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An empirically derived framework of logistics management strategy

Michael A. McGinnis
Penn State New Kensington Campus, mam47@psu.edu

Ali Kara
Penn State York Campus, axk19@psu.edu

Leslie I. Wolfe
Penn State Electro-Optics Center, lid101@psu.edu

AN EMPIRICALLY DERIVED FRAMEWORK OF LOGISTICS MANAGEMENT STRATEGY

Michael A. McGinnis, CPSM, C.P.M. 1
Penn State New Kensington Campus

Ali Kara
Penn State York Campus

Leslie I. Wolfe
Penn State Electro-Optics Center

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.

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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.2 As described by Mentzer, er 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.

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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 me 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

Authors	Background	Methodology	Findings
McGinnis and Kohn (1990)	Authors began a review of alternate perspectives of logistics organization and logistics strategy.	Mail questionnaire to 523 logistics managers of USA manufacturing firms. Two hundred and twenty-two (42.4%) usable returns.	Logistics Coordination Effectiveness, Customer Service Effectiveness, and Competitive Responsiveness, among other variables, that varied $p<0.05$ among identified strategies. No attempt to identify paths among significant variables.
McGinnis and Kohn (1993)	Builds on previous research to develop additional insights into logistics as a part of strategy	Mail questionnaire to 146 subjects who had responded to a previous questionnaire. Fifty-nine (43.7%) usable returns.	Three logistics strategy clusters identified based on Process and Market strategies. Logistics Coordination Effectiveness, Customer Service Effectiveness, and Company/Division Competitiveness varied $p<0.05$ among strategies. The need to explore linkages of logistics strategy was recognized.
Clinton, and Closs (1997)	Assess whether underlying factors could be identified for the Bowersox/ Daugherty typology.	Used survey data from 375 USA manufacturers and 103 Canadian Association of Logistics Management members.	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.
McGinnis and Kohn (2002)	Tested relationship of Bowersox/ Daugherty variables with Logistics Coordination Effectiveness (LCE).	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.	Factor analysis identified two independent variables, one comprised of Process and Information strategies (P&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.
Autry, Zacharia, and Lamb (2008)	Empirically developed logistics strategy taxonomy.	Mail questionnaire to logistics managers from multiple industries. Two hundred and fifty-four (38.0%) usable surveys were received from 668 subjects.	Cluster analysis was used to identify two logistics strategies: Functional Logistics (FL) and Externally Oriented Logistics (EOL). Recommended that further research investigate logistics strategy.
McGinnis, Kohn, and Spillan (2010)	Studied logistics strategy from 1990 to 2008.	Compared empirical data gathered in 1990, 1994, 1999, and 2008.	Identified logistics strategy clusters (intense and passive) and their relationships to logistics strategy outcomes. Concluded that cost efficiency is common to both strategy clusters, that reducing complexity faced by customers and inter- and intra-organizational coordination is less important in passive logistics strategies. Also concluded that logistics coordination effectiveness and customer service commitment better measure logistics strategy outcomes.

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 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

TABLE 2
SUMMARY OF LOGISTICS STRATEGY AND ORGANIZATIONAL COMPETITIVENESS

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

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

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. The following paragraph discusses these variables. The following paragraph introduces two variables that were used to relate logistics strategy to the dependent variable, 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

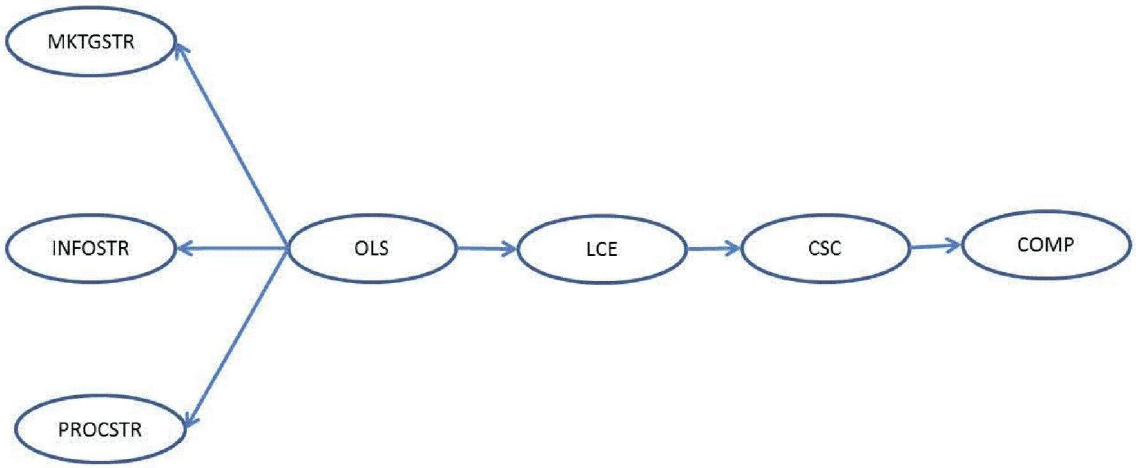
Strategy, Logistics Effectiveness, and Customer Service Commitment. Figure 1 illustrates the conceptualized framework.

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

FIGURE 1
CONCEPTUALIZED MODEL OF LOGISTICS MANAGEMENT STRATEGY



Legend:

PROCSTR– Process Strategy
MKTGSTR – Market Strategy
INFOSTR – Information Strategy
OLS – Overall Logistics Strategy
LCE – Logistics Coordination Effectiveness
CSC – Customer Service Commitment
COMP – Organizational Competitiveness

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 3
FIRST ORDER CONFIRMATORY FACTOR ANALYSIS
FOR OVERALL LOGISTICS STRATEGY (OLS)

Country & Data Collection Date	Chi-square	p=	GFI	CFI	RMSEA
United States 1990 data[1]	48.05	0.002	0.775	0.849	0.131
United States 1994data[2]	25.39	0.385	0.993	0.944	0.025
United States 1999 data[3]	31.06	0.095	0.970	0.962	0.049
United States 2008 data[4]	32.28	0.094	0.933	0.875	0.091
Guatemala 2010 data[5]	48.65	0.001	0.994	0.941	0.082
Turkey 2010 data[6]	38.40	0.017	0.962	0.988	0.059
China 2011 data[7]	25.61	0.363	0.985	0.995	0.014
Ghana 2012 data[8]	73.991	0.000	0.954	0.917	0.082
Peru 2013 data[9]	43.81	0.008	0.937	0.953	0.078

[1]Data first published in McGinnis, Michael A. and Jonathan W. Kohn (1993), "Logistics Strategy, Organizational Environment, and Time Competitiveness," *Journal of Business Logistics*, Vol. 14, No. 2, pp. 1-23.
[2]Data first published in Kohn, Jonathan W. and Michael A. McGinnis (1997a), "Logistics Strategy: A Longitudinal Study," *Journal of Business Logistics*, Vol. 18, No. 2, pp. 1-14 and Kohn, Jonathan W. and Michael A. McGinnis (1997b), "Advanced Logistics Organization Structures: Revisited," *Journal of Business Logistics*, Vol. 18, No. 2, pp. 147-162.
[3]Data first published in McGinnis, Michael A. and Jonathan W. Kohn (2002), "Logistics Strategy-Revisited," *Journal of Business Logistics*, Vol. 23, No. 2, pp. 1-17.
[4]Data first published in Kohn, Jonathan, Michael A. McGinnis, and Ali Kara ((2011), A Structural Equation Model Assessment of Logistics Strategy," *International Journal of Logistics Management*, Vol. 22, No.3, pp. 284-305.
[5, 6]Data first published in McGinnis, Michael A., Talha Harcar, Ali Kara, and John E. Spillan (2011), "Cross-Cultural Validation of the Factorial Structure of a Logistics Strategy Model: A Three Country Study," *Journal of Transportation Management*, Vol. 22, No. 2, pp.25-43.
[7]Data first published in Spillan, John E., Michael A. McGinnis, Ali Kara, and George Liu Yi (1993), "A Comparison of the Effect of Logistics Strategy and Logistics Integration on Firm Competitiveness in the USA and China," *The International Journal of Logistics Management*, Vol. 24, No. 2, pp. 153-179.
[8]Data first published in McGinnis, Michael A., Ali Kara, and John E. Spillan (2013), "An Empirical Cross Cultural Assessment of a Logistics Management Typology," *Journal of Transportation Management*Vol.24, No. 1, pp. 77-94.
[9]Peru 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 .0.90 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 indicates 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 4
STRUCTURAL EQUAION MODEL OF OVERALL LOGISTICS STRATEGY AND ORGANIZATIONAL COMPETITIVENESS

Country and Data Collection Date	Chi-square	p=	GFI	CFI	RMSEA	R^2
United States 1990 data	150.00	0.001	0.791	0.795	0.960	0.51
United States 1994 data	118.89	0.074	0.865	0.951	0.049	0.44
United States 1999 data	125.97	0.022	0.916	0.960	0.043	0.19
United States 2008 data	126.60	0.023	0.766	0.874	0.079	0.10
Guatemala 2010 data	192.60	0.000	0.867	0.910	0.081	0.75
Turkey 2010 data	170.72	0.000	0.912	0.962	0.061	0.26
China 2011 data	154.47	0.000	0.949	0.936	0.040	0.62
Ghana 2012 data	162.87	0.000	0.941	0.935	0.045	0.13
Peru 2013 data	166.51	0.000	0.875	0.904	0.072	0.46

moderating) variables (Tabachinck 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.

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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

Ali Kara is Professor Marketing at the Penn State York Campus. He holds a doctorate from Florida International University, Miami, Florida and an MBA degree from the University of Bridgeport, Connecticut. He has published numerous articles in journals such as the *Journal of Marketing Research, Journal of Advertising, International Journal of Research in Marketing, European Journal of Operations Research, Journal of Global Marketing,* and the *International Journal of Logistics Management*. E-mail: axk19@psu.edu

Leslie I. Wolfe is a Project Portfolio Manager at Penn State Electro-Optics Center**.** E-mail: lid101@psu.edu