods of high or low demand. It follows that conducting a more extensive skill needs assessment using a composite measure index, which gives weight to importance, capability, and availability, would likely be more informative in the planning and acquisition process in forecasting talent in terms of supply and demand.

**Analysis 3: Importance, Capability, and Availability**

**Composite Index and Skills Forecast**

An exploratory effort was made to understand if assessing importance alone can fall short of truly understanding skill needs. Thus, further analysis was conducted to determine the skills needed most when considering multiple factors, specifically current capabilities (CC), current importance (CI), and future importance (FI), and current availability (CA) in today’s labor market. The practice of concurrently analyzing factors, such as importance and performance, has been around for decades (e.g., Martilla and James, 1977). A number of researchers in logistics and supply chain management (e.g., Garver, 2003; Lambert and Sharma, 1990; Lorentz et al., 2013) have demonstrated the utility and practicality of analyzing critical attributes, such as customer satisfaction and employee skills, using multiple factors, specifically importance and performance. A similar technique is deployed here with CC, CI, FI, and CA in order to create a logistics skill needs assessment (SNA) index to rate and rank the skills in the study.

This analysis takes a comparable approach to the performance-importance method found in literature but utilizes the normalized z scores for importance (CI and FI), capability (CC), and availability (CA). Means were transformed into corresponding z scores to standardize the CC, CI, FI, and CA data because the items were measured using different Likert scale anchors. The transformation allows the standardized scores to be combined into composite scores. In addition, initial capability and availability scores measured on Likert scales were reverse coded before being standardized so original low scores (low capability, low availability) were transformed as higher coefficients. Next, each z score was multiplied by an assigned weight of 0.250 that is the same (equal) for each of the four factors used for this study (e.g., CI for S1 = 0.387 z score x 0.250 weight = 0.097 CI factor score). The separate factor scores for CI, CC, CA, and FI are then added to produce an overall skills needs assessment (SNA) index rating for the skill (e.g., SNA Index Rating for S14 Big Picture = 0.033 + 0.080 + 0.092 + 0.019 = 0.225; Index Rating for S1 Analytical Skill = 0.097 + 0.077 + -0.056 + -

---

**TABLE 4**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M = 3.450</td>
<td>Category</td>
<td>M = 3.201</td>
<td>Category</td>
<td>CC/CA</td>
</tr>
<tr>
<td>S1 - Analytical Skills</td>
<td>3.660</td>
<td>H</td>
<td>3.330</td>
<td>H</td>
<td>HH</td>
</tr>
<tr>
<td>S2 - Communication</td>
<td>3.560</td>
<td>H</td>
<td>3.370</td>
<td>H</td>
<td>HH</td>
</tr>
<tr>
<td>S3 - Change Management</td>
<td>3.310</td>
<td>L</td>
<td>2.840</td>
<td>L</td>
<td>LL</td>
</tr>
<tr>
<td>S4 - Project Management</td>
<td>3.360</td>
<td>L</td>
<td>3.080</td>
<td>L</td>
<td>LL</td>
</tr>
<tr>
<td>S5 - Problem-solving</td>
<td>3.660</td>
<td>H</td>
<td>3.410</td>
<td>H</td>
<td>HH</td>
</tr>
<tr>
<td>S6 - Leadership</td>
<td>3.350</td>
<td>L</td>
<td>3.010</td>
<td>L</td>
<td>LL</td>
</tr>
<tr>
<td>S7 - Ability to plan</td>
<td>3.590</td>
<td>H</td>
<td>3.270</td>
<td>H</td>
<td>HH</td>
</tr>
<tr>
<td>S8 - Decision-Making</td>
<td>3.600</td>
<td>H</td>
<td>3.250</td>
<td>H</td>
<td>HH</td>
</tr>
<tr>
<td>S9 - Creative thinking</td>
<td>3.220</td>
<td>L</td>
<td>3.050</td>
<td>L</td>
<td>LL</td>
</tr>
<tr>
<td>S10 - Relationship</td>
<td>3.550</td>
<td>H</td>
<td>3.250</td>
<td>H</td>
<td>HH</td>
</tr>
<tr>
<td>S11 - Negotiation skills</td>
<td>3.110</td>
<td>L</td>
<td>2.900</td>
<td>L</td>
<td>LL</td>
</tr>
<tr>
<td>S12 - Financial analysis</td>
<td>3.110</td>
<td>L</td>
<td>3.010</td>
<td>L</td>
<td>LL</td>
</tr>
<tr>
<td>S13 - Technical capability</td>
<td>3.380</td>
<td>L</td>
<td>3.310</td>
<td>L</td>
<td>LL</td>
</tr>
<tr>
<td>S14 - Big Picture</td>
<td>3.150</td>
<td>L</td>
<td>2.870</td>
<td>L</td>
<td>LL</td>
</tr>
<tr>
<td>S15 - Active listening</td>
<td>3.320</td>
<td>L</td>
<td>3.090</td>
<td>L</td>
<td>LL</td>
</tr>
<tr>
<td>S16 - Ability to learn quickly</td>
<td>3.760</td>
<td>H</td>
<td>3.760</td>
<td>H</td>
<td>HH</td>
</tr>
<tr>
<td>S17 - Ability to work in teams</td>
<td>3.830</td>
<td>H</td>
<td>3.750</td>
<td>H</td>
<td>HH</td>
</tr>
<tr>
<td>S18 - Ability to handle high pressure</td>
<td>3.700</td>
<td>H</td>
<td>3.100</td>
<td>L</td>
<td>LL</td>
</tr>
</tbody>
</table>
The scenario examined for this study includes multiple factors that aim to determine needed skills in logistics and SCM. Skill rankings from the scenario are also compared to the initial one-dimensional rankings by current skill importance alone to determine if significant differences exist between the rankings by each method. Results are displayed in Table 5.

The analysis follows previous research on importance (e.g., Garver, 2003; Lorentz et al., 2013) but assigns equal weight of 0.250 to each of the four factors: CI (is it important now), CC (do we have it now), CA (can we get it), and FI (is it important for the future). Equality is assumed because respondents were not asked to estimate a weight for each factor. The results shown in Table 5 reveal that some of the top skills needed today,
based on the composite of weighted z scores for CI, CC, CA, and FI are: 1) Big Picture, 2) Leadership, 3) Change Management, and 4) Communication. When ranking by importance averages alone, Big Picture, Leadership, and Change Management fall much further down the list in the 9th, 8th, and 12th positions, respectively. A Wilcoxon rank sum test confirmed a significant difference, p < .05, exists between the ranks of current skill importance and the index ranks of needed skills, suggesting significant rank changes or differences exist. The most significant change was Change Management moved up nine positions to take the third spot in the ranking of skills. Leadership moved up six positions to second, while Big Picture moved up eight positions to assume first place as the most needed skill in the given skillset. The index method resulted in other significant differences in rankings, particularly the ability to work in teams, which was relegated from the 6th position to the 18th position in the overall ranking of the 19 different skills for logistics and supply chain management.

CONCLUSIONS

Discussion and Implications
From a theoretical perspective, this research supports Barney’s (1991) Resource-based View (RBV) theory, as it demonstrates the skills that are important to an organization. Skills must be assessed in terms of availability to make sure critical skills are abundant in an organization or readily acquirable to form the capabilities to achieve high performance and competitive advantage.

From a practitioner perspective, this study shows that compared to earlier studies of important skills for supply chain management and logistics professionals, a different set of skills are most important now. Specifically, big picture, leadership, and change management skills made significant moves to become the most important. Similar to Murphy and Poist (2007), soft managerial skills emerged as being more important than other hard skills. What remains the same, however, are several skills that are corroborated as consistently important as revealed by this study and past research (e.g., Gibson and Cook, 2001), where Communication, Problem Solving, and Decision Making approach the top of many lists.

Results from this research suggest that skill needs assessments should be conducted regularly as needed skills may change over time. This study also suggests that routine assessments look not only at skill importance but also at internal skill capabilities and external skill availability of requisite job skills to determine the skills that are critically needed to meet current and future job demands of logistics professionals. Leadership, for example, was rated as having low internal capability and low external availability, which indicates that a greater challenge will likely exist when it comes to filling or satisfying the demand for this explicitly important skill from current sources of supply. Practitioners can use the skills needs assessment method with a comparable index to run scenarios specific to their own organization, i.e., using equal or different weights for each factor included in the framework, to produce skill forecasts and to plan for improved talent acquisition.

Organizations with low skills must make it a strategic priority to acquire and develop essential skills to improve performance (Slone et al, 2013). However, with limited external availability for certain skills, employers may have no choice but to “build” an internal bench than to spend additional effort looking to “buy” what they need (Myers et al, 2004). To develop skills, organizations can institute formal training, education, mentoring, or job rotations, for example, that are shown to be impactful in meeting hiring and development needs that in turn enhance performance (Aguinis and Kraiger, 2009). In addition, organizations could benefit from having improved selection methods (e.g., better defined job postings) so the proper talent is available at time of hire versus after a period of internal development (Gibson et al, 2013; Williams et al, 2011). Improving talent fit in a given role is beneficial to keeping logistics employees satisfied in their role or career (Goffnett et al, 2012). Ellinger and Ellinger (2013) suggest a number of HR
interventions that can improve specific skill sets, such as Team Leadership.

From an academic perspective, educators can be better informed of changing demands and work to support industry needs by helping to produce talent who possess essential skills. Curriculum should cover important and essential skills, particularly those that are critical with low current capabilities or availability in industry. Skills can be introduced through cases, lectures, quizzes, tours, etc. In addition, educators can provide greater skills awareness and competency development by exposing students to stimulating group work and special projects (Pyne, Dinwoodie, and Roe, 2007; Yi, 2012). This can also be accomplished through supply chain simulations and logistics case competitions, student organization activities involving real-world projects, professional development events (e.g. career fairs, facility tours, industry certifications) and community service. Educators could develop a service-learning project opportunity with a non-profit organization that requires students to use needed or essential skills, such as change management and problem solving, to enhance learning and develop professional skills while providing supply chain solutions (Goffnett et al, 2012; Yi, 2012).

Limitations, and Future Research
This exploratory research suggests that the supply chain profession needs leaders – today! The industry needs transformational leaders who see the Big Picture, can inspire with Leadership character to motivate others toward common goals, identify and manage needed Change, while exercising clear Communication to aid in Problem-Solving and Analytics that inform Decision Making for success.

This study, however, had a number of limitations. First, a convenience sample of logistics alumni was used in this research, thus the generalizability of the study may be narrow. Future research that investigates a larger or more representative sample should be completed to extend the body of skills research. For instance, it would be interesting to see what skill sets are important in other SCM related functions, such as purchasing or production control. Second, this study encompassed a broad set of skills that may or may not be applicable to every function or level in logistics and supply chain management. A third limitation is the inherent challenge with accuracy that surrounds practically every method used to forecast something. One truism is forecasts are always wrong (Wallace, 2006). A fourth limitation may be present in the single-item measures for each skill. Future research might explore the specific structure of each skill to identify items that may offer greater characterization and accuracy in measuring the variables used in the study and to enhance reliability and validity of each skill domain. For example, the “technical capability” variable is likely to have multiple dimensions to it that may better describe the skill and allow improved assessment of criticality using a skill needs assessment (incl. importance, capability, availability). For example, “technical capability: could include dimensions related to everything from modeling, to Excel skills, to an understanding of engineering drawings depending on the job function. Likewise, research on “relationships” show that relationship skill can include or be demonstrated by items such as amount of interaction, information sharing, and cooperation (Boles, Brashear, Bellenger and Barksdale, 2000), and research has also shown that relationships and communication, specifically information exchange, are strong predictors of buyer satisfaction with supplier performance (Graca, Barry and Doney, 2015).

Additional research that explores essential KSAs not only at various levels in the organizational hierarchy but also in terms of workforce differentiation (Huselid and Becker, 2011) that examines key employee segments (Dries and De Gieter, 2014; Gibson and Cook, 2003), specifically high performing groups that exist are needed within an organization, given their potential to have a positive impact on performance (Collings and Mellahi, 2009; Myers et al, 2004; Zheng, Garrick, Atkinson-Palombo, McCahill, and Marshall, 2013). For example, previous studies in the sales segment show that top sales people possess strong “people skills” such as communication and relationship building (Rich and Smith, 2000), which in turn can impact performance (Graca, Barry and Doney, 2015).
Research that examines the skills needed by sales people who work in logistics for freight brokerages would provide greater understanding of the skills needed in both the Sales and logistics fields. What specific type of supply chain logistics skills are needed at each hierarchical level from entry level to executive level? When important skills are not available, how do organizations respond to fill gaps and needs?

As SCM truly is a multi-disciplinary function, it is likely that the human resource activities to support logistics, and many other SCM functions, may provide unique challenges that call for much needed future research. Skills needs assessment and talent management in SCM related jobs require additional research (Leon and Uddin, 2016). While recent literature shows no consensus as to the specific skills that are most important for supply chain and logistics professionals, this trend suggests that industry needs change over time. Thus, further research might take a longitudinal view to evaluate skill requirements at each hierarchical level in logistics careers to determine the changes or differences in what is essential to each role over time.

REFERENCES


ManpowerGroup 2013, 2013 Talent Shortage Survey Research Results, Milwaukee, WI.


**BIOGRAPHIES**

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APPENDIX A
SIGNIFICANTLY DIFFERENT MEAN SKILL IMPORTANCE RATINGS SORTED HIGH TO LOW
PAIRED T-TEST RESULTS FOR ANALYSIS 1

| Mean | SD | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 | S17 | S18 | S19 | S20 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 4.550 | 0.620 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.473 | 0.832 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.460 | 0.717 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.363 | 0.703 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.330 | 0.670 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.300 | 0.770 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.300 | 0.784 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.220 | 0.750 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.180 | 0.767 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.180 | 0.798 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.130 | 0.798 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 4.100 | 0.756 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 3.970 | 0.668 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 3.850 | 0.660 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 3.680 | 0.622 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| 3.520 | 0.622 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |

*p < .05; **p < .01; ***p < .001; ns = not significant (p > .10)

Note: This Appendix presents the results of the series of paired t-tests and lists the skills from most important to least important that informed Analysis 1.
Guidelines for Journal of Transportation Management
Submission/Publication

GENERAL

1. Editor Contact Information – Dr. John C. Taylor, Associate Professor of Supply Chain Management, Department of Marketing and Supply Chain Management, School of Business, Wayne State University, Detroit, MI 48202. Office Phone: 313 577-4525. Cell Phone: 517 719-075. Fax: 313 577-5486. Email: taylorjohn@wayne.edu

2. Articles should be submitted electronically to Dr. Taylor at taylorjohn@wayne.edu.

3. Articles should be submitted using Microsoft Word for Windows in either doc or docx formats. Articles prepared on Mac systems should be saved in Word for Windows compatible format. Accepted articles, in final form, are also submitted via email.

4. Article length should be in the range of 6000-7000 words including references. Tables and figures are in addition to the word count. However articles including all text, references, appendixes, tables and figures (but excluding front matter) should not exceed 30 double spaced pages in the format described below. Shorter articles are also acceptable. It will be difficult to publish articles much longer than 7000 words.

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1. First Page - Title of the paper, name and position of the author(s), author(s) complete address(es) and telephone number(s), e-mail address(es), and any acknowledgment of assistance. Times New Roman with 12 point font.

2. Second Page - A brief biographical sketch of each author including name, degree(s) held, title or position, organization or institution, previous publications and research interests. Include each author’s email address at end. Maximum of 90 words per author. Times New Roman with 12 point font.

3. Third Page - Title of the paper without author name(s) and a brief abstract of no more than 125 words summarizing the article in Times New Roman 12 point font. The abstract serves to generate reader interest in the full article.

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4. The entire manuscript must be typed LEFT-JUSTIFIED, with the exception of tables and figures.
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1. The manuscript title should be printed in Times New Roman 12 point and in all capital letters and bold print.

2. Author(s) and affiliation(s) are to be printed in upper and lower case letters below the title. Author(s) are to be listed with affiliation(s) only. Times New Roman 12 point.

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1. ONLY Tables and Figures are to appear in camera-ready format! Each table or figure should be numbered in Arabic style (i.e., Table 1, Figure 2).

2. All tables MUST be typed using Microsoft Word for Windows table functions. Tables should NOT be tabbed or spaced to align columns. Column headings should not be created as separate tables. Table titles should NOT be created as part of the table. Table Titles should be 12 point upper case and bold. All tables MUST be either 3 1/4 inches wide or 6 7/8 inches wide.

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5. Please remember that JTM is printed in **black and white**. Use of color and/or shading should be avoided.

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1. Equations are placed on a separate line with a blank line both above and below, and numbered in parentheses, flush right. Examples:

\[ y = c + ax + bx \]
\[ y = a + 1x + 2x + 3x + ax \]

2. References within the text should include the author’s last name and year of publication enclosed in parentheses, e.g. (Wilson, 2004; Manrodt and Rutner, 2004). For more than one cite in the same location, references should be in chronological order. For more than one cite in the same year, alphabetize by author name, such as (Wilson, 2001; Mandrodt, 2002; Rutner, 2002; Wilson, 2003). If practical, place the citation just ahead of a punctuation mark. If the author’s name is used within the text sentence, just place the year of publication in parentheses, e.g., “According to Manrodt and Rutner (2003) ....”. For multiple authors, use up to three names in the citation. With four or more authors, use the lead author and et al., (Wilson et al., 2004). References from the Internet should contain the site name, author/organization if available, date the page/site was created, date page/site was accessed, and complete web addresses sufficient to find the cited work.

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Journal Article:

Book Chapter:

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MANUSCRIPT SAMPLE

A FRAMEWORK FOR EVALUATING SUPPLY CHAIN PERFORMANCE

Terrance L. Pohlen, University of North Texas

ABSTRACT

Managers require measures spanning multiple enterprises to increase supply chain competitiveness and to increase the value delivered to the end-customer. Despite the need for supply chain metrics, there is little evidence that any firms are successfully measuring and evaluating inter-firm performance. Existing measures continue to capture intrafirm performance and focus on traditional measures. The lack of a framework to simultaneously measure and translate inter-firm performance into value creation has largely contributed to this situation. This article presents a framework that overcomes these shortcomings by measuring performance across multiple firms and translating supply chain performance into shareholder value.

INTRODUCTION

The ability to measure supply chain performance remains an elusive goal for managers in most companies. Few have implemented supply chain management or have visibility of performance across multiple companies (Supply Chain Solutions, 1998; Keeler et al., 1999; Simatupang and Sridharan, 2002). Supply chain management itself lacks a widely accepted definition (Akkermans, 1999), and many managers substitute the term for logistics or supplier management (Lambert and Pohlen, 2001). As a result, performance measurement tends to be functionally or internally focused and does not capture supply chain performance (Gilmour, 1999; *Supply Chain Management*, 2001). At best, existing measures only capture how immediate upstream suppliers and downstream customers drive performance within a single firm.
Developing and Costing Performance Measures
ABC is a technique for assigning the direct and indirect resources of a firm to the activities consuming the resources and subsequently tracing the cost of performing these activities to the products, customers, or supply chains consuming the activities (La Londe and Pohlen, 1996). An activity-based approach increases costing accuracy by using multiple drivers to assign costs whereas traditional cost accounting frequently relies on a very limited number of allocation bases.

\[ y = a^2 - 2ax + x^2 \]

REFERENCES


Revised August 30, 2011
Dr. John C. Taylor, Editor
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