A LONGITUDINAL STUDY OF LOGISTICS STRATEGY: 1990-2008

by

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INTRODUCTION

Since the 1960's the roles of logistics in the firm (Smykay, Bowersox, and Mossman 1961) and channel (Heskett, Ivie, and Glaskowsky 1964) have been recognized in the literature. In addition, logistics' role as part of organizational strategy has been apparent since the 1970's (Heskett 1977). Interest in strategic issues in business logistics increased during the 1980's and by the early 1990's strategic issues or strategy considerations had become recurring themes in the Council of Logistics Management's (now named the Council of Supply Chain Management Professionals) *Supplement to Bibliography on Logistics Management* (Kohn and McGinnis 1997b). Over time**,** with the discontinuance of the Bibliography during the 1990's**,** this valuable tool for tracking trends in logistics and supply chain management was lost.

As part of ongoing research during the 1980's, Bowersox and Daugherty (1987) presented a typology which postulated three dimensions of logistics strategy: process; market; and information. Their typology has inspired a stream of empirical research over the last two decades which examined it from different perspectives. However, a review of the literature did not offer any research that examined the typology over time. To accomplish this task, this article presents the results of empirical research into the management of logistics strategy from 1990 to 2008. The analysis and findings focus on the Bowersox and Daugherty (1987) typology and provide insights into logistics strategy over an 18-year period. This typology was selected because it provides a frame of reference that has a reasonable level of credibility and acceptance over more than 20 years. Therefore, the purpose of this article is to document logistics strategy over an 18-year period that overlaps the last decade of the 20th century and first decade of the 21st century.

This article is organized into six sections. The first two sections contain the introduction and literature review, which provides an overview of the conceptual framework for the study. Sections three and four contain the research methodology, data analysis, and findings. The fifth section provides the discussion of the results and presents the conclusions reached from the study. The final section discusses the relevance of this research to the literature and provides implications for logistics/supply chain management practitioners, teachers, and researchers.

LITERATURE REVIEW AND DEVELOPMENT OF RESEARCH HYPOTHESES

Bowersox and Daugherty (1987) identified three logistics strategic orientations, which may be used individually or in combination, in response to organizational business requirements. They are summarized as:

1. Process Strategy: Management of traditional logistics activities with a primary goal of controlling costs.
2. Market Strategy: Management of selected traditional logistics activities across business units with the goal of reducing complexity faced by customers.
3. Information Strategy (also referred to as "Channel Strategy" by some authors): A diverse group of traditional—and other activities—managed as a system, with the goal of achieving inter-organizational coordination and collaboration through the channel.

Subsequent research has concluded that the Bowersox and Daugherty (1987) typology was worthy of further research (McGinnis and Kohn 1993); that the typology is "promising" (Clinton and Closs 1997); that multiple strategies are present in all organizations to varying degrees (Kohn and McGinnis 1997a); that process strategy explains more variance in logistics coordination effectiveness than does market and information strategies; and that the typology can be used for examining logistics strategy in U.S. manufacturing firms (McGinnis and Kohn 2002).

Later, Autry, Zacharia, and Lamb (2008) surveyed 254 logistics managers from multiple industries. Their research identified two logistics strategy dimensions: Functional Logistics (FL) strategy; and Externally Oriented Logistics (EOL) strategy. The former was described as similar to Bowersox and Daugherty's Process Strategy. The latter was described as somewhat resembling Channel (Information) Strategy. Logistics activities associated with the two strategies were as follows:

- Functional Logistics: Inventory and Order Management, Order Processing, Procurement, and Storage.
- Externally Oriented Logistics: Coordination and Collaboration Activities, Logistics Social Responsibility, Strategic Distribution Planning, and Technology and Information Systems.
- Four logistics activities that did not vary significantly between FL and EOL strategies were Customer Service, Operational Controls, and Transportation Management.

Based on the literature review, the authors' concluded that the Bowersox and Daugherty typology provides a relevant framework for a longitudinal study of logistics strategy. Since two of the co-authors had collected logistics strategy data on U.S. manufacturing firms since the 1980's, and had collected comparable data in 1990, 1994, and 1999, they decided to collect additional data in 2008 which would complete a longitudinal study over an 18-year period, 1990 to 2008.

Six variables were identified for purposes of evaluating logistics strategies in U.S. manufacturing firms during the interval studied. The three independent variables were scales that represent the three Bowersox and Daugherty strategies: Process; Market; and Information. They have been used in several studies reported in the literature, have sufficient content validity (Kohn and McGinnis 1997a), and have adequate average levels of reliability (George and Mallery 2003). Three scales were selected as dependent variables representing outcomes of logistics strategy. They are Logistics Coordination Effectiveness, Customer Service Commitment, and Company/Division Competitiveness. These scales had been originally developed using factor analysis, have been replicated, appear to fit the construct name, and have relevant levels of reliability (Kohn and McGinnis 1997a). All six scales are described and discussed by Keller et al. (2002). After considering issues of validity and reliability, occurrence of scale replication, consistency of sampling, and data collection methodologies, and the lack of relevant longitudinal data on logistics strategy, the authors concluded that the six scales selected for this research would provide a useful basis for comparing logistics strategies and logistics strategy outcomes over time.

The logistics/supply chain management literature well documents the role of logistics relative to supply chain management and other activities such as marketing, production, and purchasing (Frankel et al. 2008; Mentzer, Stank, and Esper 2008). Larson, Poist, and Halldorsson (2007) empirically examined this issue and concluded that senior supply chain executives are not in agreement regarding whether logistics is a subset of supply chain management (the unionist perspective), or whether the two overlap (the intersectionist perspective). Overall, the authors are open to further discussion whether supply chain management is an academic discipline, an umbrella term

that includes a wide range of disciplines (such as marketing channels, logistics, operations/production management, and purchasing/procurement/supply management), or a philosophy of business, such as just-in-time, lean management, total quality management, or Six-sigma. For purposes of this article, "logistics" is used rather than "supply chain management," because "logistics" was the more common terminology in use when the study began.

TABLE 1

INDEPENDENT AND DEPENDENT VARIABLES

Independent Variables*

Scale 1: Process Strategy (PROCSTR)

1-1 In my company/division, management emphasizes achieving maximum efficiency from purchasing, manufacturing, and distribution.

1-2 A primary objective of logistics in my company/division is to gain control over activities that result in purchasing, manufacturing, and distribution costs.

1-3 In my company/division, logistics facilitates the implementation of cost and inventory reducing concepts such as Focused Manufacturing and Just-in-Time Materials Procurement.

Reliability coefficients (alphas): 1990 = 0.626, 1994 = 0.710, 1999 = 0.579, 2008 = 0.609.
Average of alphas for four surveys = 0.651

Scale 2: Market Strategy (MKTGSTR)

2-1 In my company/division, management emphasizes achieving coordinated physical distribution to customers served by several business units.

2-2 A primary objective of logistics in my company/division is to reduce the complexity our customers face in doing business with us.

2-3 In my company/division, logistics facilitates the coordination of several business units in order to provide competitive customer service.

Reliability coefficients (alphas): 1990 = 0.811, 1994 = 0.642, 1999 = 0.737, 2008 = 0.772.
Average of alphas for four surveys = 0.741

Scale 3: Information Strategy (INFOSTR)

3-1 In my company/division, management emphasizes coordination and control of channel members (distributors, wholesalers, dealers, retailers) activities.

3-2 A primary objective of logistics in my company/division is to manage information flows and inventory levels throughout the channel of distribution.

3-3 In my company/division, logistics facilitates the management of information flows among channel members (distributors, wholesalers, dealers, retailers).

Reliability coefficients (alphas): 1990 = 0.520, 1994 = 0.727, 1999 = 0.568, 2008 = 0.699.
Average of alphas for four surveys = 0.629

*Scales: 1 = Strongly Agree, 2 = Agree, 3 = Neither Agree nor Disagree, 4 = Disagree,
5 = Strongly Disagree.

TABLE 1 (Continued)

Dependent Variables*

Logistics Coordination Effectiveness (LCE)

LC-1 The need for closer coordination with suppliers, vendors, and other channel members has fostered better working relationships among departments within my company.

LC-2 In my company logistics planning is well coordinated with the overall strategic planning process.

LC-3 In my company/division logistics activities are coordinated effectively with customers, suppliers, and other channel members.

Reliability Coefficients (alphas): 1990 = 0.539,1994 = 0.649, 1999 = 0.708, 2008 = 0.538.
Average of alphas for four surveys = 0.609

Customer Service Commitment (CSC)

CSC-1 Achieving increased levels of customer service has resulted in increased emphasis on employee development and training.

CSC-2 The customer service program in my company/division is effectively coordinated with other logistics activities.

CSC-3 The customer service program in my company/division gives us a competitive edge relative to our competition.

Reliability Coefficients (alphas): 1990 = 0.723, 1994 = 0.729, 1999 = 0.673, 2008 = 0.653.
Average of alphas for four surveys = 0.695

Company/Division Competitiveness (COMP)

COMP-1 My company/division responds quickly and effectively to changing customer or supplier needs compared to our competitors.

COMP-2 My company/division responds quickly and effectively to changing competitor strategies compared to our competitors.

COMP-3 My company/division develops and markets new products quickly and effectively compared to our competitors.

COMP-4 In most of its markets my company/division is a:

Very Strong Competitor		Moderately Strong Competitor		Weak Competitor
1	2	3	4	5

Reliability Coefficients (alphas): 1990 = 0.684, 1994 = 0.862, 1999 = 0.675, 2008 = 0.701.
Average of alphas for four surveys = 0.733

*Scales: 1 = Strongly Agree, 2 = Agree, 3 = Neither Agree nor Disagree, 4 = Disagree, 5 = Strongly Disagree. See COMP-4 for that variable's scale.

A major question facing the subject of this research is whether the Bowersox and Daugherty (1987) typology has remained stable over the last two decades. Further, if it has not remained stable, how has it changed and what are the implications for the research, teaching, and practice of logistics? Based on the above questions the following null hypotheses were developed based on a survey of logistics managers in U.S. manufacturing firms:

H_1: The importance of Process Strategy remained constant from 1990 to 2008.

H_2: The importance of Marketing Strategy remained constant from 1990 to 2008.

H_3: The importance of Information Strategy remained constant from 1990 to 2008.

H_4: The importance of Logistics Coordination Effectiveness remained constant from 1990 to 2008.

H_5: The importance of Customer Service Commitment remained constant from 1990 to 2008.

H_6: The importance of Company/Division Competitiveness remained constant from 1990 to 2008.

The authors did not find any empirical research that examined the relative importance of independent variables Process Strategy, Market Strategy, and Information Strategy to overall logistics strategy. As a result, the authors can posit the null hypothesis that:

H_7: Within a logistics strategy, Process Strategy, Market Strategy, and Information Strategy will be of equal importance.

Previous research (Autry, Zach, and Lamb 2008; Clinton and Closs 1997; Kohn and McGinnis 1997a; Kohn and McGinnis 1997b; McGinnis and Kohn 2002) has established that independent variables, such as Process Strategy, Market Strategy, and Information Strategy, vary within organizations. However, the effect of logistics strategy independent variables on outcomes, such as Logistics Coordination Effectiveness, Customer Service Commitment, and Company/Division Competitiveness, has not been as closely examined. As a result the authors hypothesized that:

H_8: Logistics Coordination Effectiveness does not vary as logistics strategy varies.

H_9: Customer Service Commitment does not vary as logistics strategy varies.

H_{10}: Company/Division Competitiveness does not vary as logistics strategy varies.

The ten hypotheses provide a basis for assessing logistics strategy over an 18-year period. If, for example, the first three hypotheses are accepted, then it would be concluded that the importance of Process, Market, and Information strategies had not changed during the 18 years bridging the 20th and 21st centuries. On the other hand**,** if any of the first three hypotheses are rejected, then it is probable that there were shifts in the priorities of logistics managers during that period. In a similar manner, acceptance of the second group of three hypotheses would suggest that logistics managers' perceptions of three outcomes (Logistics Coordination Effectiveness, Customer Service Commitment, and Company/Division Competitiveness) had been stable during the period studied. Conversely, rejection of any of the hypotheses 3, 4, or 5 would then suggest that logistics managers either (a) perceived the dependent variables to have changed in importance, or (b) their organizations were performing differently over time.

H_7 provides a means of assessing the relative importance, if any, of Process, Market, and Information strategies. If one strategy proved to be of greater (or less) importance by logistics managers, then a different perspective on logistics strategy would result than if Process, Market, and Information strategies were perceived as being of similar importance. **H_8**, **H_9,** and **H_{10}** enable the authors to test whether the dependent variables vary among logistics strategy scenarios.

RESEARCH METHODOLOGY

Data were collected at four points in time. Identically worded questions were used for each of the six scales. The subjects were logistics managers in U.S. manufacturing firms who were members of the Council of Supply Chain Management Professionals (CSCMP)—previously the Council of Logistics Management (CLM). Collection of the 1990 data is described in McGinnis and Kohn (1993); collection of the 1994 data is described in Kohn and McGinnis (1997a, 1997b); and collection of the 1999 data is described in McGinnis and Kohn (2002). In each of these cases subjects were sampled using mail questionnaires with a pre-notification letter, the questionnaire with a cover letter, and a follow-up letter. Net usable response rates were 42.4 % (1990), 35.7 % (1994), and 24.1 % (1999).

In 2008, a four-page, 46-item questionnaire was electronically sent to 905 CSCMP members who worked for U.S. manufacturing firms and had job titles of manager or higher in logistics, distribution, or supply chain management. One hundred and twenty-three were undeliverable for a net sample of 782 subjects. After two follow-ups, a total of 50 (6.4%) usable responses were returned. While the response rate was lower than the previous surveys, it is understandable given the results of similar recent studies reported in the logistics/supply chain management literature (Flint, Larsson, and Gammelgaard 2008). After examining the means, standard deviations, and reliability coefficients for the six variables, the authors concluded that the 2008 results were adequate for inclusion in the longitudinal analysis.

DATA ANALYSIS AND RESULTS

Analysis was conducted in three steps. First, the means of each of the variables were compared in each of the four years (1990, 1994, 1999, and 2008) using one-way analysis of variance. The results, as shown in Table 2, indicated that the means of the six variables did not vary among the four replications by an amount greater than chance. In addition, post hoc analysis did not identify any pairs of any variables that varied, alpha < 0.05, significantly.

TABLE 2

COMPARISON OF MEANS OF SCALE SCORES*: 1990 THROUGH 2008

	N/ Means**/ Standard Deviations				ANOVA Mean Differences Significant
	1990	1994	1999	2008	< 0.05
Process Strategy (PROCSTR)	59/ 2.186/ 0.736	91/ 2.337/ 0.817	172/ 2.330/ 0.706	50/ 2.187/ 0.660	NO***
Market Strategy (MKTGSTR)	59/ 2.254/ 0.796	91/ 2.535/ 0.789	172/ 2.543/ 0.848	50/ 2.186/ 0.660	NO***
Information Strategy (INFOSTR)	59/ 2.582/ 0.688	91/ 2.718/ 0.740	172/ 2.770/ 0.717	50/ 2.580/ 0.609	NO***
Logistics Coordination Effectiveness (LCE)	59/ 2.554/ 0.774	91/ 2.685/ 0.707	172/ 2.582 0.730	50/ 2.580 0.609	NO***
Customer Service Commitment (CSC)	59/ 2.271/ 0.838	83/ 2.528/ 0.823	172/ 2.518/ 0.743	50/ 2.633/ 0.772	NO***
Company/Division Competitiveness (COMP)	59/ 2.284/ 0.629	91/ 2.500/ 0.703	172/ 2.402/ 0.589	48/ 2.422/ 0.659	NO***

*Scale Scores = (Sum of item scores of items in that scale)/(Number of items)
**Scales: 1 = Strongly Agree, 2 = Agree, 3 = Neither Agree nor Disagree, 4 = Disagree, 5 = Strongly Disagree.
***Post hoc analysis did not identify any year-pairs mean differences at < 0.05.

In the second step, data for the three independent variables, for each of the four replications, were cluster analyzed to ascertain whether logistics strategies were homogenous, and if not, in what way were they heterogeneous. SPSS 16.0's Two Step Cluster was used in this step. As shown in Table 3, two logistics clusters, named Intense Logistics Strategy and Passive Logistics Strategy, were identified in 1990, 1994, 1999, and 2008. In addition to Intense Logistics Strategy and Passive Logistics Strategy, a third cluster, Moderate Logistics Strategy, was identified in the 1994 data. As shown in Table 3, the means of Process, Market, and Information strategies (PROCSTR, MKTGSTR, and INFOSTR respectively) were significantly different between (among for 1994) logistics strategy clusters.

TABLE 3

RESULTS OF STRATEGY CLUSTER ANALYSES 1990 THROUGH 2008: INDEPENDENT VARIABLES

1990 – N = 59

Cluster*	PROCSTR Mean/Standard Deviation**	MKTGSTR Mean/Standard Deviation	INFOSTR Mean/Standard Deviation	ANOVA Significance & Comments***
1. Intense Logistics Strategy N =31 52.5 %	1.9462/0.56501 Unclassified	1.7204/0.50998 Highest	2.1505/0.54323 Lowest	0.009. Mean of PROCSTR not significant from MKTGSTR & INFOSTR at alpha < 0.05
2. Passive Logistics Strategy N = 28 47.5 %	2.4524/0.81758 Highest	2.8452/0.61852 Unclassified	3.0595/0.48900 Lowest	0.003. Mean of MKTGSTR not significant from PROCSTR & INFOSTR at alpha < 0.05
Significance	0.009	0.000	0.000	

*Cluster Classification:
Intense Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR < 2.000.
Moderate Logistics Strategy: No values of PROSTR, MKTGSTR, or INFOSTR = 2.000 to 2.999.
Passive Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR = 3.000 or greater**.**
**Scales: 1 = Strongly Agree through 5 = Strongly Disagree.
***Variable means tested using Duncan post hoc test.

1994, N = 91

Cluster	PROCSTR Mean/Standard Deviation	MKTGSTR Mean/Standard Deviation	INFOSTR Mean/Standard Deviation	ANOVA Significance & Comments
1. Intense Logistics Strategy N = 30 33.0 %	1.7333/0.44118 Highest	1.7000/0.35398 Highest	2.2444/0.44578 Lowest	0.000. Means of PROCSTR & MKTGSTR not significant at alpha < 0.05
2. Moderate Logistics Strategy N = 41 45.1 %	2.4390/0.66013	2.7073/0.41630	2.5447/0.45799	0.067. No means significantly different at alpha = 0.05
3. Passive Logistics Strategy N = 20 22.0 %	3.0333/0.91703 Highest	3.4333/0.61273 Unclassified	3.7833/0.48696 Lowest	0.005. Mean of MKTGSTR not significant from PROCSTR & INFOSTR at alpha < 0.05
Significance	0.000	0.000	0.000	

NOTE: Percentages do not add to 100 due to rounding.

TABLE 3 (Continued)

1999, N = 172

Cluster	PROCSTR Mean/Standard Deviation	MKTGSTR Mean/Standard Deviation	INFOSTR Mean/Standard Deviation	ANOVA Significance & Comments
1. Intense Logistics Strategy N = 105 61.0 %	1.9413/0.46684 Highest	2.2127/0.74266 Medium	2.4032/0.52439 Lowest	0.000. All means significantly different at alpha = 0.05
2. Passive Logistics Strategy N = 67 39.0 %	2.9403/0.57421 Highest	3.0597/0.74066 Highest	3.3458/0.58912 Lowest	0.001. Means of PROCSTR and MKTGSTR n.s. at alpha < 0.05
Significance	0.000	0.000	0.000	

2008, N = 49

Cluster	PROCSTR Mean/Standard Deviation	MKTGSTR Mean/Standard Deviation	INFOSTR Mean/Standard Deviation	ANOVA Significance & Comments
1. Intense Logistics Strategy N = 35 71.4%	1.8952/0.45569 Highest	2.0000/0.74096 Highest	2.6095/0.68830 Lowest	0.000. Means of PROCSTR and MKTGSTR n.s. at alpha < 0.05
2. Passive Logistics Strategy N = 14 28.6%	2.9048/0.56126 Highest	3.4286/0.67214 Lowest	3.4762/0.55028 Lowest	0.027. Means of MKTGSTR and INFOSTR n.s. at alpha < 0.05
Significance	0.000	0.000	0.000	

In third step of the analysis, the means of dependent variables Logistics Coordination Effectiveness (LCE), Customer Service Commitment (CSC), and Company/Division Competitiveness (COMP), were tested for significant differences between (among for 1994) logistics strategy clusters. These results are shown in Table 4. LCE and CSC were significantly different between (among for 1994) clusters, however in the 1994 data, post hoc analysis of LCE and CSC identified pairs of strategies that were not significantly different, alpha < 0.05. The means of Company/Division Competitiveness (COMP) were significantly different, alpha < 0.05, in 1999, but not in 1990 or 2008. In 1994, the means of COMP were significant at 0.05, but post hoc analysis indicated that a pair of strategies was not significant at 0.05. The following paragraphs discuss the findings based on the analysis.

The following summarizes the findings regarding the null hypotheses. As shown in Table 5, the first six hypotheses were supported by the results. This indicates that the importance of the three independent variables (Process Strategy, Marketing Strategy, and Information Strategy) and the three dependent variables (Logistics Coordination Effectiveness, Customer Service Commitment, and Competitive Responsiveness) did not change appreciably between 1990 and 2008. This finding is interesting considering the changes that occurred in the business environment during that period, and suggests that logistics strategy is stable over time in a dynamic business environment.

TABLE 4

RESULTS OF STRATEGY CLUSTER ANALYSES 1990 THROUGH 2008: DEPENDENT VARIABLES

1990, N = 59

Cluster*	LCE Mean/Standard Deviation	CSC Mean/Standard Deviation	COMP Mean/Standard Deviation	ANOVA Significance & Comments
1. Intense Logistics Strategy N =31 52.5 %	2.3118/0.52306 Lowest	1.9247/0.68115 Highest	2.1532/0.58639 Unclassified	0.043. Mean of COMP not significant. from LCE & CSC at alpha < 0.05
2. Passive Logistics Strategy N = 28 47.5 %	2.8214/0.86297	2.6548/0.83878	2.4286/0.65212	0.183. Means of LCE, CSC, and COMP not significant. at alpha < 0.05
Significance	0.010	0.001	0.093	

*Cluster Classification:
Intense Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR < 2.000.
Moderate Logistics Strategy: No values of PROSTR, MKTGSTR, or INFOSTR = 2.000 to 2.999.
Passive Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR = 3.000 or greater.
**Scales: 1 = Strongly Agree through 5 = Strongly Disagree.
***Variable means tested using Duncan post hoc test.

1994, N = 91

Cluster	LCE Mean/Standard Deviation	CSC Mean/Standard Deviation	COMP Mean/Standard Deviation	ANOVA Significance & Comments
1. Intense Logistics Strategy N = 30 33.0 %	2.1667/0.67665	2.1429/0.63134 (N = 28)	2.1333/0.61143	0.140. No Means significantly different at alpha = 0.05
2. Moderate Logistics Strategy N = 41 45.1 %	2.8293/0.55838	2.5439/0.74906 (N = 38)	2.5732/0.63552	0.099. No means significantly different at alpha = 0.05
3. Passive Logistics Strategy N = 20 22.0 %***	3.1667/0.54612	3.1765/0.89067 (N = 17)	2.9000/0.72729	0.409. No means significantly different at alpha = 0.05
Significance	0.000*	0.000**	0.000*	

*Means for Clusters 2 and 3 not significantly different < 0.05.
**Means for Clusters 1 and 2 not significantly different < 0.05.
***Percentages do not add to 100 due to rounding

1999, N = 172

Cluster	LCE Mean/Standard Deviation	CSC Mean/Standard Deviation	COMP Mean/Standard Deviation	ANOVA Significance & Comments
1. Intense Logistics Strategy N =105 61.0 %	2.2698/0.54713	2.3127/0.66173	2.3183/0.58009	0.814. No means significantly different at alpha = 0.05
2. Passive Logistics Strategy N = 67 39.0 %	3.0721/0.71317 Lowest	2.8408/0.75290 Lowest	2.5336/0.58208 Highest	0.000. Means of LCE and CSC n.s. at alpha < 0.05
Significance	0.000	0.000	0.019	

TABLE 4 (Continued)

2008, N = 49

Cluster	LCE Mean/Standard Deviation	CSC Mean/Standard Deviation	COMP Mean/Standard Deviation	ANOVA Significance & Comments
1. Intense Logistics Strategy N = 35 71.4 %	2.3714/0.49686	2.4000/0.69452	2.3235/0.64412 (N = 34)	0.874. No means significantly different at alpha = 0.05
2. Passive Logistics Strategy N = 14 28.6 %	3.1429/0.51829 Lowest	3.2143/0.68696 Lowest	2.6607/0.65492 Highest	0.049. Means of LCE and CSC not significant at alpha < 0.05
Significance	0.000	0.001	0.108	

TABLE 5

RESULTS OF HYPOTHESES TESTING

Hypothesis	Supported or Not Supported
H_1: The importance of Process Strategy remained constant from 1990 to 2008.	Supported by the results; see Table 2.
H_2: The importance of Marketing Strategy remained constant from 1990 to 2008.	Supported by the results; see Table 2.
H_3: The importance of Information Strategy remained constant from 1990 to 2008.	Supported by the results; see Table 2.
H_4: The importance of Logistics Coordination Effectiveness remained constant from 1990 to 2008.	Supported by the results; see Table 2.
H_5: The importance of Customer Service Commitment remained constant from 1990 to 2008.	Supported by the results; see Table 2.
H_6: The importance of Company/Division Competitive Responsiveness remained constant from 1990 to 2008.	Supported by the results; see Table 2.
H_7: Within a logistics strategy Process Strategy, Market Strategy, and Information Strategy will be of equal importance.	Not supported by the results; see Table 3. Within a logistics strategy the differences among independent variable means was usually significant, alpha < 0.5. For both "Intense" and "Passive" logistics strategies, Process Strategy was most often highest in importance with Market Strategy somewhat less important and Information Strategy lowest in importance.
H_8: Logistics Coordination Effectiveness does not vary as logistics strategy varies.	Not supported by the results; see Table 4. Logistics Coordination Effectiveness was significantly more important in Intense Logistics Strategies than in Passive Logistics Strategies.
H_9: Customer Service Commitment does not vary as logistics strategy varies.	Not supported by the results; see Table 4. Customer Service Commitment was significantly more important in Intense Logistics Strategies than in Passive Logistics Strategies.
H_{10}: Company/Division Competitiveness does not vary as logistics strategy varies.	Not supported by the results; see Table 4. The means of Company/Division Competitiveness were significantly different, alpha < 0.05, between "Intense" and "Passive" logistics strategies in 1994 and 1999, but not in 1990 and 2008. As a result the authors rejected the null hypothesis.

The last four hypotheses were not supported by the results. This indicates that the importance of the independent variables (Process Strategy, Market Strategy, and Information Strategy) varies with the intensity of logistics strategy. This finding is not unexpected since the logistics strategy clusters were based on the independent variables. In addition, two of the dependent variables (Logistics Coordination Effectiveness and Customer Service Commitment) also varied with the intensity of logistics strategy. As shown in Table 5, one dependent variable (Competitive Responsiveness) varied, alpha < 0.05, with logistics strategy in 1994 and 1999, but not in 1990 and 2008. This suggests that Competitive Responsiveness is a less reliable measure of logistics strategy effectiveness. Since a large number of variables (such as predictable demand patterns, low levels of customer expectations, large customer safety stocks, identification and exploitation of target markets, and execution of strategy) may account for competitive responsiveness, it appears that the contribution of logistics strategy to competitive responsiveness may vary among firms, or with variations in market conditions. Of the three dependent variables, Logistics Coordination Effectiveness and Customer Service Commitment appear to be more reliable assessments of logistics strategy effectiveness than Competitive Responsiveness.

DISCUSSION AND CONCLUSIONS

The results shown in Table 2 indicate that the perceptions of the three dimensions of Bowersox and Daugherty (1987) typology by managerial-level individuals in logistics, or similar titles, in U.S. manufacturing firms, did not vary significantly in the 18-year interval studied. In addition, respondent perceptions of the three dependent variables did not vary over the period studied by an amount greater than due to chance. These findings suggest that managerial perceptions of logistics strategy dimensions (independent variables) and selected dependent variables are stable enough to permit longitudinal analysis of logistics strategy. This finding is interesting given the dynamic nature of economic activity over an 18-year period, where manufacturing has experienced substantial changes in the areas of outsourcing, integration of multi-national operations, increasing foreign direct manufacturing investment in the U.S., increasing emphasis on techniques such as lean manufacturing, and increasing integration of supply chain members. The authors concluded that the results shown in Table 2 supported the first six null hypotheses; specifically, that the perceived importance of the three independent variables (Process, Market, and Information strategies) and three dependent variables (Logistics Coordination Effectiveness, Customer Service Commitment, and Company/Division Competitiveness) did not vary by an amount greater than due to chance during the 18 years studied. The authors further concluded that logistics thought, at least among logistics managers in U.S. manufacturing firms, is mature and stable.

The results shown in Table 3 provide three insights regarding logistics strategy over time. First, cluster analysis of the independent variables identified two, and in one case three, distinct strategies. Because the third logistics strategy, "Moderate Logistics Strategy," occurred at one point in time (1994), the balance of the discussion focuses on the two strategies identified in all four surveys. They are: "Intense Logistics Strategy;" and "Passive Logistics Strategy." Respondents classified into Intense Logistics Strategy placed greater importance on Process Strategy (PROCSTSR), Market Strategy (MKTGSTR), and Information Strategy (INFOSTR) than did respondents classified into the Passive Logistics Strategy.

Second, examination of the results for 1990, 1999, and 2008, indicate that the percentages of respondents classified as Intense Logistics Strategy increased from 52.5 % in 1990, to 61.0 % in 1999, to 71.4 % in 2008, with appropriate decreases in respondents classified as having Passive Logistics Strategy (1994's results are not included here because "Moderate Logistics Strategy" distorted the percentages of Intense and Passive logistics strategies). This result suggests that (a) during the period studied, the importance of logistics strategy in U.S. manufacturing firms increased in importance and/or**,** (b) U.S. manufacturing firms that remained in 2008 were more intensely managed overall, including logistics. Since this study was limited to logistics in U.S. manufacturing firms, it was not possible to compare the intensity of logistics strategy compared to the intensities of other strategies, such as finance, marketing, production management, and purchasing. The authors suspect that the increase in focus on logistics strategy intensity parallels increases in intensity across surviving manufacturing firms in the U.S.

Third, examination of the ANOVA indicated that the means of PROCSTR, MKTGSTR, and INFOSTR were significant at alpha < 0.05 in all four Intense Logistics Strategies, and all four Passive Logistics Strategies. However, post hoc analysis, as shown in Table 3, identified multiple situations where pairs of independent variables were not significantly different from each other. Based on the post hoc analysis, the independent variables were classified as

"Highest," "Medium," "Lowest," or "Unclassified." A variable was classified as "Highest" when (a) its mean was significantly lower (more important) or (b) when two variables had low scores that were not significantly different; "Medium" when a variable's mean was significantly different from a lower and greater mean; "Lowest" when (a) a mean was significantly greater (less important), or (b) when two variables had greater means that were not significantly different; and "Unclassified" when a variable's mean was not significantly different from one variable classified as "High" and another classified as "Low." The "Moderate Logistics Strategy" from the 1994 data was not included in this analysis. Tabulation, based on eight strategy classifications per independent variable, revealed that:

- PROCSTR was more likely to be classified as "Highest" (seven instances) than MKTGSTR (four instances) and INFOSTR (zero instances).
- MKTGSTR (one) was only variable classified as "Medium."
- INFOSTR was more likely to be classified as "Lowest" (eight instances), than MKTGSTR (one instance) and MKTGSTR (zero instances).
- PROCSTR was "Unclassified" once, MKTGSTR once, and INFOSTR not at all.

The above patterns were consistent between "Intense" and "Passive" logistics strategies. This suggests that PROCSTR is relatively more important in more logistics scenarios than MKTGSTR, with both being more important than INFOSTR. While all three strategies are relevant, especially in logistics strategies that are "Intense," PROCSTR (cost control) is rated highest overall by respondents in "Intense" and "Passive" logistics strategies. MKTGSTR (reducing complexity faced by customers) overall is nearly as important as PROCSTR overall (being more important than PROCSTR in one instance, tied in two instances, and less important in five instances). INFOSTR (inter-organizational cooperation and collaboration) was less important than PROCSTR and MKTGSTR. In addition, INFOSTR's importance declined substantially (numerical value increased) to > 3.0 in all four Passive Logistics Strategy categories identified.

The results of Table 3 are summarized as Table 6 and Figure 1. As shown in Table 6, PROCSTR, MKTGSTR, and INFOSTR have overall un-weighted averages in the four studies of 1.879, 1.908, and 2.352 respectively, when logistics strategies are Intense. For Passive Logistics Strategies, the overall un-weighted averages for PROCSTR (2.844), MKTGSTR (3.192), and INFOSTR (3.416), revealed a similar ordering of dependent variables, but with a wider variability from one level of logistics strategy intensity to the next. For all three independent variables, the gap between Intense and Passive logistics strategies was substantial, ranging from 0.965 to 1.284. The magnitude of these gaps indicates that the emphasis on the three dimensions of the Bowersox and Daugherty (1987) typology varies substantially between logistics strategy intensity levels. This summary provides an alternate perspective where PROCSTR is slightly more important than MKTGSTR, and both are substantially more important than INFOSTR.

Similarly, inspection of Figure 1 shows a clear delineation of independent variables between Intense and Passive logistics strategies. When the logistics strategy is Intense, all three independent variables have average cluster scores that are lower (of greater importance) than in Passive logistics strategies. Further examination of Figure 1 shows that, for each year shown, all independent variables in Intense logistics strategies have values that are lower (of greater importance) than Passive logistics strategies. Taken together, the assessment from the previous paragraph and the information provided in Table 5 ($\mathbf{H_7}$) suggests that Process Strategy (cost control) is generally more important than Market Strategy (reducing complexity faced by customers), and that both are more important than Information Strategy (inter-organizational cooperation and collaboration).

Analysis of the three dependent variables, as shown in Tables 3 and 6, and Figure 1, provided useful insights into the outcomes of "Intensive" and "Passive" logistics strategies. Again, the results of the "Moderate Logistics Strategy" identified only in the 1994 study were not included in the assessment. Examination of the results for "Intense Logistics Strategy" revealed that the means of Logistics Coordination Effectiveness (LCE), Customer Service Commitment (CSC), and Company/Division Competitiveness (COMP), did not vary greatly. Except for the 1990 data, the three dependent variables did not vary from each other by an amount greater than due to chance. In the 1990 data, the ANOVA means were significant, alpha < 0.05. However, post hoc analysis indicated that COMP was not significantly different from the most important variable (CSC) and the least important variable (LCE).

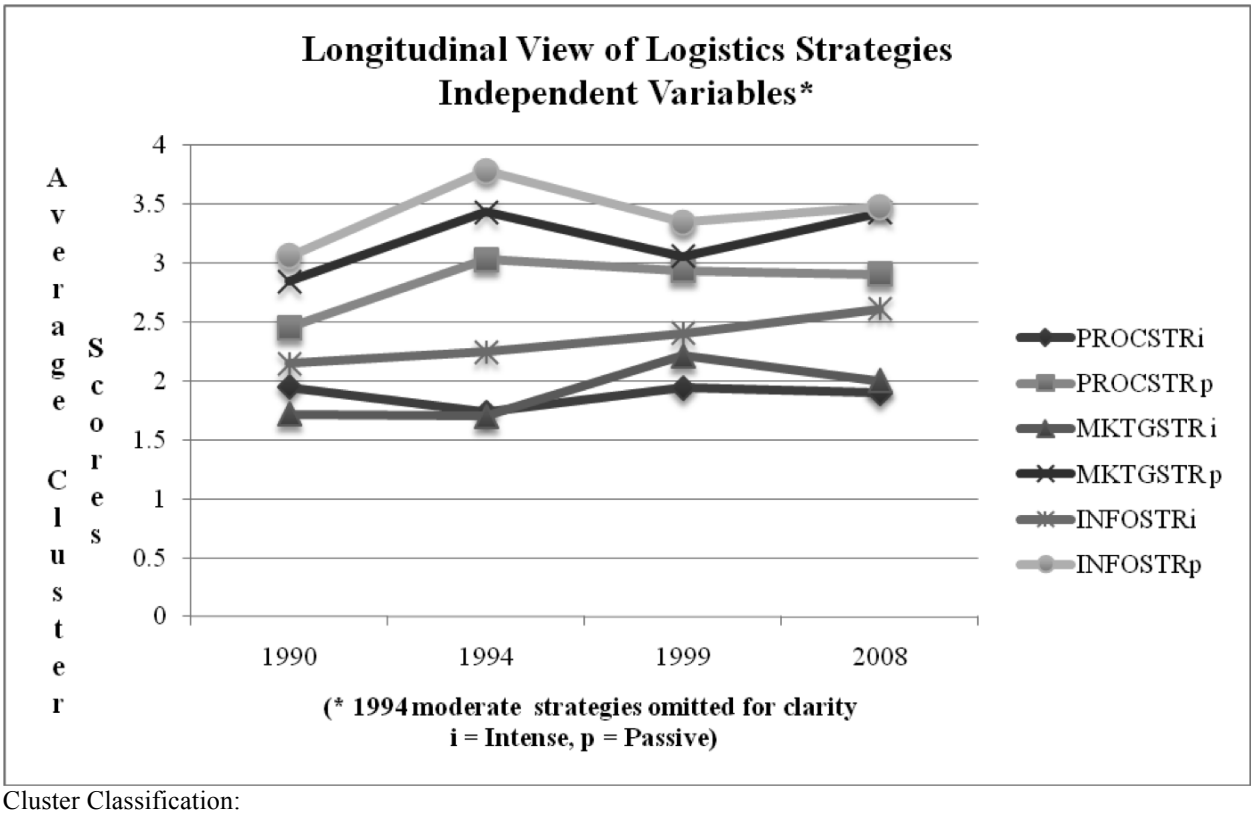
TABLE 6

SUMMARY OF UNWEIGHTED MEAN SCORES OF INDEPENDENT VARIABLES: PROCESS STRATEGY, MARKET STRATEGY AND INFORMATION STRATEGY FROM 1990, 1994, 1999, AND 2008 STUDIES*

	Logistics Strategy		
Variable	Overall	Intense	Passive (change)
Process Strategy	2.260	1.879	2.844 (0.381)
Market Strategy	2.380	1.908	3.192 (1.284)
Information Strategy	2.463	2.352	3.416 (1.064)

*Scales: 1 = Strongly Agree, 2 = Agree, 3 = Neither Agree nor Disagree, 4 = Disagree, 5 = Strongly Disagree.

FIGURE 1



Cluster Classification:
Intense Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR < 2.000.
Passive Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR = 3.000 or greater.
Scales: 1 = Strongly Agree through 5 = Strongly Disagree.
Source: Table 3.

Examination of the results shown in Table 4 revealed that the means of LCE and CSC were significantly different at alpha < 0.05 in all four sets of data when comparing Intensive and Passive logistics strategies. However, the means of COMP were significant in half of the data sets (1990 and 2008), but not significant in two (1994 and 1999).

Summarizing the results shown in Table 4 as Table 7 and Figure 2 provided additional insights into the differences in means of dependent variables between Intensive and Passive logistics strategies. As shown in Table 7, the amount of change of COMP (0.399) was substantially less than either LCE (0.771) or CSC (0.924). This observation suggests that logistics strategy has a greater impact on outcomes (LCE and CSC) that are more directly related to logistics strategy. Apparently COMP is affected by a wide range of strategies beyond logistics strategy, including product design, customer acceptance, production efficiencies, procurement effectiveness, financial strategies, as well as product and process innovation. Finally, the results summarized as Figure 2 show delineation of the values in dependent variables between Intense and Passive logistics strategies graphically. Taken together, the results shown in Tables 3, 4, 6, 7, and Figures 1 and 2, illustrate that all independent variables (PROCESTR, MKTGSTR, INFOSTR), and all dependent variables (LCE, CSC, COMP), differ considerably between Intense and Passive logistics strategies.

Based on the results of this research the authors reached six conclusions. First, the Bowersox and Daugherty (1987) typology provides an excellent framework for describing logistics strategy in U.S. manufacturing firms during the last decade of the 20th century and first decade of the 21st century. This conclusion suggests that logistics (and supply chain management?) strategy is more stable over time than the authors expected. Despite the dynamic nature of business during the period studied, the Bowersox and Daugherty typology remained stable. This does not suggest that techniques used in logistics/supply chain management are stagnant. However, the three strategies (process, market, information) provide a stable framework for describing and studying logistics.

Second, examination of Table 6 reveals that cost efficiency (Process Strategy) and reducing complexity faced by customers (Market Strategy) are the primary focus of intense logistics strategies, while only cost efficiency (Process Strategy) is the primary focus of passive logistics strategies. Third, it appears that cost efficiency and reduced customer complexity are facilitated by Information Strategy in intense logistics strategies (see Table 6). Further examination of Table 6 reveals that Process Strategy (cost efficiency) changes less between Intense and Passive logistics strategies than does Market and Information strategies. This observation results in the fourth conclusion that Process Strategy remains relatively important in both Intense and Passive logistics strategies, while Market Strategy and Information Strategy decline in relative importance in Passive logistics strategies. Figure 1 summarizes the results of Table 3 graphically, showing (a) the delineation of the independent variables between intense and passive logistics strategies that continues throughout the study, and (b) their relative stability from 1999 through 2008.

Examination of Table 7 indicates that all three independent variables are important in Intense Logistics Strategies. However, the importance of Logistics Coordination Effectiveness (LCE) and Customer Service Commitment (CSC), as shown by the change in their values, declined much more than Company/Division Competitiveness (COMP) when the logistics strategy is passive. These observations resulted in the fifth conclusion; that Logistics Coordination Effectiveness and Customer Service Commitment are better assessments of logistics strategy outcomes than Company/Division Competitiveness. Figure 2 summarizes the results of Table 4 graphically. The pattern of dependent variables is similar to the pattern of dependent variables shown in Figure 1, where there is a clear delineation of all three dependent variables between intense and passive logistics strategies, and little variation in values over time.

Finally, the authors concluded that longitudinal research provides a positive approach for examining logistics/supply chain management strategies over time. We encourage others to replicate past research to assess whether the stability found in the Bowersox and Daugherty typology is present in other areas of logistics/supply chain topics.

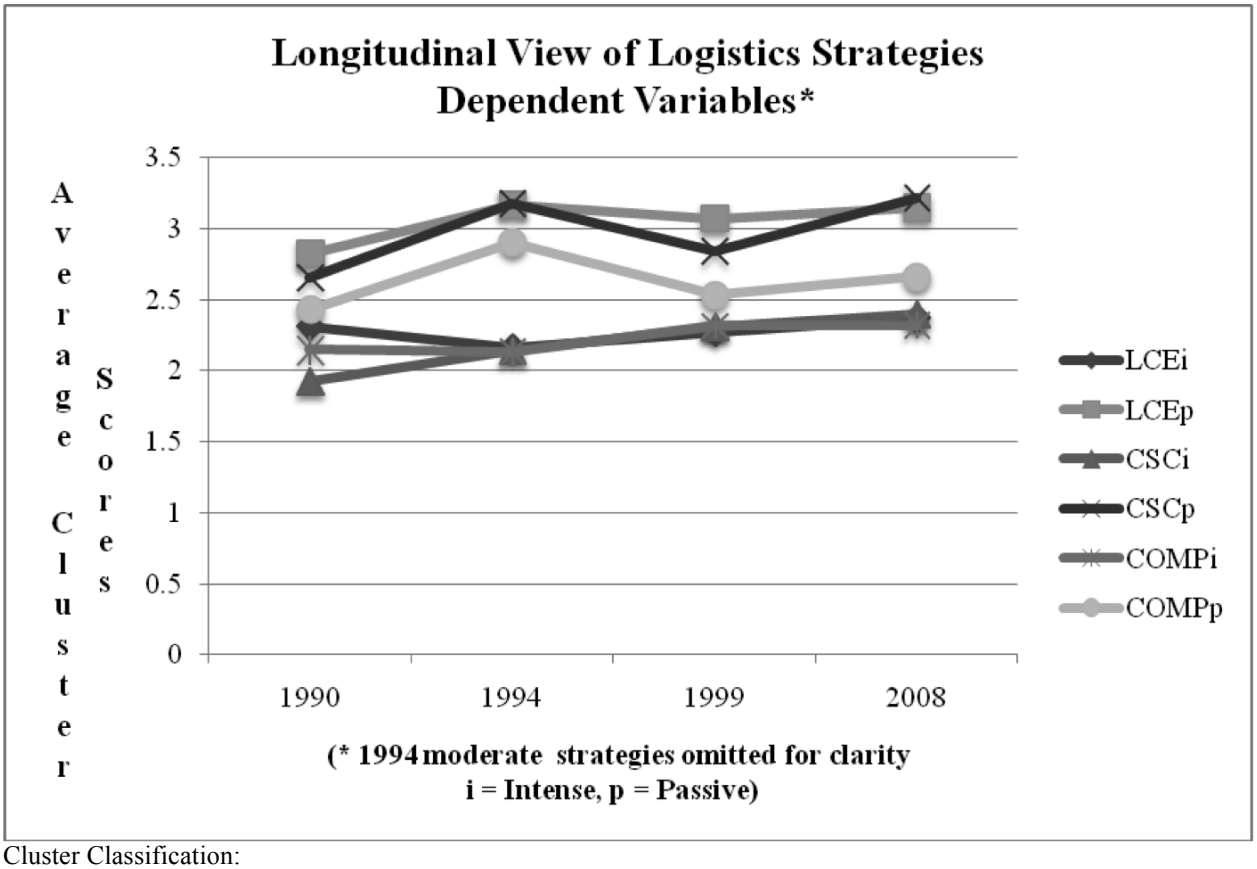
TABLE 7

SUMMARY OF UNWEIGHTED MEAN SCORES OF DEPENDENT VARIABLES: LOGISTICS COORDINATION EFFECTIVENESS, CUSTOMER SERVICE COMMITMENT, AND COMPANY/DIVISION RESPONSIVENESS FROM 1990, 1994, 1999, AND 2008 STUDIES*

		Logistics Strategy	
Variable	Overall	Intense	Passive (change)
Logistics Coordination Effectiveness	2.600	2.280	3.051 (0.771)
Customer Service Commitment	2.488	2.195	3.120 (0.924)
Company/Division Competitive Responsiveness	2.402	2.232	2.631 (0.399)

*Scales: 1 = Strongly Agree, 2 = Agree, 3 = Neither Agree nor Disagree, 4 = Disagree, 5 = Strongly Disagree.

FIGURE 2



Cluster Classification:
Intense Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR < 2.000.
Passive Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR = 3.000 or greater.
Scales: 1 = Strongly Agree through 5 = Strongly Disagree.
Source: Table 4.

RELEVANCE AND IMPLICATIONS

While the results of the research reported in this article provide insights into the value of the Bowersox and Daugherty typology, these findings are also relevant to others' work. The following paragraphs address two questions. First, how are the results of this research relevant to other selected relevant work? Second, what are the implications for practitioners, teachers, and researchers?

Three perspectives were selected as a framework for discussing the relevance of the results reported in this article. As discussed earlier, Autry, Zacharia, and Lamb (2008) empirically examined logistics strategy. The subjects were manager and executive level employees from a broad range of manufacturing, non-manufacturing, governmental, and not-for-profit organizations. They identified two logistics strategies which they compared to the Bowersox and Daugherty typology. The first strategy, Functional Logistics (FL) strategy, was described as being similar to Process Strategy. Logistics activities associated with FL included Inventory and Order Management, Order Processing, Procurement, and Storage. The second strategy, Externally Oriented Logistics (EOL) strategy, was described as having some resemblance to Information Strategy. Logistics activities associated with EOL included Coordination and Collaboration Activities, Logistics Social Responsibility, Strategic Distribution Planning, and Technology and Information Systems. Several logistics activities (Customer Service, Operational Controls, and Transportation Management) were common to FL and EOL. While differing in detail from the Bowersox and Daugherty typology, the results of obtained by Autry, Zacharia, and Lamb (2008) suggest that a multidimensional logistics strategy is not limited to manufacturing organizations. If this is true, then the implication is that the results of the study reported in this article may be applicable to non-manufacturing organizations.

The second perspective is the dichotomies in logistics discussed by Shapiro and Heskett (1985). They provide two insights relevant to this manuscript. First are the four inherent conflicts in logistics strategy which Shaprio and Heskett call the "Two Faces of Logistics." These four conflicts are tactical versus strategic, short-term versus long-term, quantitative versus qualitative, and detailed versus broad. Second, they describe four considerations that must be constantly balanced. They are internal (efficiency), inter-functional (intraorganizational), channel (suppliers and channel partners), and strategic (competitive advantage). The results of this research indicate that the Bowersox and Daugherty typology's focus appears to correspond with Heskett and Shapiro's tactical, short-term, and detailed, rather than their strategic, long-term, and broad. Overall, the Bowersox and Daugherty typology appears to focus on "the firm's activities" rather than "integration across the supply chain" (Stock and Lambert 2001).

The third perspective is that of managing the organization to simultaneously seek certainty and flexibility (Thompson 1967). The former is needed in the short-run in order for the organization to perform well on technological measures of performance, while the latter is needed for the firm to respond to an uncertain external environment. Thompson refers to this inherent conflict as the "Paradox of Administration," where the organization simultaneously seeks the conflicting goals of the short-run (certainty) and the long-run (flexibility). Management of this paradox is achieved by "administration" which constantly mediates, simultaneously seeking (a) flexibility in order to respond to the external environment, and (b) certainty, so that the organization can perform well on objective measures of performance. In this context, the three dimensions of Bowersox/Daugherty appear to emphasize the need to reduce uncertainty (through cost control, reduction of complexity facing customers, and increasing both cooperation and collaboration in the channel), rather than increase organizational flexibility.

Overall, the relevance of the research reported in this article is that (a) logistics strategy is stable over time, (b) alternate logistics strategies appear to persevere over time, (c) logistics' contribution to strategy focuses on efficiency (through internal cost drivers) and coordination (within the organization and with the channel) and mitigating between certainty (enabling the firm to achieve efficiency by managing complexity) and uncertainty (enabling the firm to respond to the needs of its channel by providing flexibility). Taken together, the three Bowersox and Daugherty strategies (Process, Market, and Information) appear to capture the essence of logistics' role in achieving organizational effectiveness. These findings have implications for practitioner, teachers, and researchers and are addressed in the following paragraphs.

The findings of this research provide four insights for practitioners. First, the Bowersox and Daugherty typology (Process, Market, and Information strategies) provides a framework that enables those logistics (and supply chain management) practitioners to better understand their context within overall organizational strategy. Second, this research provides a perspective of logistics' dynamics and its role in strategy. For example, a firm that faces strong competition in cost and responsiveness would probably need a logistics strategy that is "intense." This would be especially true if logistics cost containment and coordination are sources of competitive advantage. However, if a firm's source of competitive advantage is based on technological dominance, product features, exceptional brand acceptance, or exceptional cost advantages, then a "passive" logistics strategy could be appropriate. Third, the challenge facing logistics managers is not designing the "ideal" logistics system. It is designing the logistics strategy that helps the organization achieve its objectives be it an "intense logistics strategy," a "passive logistics strategy," or something in between. Finally, the results of this research indicate that the percentage of "intense" logistics strategies increased between 1990 and 2008; and that the percentage of firms with "passive" logistics strategies declined. This suggests that logistics importance in overall organizational strategy increased during the period from 1990 to 2008.

There are three insights for those who teach logistics. First, the sub-strategies (Process, Market, and Information) of the Bowersox and Daugherty typology can help students in introductory courses better understand logistics' role in the organization. Second, in advanced undergraduate/basic MBA courses, students can begin to grasp the challenges of simultaneously managing efficiency, coordination, collaboration, and control within the organization and among channel members. For example, many cases in logistics/supply chain management include situations where both efficiency and performance have to be simultaneously improved, as opposed to managing efficiency/performance tradeoffs. Finally, in advanced level courses the Bowersox and Daugherty typology provides a framework for managing the dynamics of efficiency, coordination, and control internally and among suppliers, channel members, and final customers, including scenarios where there are multiple channels and/or supply chains.

For logistics/supply chain management researchers this research offers three implications. First, to what extent can the findings of this research be generalized? While recent work suggests that logistics strategies appear to be similar among industries (Autry, Zacharia, and Lamb 2008), further research is needed in non-manufacturing to further ascertain similarities among industries, especially since the U.S. is now a post-industrial society. Second, there has been little research into the relevance of the Bowersox and Daugherty typology outside the U.S. While many other economies have well developed manufacturing sectors, it is possible that economic, cultural, and political considerations would modify the premises underlying Bowersox and Daugherty. Finally, while this typology has been relevant in the U.S. over a period spanning nearly 20 years, are there forces that are likely to change that relevance in the future? Continued research over time will answer that question.

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