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A study of logistics strategies in small versus large U.S. manufacturing firms

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A STUDY OF LOGISTICS STRATEGIES IN SMALL VERSUS LARGE U.S. MANUFACTURING FIRMS

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ABSTRACT

The research reported in this manuscript empirically compares the similarities and differences of logistics strategies for small and large manufacturing firms. The hypotheses focus on whether there are significant differences between logistics strategies of small and large manufacturing firms and whether logistics strategy outcomes differ. The findings indicate that there are many similarities but differences do exist. The results identify dimensions of logistics strategy and assess their impact on logistics coordination effectiveness, customer service commitment, and company/division competitive responsiveness.

INTRODUCTION

Smaller businesses frequently make an assortment of logistics-related decisions, relating to purchasing, customer service, warehousing, inventory management, order management, transportation etc. (Murphy, Daly and Dalenberg, 1995). While larger organizations make these same decisions, there are continued questions about whether there are any similarities or differences between the two (Evans, Feldman and Foster, 1990).

Larger companies generally have a variety of people who are trained in supply chain or logistics management. (Evans, Feldman and Foster, 1990). Smaller businesses, on the other hand, may have only one person who has logistics management responsibilities and other functions to perform (Harrington, 1995). As such, logistics management personnel at smaller companies may have less formal logistics training, and may be less

experienced than at larger organizations. Whether this situation causes increased logistics costs and/ or less responsiveness in small firms has not been adequately addressed.

The majority of the logistics literature focuses on large companies. A review of the literature identified two articles on small company logistics. Halley and Guilhon (1997) investigated the logistics strategies of small businesses using both anecdotal and primary data. The results revealed that among small businesses there were no good or bad logistics strategies. However, two key factors associated with small business logistics strategy development were identified. They were the role of the owner-manager involvement and the company's dependency on other firms. In another study of selected logistics practices of small businesses engaged in international trade, Murphy, Daley, and Dalenberg (1995) found different types of distribution departments among the firms studied.

The idea that small and large firms have similar logistics management practices is probably something that the average manager would not expect given firm size and economies of scale (Harrington, 1995). However, Pearson and Ellram (1995) discovered that there were no statistically significant differences between small and large electronic companies in their selection and evaluation of suppliers. Similarly, Calof (1993) maintained that business size is not an obstacle to internationalization nor is it a constraint in selecting a country in which to do business.

Despite the fact that logistics strategy has been widely discussed in the literature (Clinton and Closs, 1997), the research reported in this paper focuses on a typology that has been examined over the last two decades. This typology, proposed by Bowersox and Daugherty (1987), focuses on three forms of "advanced organizational structures" comprised of "process strategy", "market strategy", and "information strategy". While support for the Bowersox and Daugherty typology has been shown empirically in large firms (Clinton and Closs, 1997; McGinnis and Kohn, 1993, 2002 and 2010; and Kohn and McGinnis, 1990 and 1997) and across industries (Autry, Zacharia, and Lamb, 2008) it is not yet clear whether the typology is relevant to small firms.

The purpose of the research presented in this manuscript is to identify similarities and differences in logistics strategies of large and small U.S. manufacturing firms. This research compares logistics strategies and assesses logistics strategy outcomes of large and small manufacturing firms. Levels of logistics strategy intensity (emphasis on process, market, and information) and outcomes (logistics coordination effectiveness, customer service commitment, and competitiveness) are compared.

Insights and implications for logistics practitioners, researchers, and teachers are provided. The remainder of the paper is organized into six sections starting with the literature review. This discussion is followed by sections on research questions variables, and hypotheses; methodology, analysis, findings, and conclusions.

LITERATURE REVIEW

The typology used to examine large and small manufacturing firms was the result of a comprehensive study of logistics integration reported by Bowersox and Daugherty (1987). Sixteen large consumer product firms were interviewed in 1986 in order to assess organizational structure. Bowersox and Daugherty identified three distinctly different organizational types based on the firm's primary strategic thrust. The first was "Process Strategy" whose primary objective was to manage flows to gain control over activities that "give rise to costs" ("cost drivers" in current terminology). The second was "Market Strategy" whose primary focus was to reduce complexity faced by its customers. Finally, "Information Strategy" was postulated as consisting of firms whose objective was to coordinate information flows throughout the channel of distribution in order to facilitate cooperation and coordination among channel members.

A literature review identified three teams of co-authors who empirically tested the Bowersox/Daugherty typology. In a series of studies McGinnis and Kohn (McGinnis and Kohn, 1993 and 2002 as well as Kohn and McGinnis, 1997a, b) sampled subjects from large U.S. manufacturing firms regarding a wide range of topics including the subject typology. They found that Process and Market strategies were emphasized when logistics strategies were intense, both strategies were present at moderate levels in balanced logistics strategies, and both strategies were present at low levels in unfocused strategies. The scale for Information Strategy was not included because of low scale reliability (McGinnis and Kohn, 1993). Later they found that Process Strategy varied with the challenge of the internal (competitive responsiveness) and external (environmental hostility) environments (Kohn and McGinnis, 1997). Emphasis on Market and Information strategies did not vary.

Finally, McGinnis and Kohn (2002) factor analyzed the nine questionnaire items (three each for Process, Market, and Information strategies) to ascertain whether the three strategies were independent. The results indicated that Process and Information loaded on one factor and Market loaded on a second factor. Regression analysis for the resulting factors indicated that the majority of variance in the dependent variable, Logistics Coordination Effectiveness, was explained by the Process & Information factor. Taken together, the results of the research by Kohn and McGinnis indicate that the three dimensions of logistics strategy (process, market, and information) are promising. However, their results suggest that logistics strategy is more likely to be a blend of the three strategies, rather than dichotomized as originally suggested by Bowersox and Daugherty (1987). Further examination of the results of this pair of researchers suggests that cost management (Process Strategy) is more likely to be a major component of logistics strategy with the roles of simplifying transactions (Market Strategy) and coordinating information flows throughout the supply chain (Information Strategy) being less influential.

Clinton and Closs (1997) studied the Bowersox/Daugherty typology using a sample of U.S. and Canadian manufacturers and merchandisers. Subjects were asked to self identify regarding their prevalent logistics strategy. Of 818 usable responses 541 (66.1%) selected Process Strategy, 146 (17.9%) selected Market Strategy, and 92 (11.3%) selected Channel (Information) Strategy. The balance, 39 (4.8%), selected "Other Strategy". Clinton and Closs found that a clear overlap exists among the three strategies. They concluded that this is to be expected since logistics must perform the same activities regardless of underlying logistics strategy. Clinton and Closs concluded that logistics strategy exists and that the Bowersox/Daugherty classification is "promising."

Finally, Autry, Zacharia, and Lamb (2008) surveyed 254 logistics managers from multiple industries. They identified two logistics strategy dimensions, Functional Logistics (FL) strategy and Externally

Oriented Logistics (FOL) strategy. The former was described as similar to Bowersox/Daugherty's Process Strategy while the latter was described as somewhat resembling Channel (Information) Strategy.

RESEARCH QUESTIONS, VARIABLES AND HYPOTHESES

Based on the literature review, the authors' concluded that the Bowersox/Daugherty typology provides a relevant framework for the study of logistics strategy. However, the earlier research focused primarily on large firms. The research reported in this manuscript examines a sample of large firms and a sample of small firms and evaluates their similarities and differences in Process (PROCSTR), Market (MKTGSTR), and Information (INFOSTR) strategies.

Three dependent variables (Logistics Coordination Effectiveness, Customer Service Commitment, and Company/Division Competitiveness) previously used in the logistics literature (Keller, et.al. 2002) were included in the study to assess outcomes of the independent variables. As shown in Exhibit 2, Logistics Coordination Effectiveness (LCE) is a scale that assesses importance of logistics coordination on internal company relationships, company strategic planning and relationships with customers, suppliers, and other channel members. This dependent variable is useful for assessing whether the Bowersox/Daugherty typology is associated with this important goal of logistics. Customer Service Commitment (CSC) is a scale that assesses customer service's level of importance (emphasis on employee development and training), value as a coordinating activity, and importance in achieving competitive goals. The third dependent variable, Company/Division Competitiveness (COMP), evaluates the firms' overall competitiveness in the areas of responsiveness and perceived overall competition. These three dependent variables provide a means of assessing whether changes in the independent variables (Process, Market, and Information strategies) result in changes of logistics outcomes.

Based on the above questions the following null hypotheses were developed:

H_1: The importance of Process Strategy is equally relevant in small and large manufacturing firms;

H_2: The importance of Marketing Strategy is equally relevant in small and large manufacturing firms;

H_3: The importance of Information Strategy is equally relevant in small and large manufacturing firms;

H_4: The importance of Logistics Coordination Effectiveness is equally relevant in small and large manufacturing firms;

H_5: The importance of Customer Service Commitment is equally relevant in small and large manufacturing firms;

H_6: The importance of Company/Division Competitiveness is equally relevant in small and large manufacturing firms;

The six hypotheses provide a basis for assessing logistics strategies of small firms. If the first three hypotheses are accepted then there is insufficient evidence to conclude that the importance of Process, Market, and Information strategies of small firms are different between small and large firms. On the other hand, rejection of hypotheses 1, 2, or 3 would indicate that the logistics strategies in small firms differ from logistics strategies in large firms. In a similar manner, acceptance of the second group of three hypotheses would suggest that small and large firm logistics managers' perceptions of three outcomes (Logistics Coordination Effectiveness, Customer Service Commitment, and Company/Division Competitiveness) were equal. Conversely, rejection of hypotheses 4, 5, or 6 would then suggest that logistics managers of small and large firms perceived logistics strategy outcomes differently.

METHODOLOGY

In 2006 a four-page, 41-item questionnaire was mailed to 700 small manufacturing firms selected randomly from the Directory of Manufacturers. The focus was exclusively on firms with annual sales of $5,000,000 or less. Ninety-nine (14.1%) usable responses were received. While the response rate was low, one-way analysis of variance by order of response quartile found no significant differences at alpha = 0.05 among the six questionnaire items that related to logistics strategy. The authors concluded that the data was adequate for use in studying logistics strategies in small U.S. manufacturing firms.

In 2008 a four-page, 46-item questionnaire was electronically sent to 905 members of a large national supply chain management organization who worked for manufacturing firms in the U.S. with sales of over $5,000,000. Large firms of over $5,000,000 sales were selected in order to provide a basis for comparison with the data gathered on small firms in 2006. The members sampled typically worked for large national or multi-national organizations that have substantial manufacturing presence in the U.S. No attempt was made to control for country of ownership. One hundred and twenty-three were undeliverable for a net sample of 782 subjects. After two follow-ups a total of forty-nine (6.3%) usable responses were returned. While the response rate was low, it is understandable given the results of similar recent studies reported in the supply chain management literature (Flint, Larsson, and Gammelgaard, 2008). As a further test the 2008 results were compared to previous data sampled from the same organization in 1990, 1994, and 1999 (McGinnis, Kohn, and Spillan, 2010). Mean responses did not vary significantly using one-way ANOVA. The authors concluded that the 2008 data was adequate as a large firm control in assessing small firm responses.

ANALYSIS

As noted earlier, three independent variables and three dependent variables were selected for the

assessment of logistics strategies in small and large manufacturing firms. Each of the variables was a multi-item scale that had been developed in previous logistics strategy research and was documented in a comprehensive review of multi-item scales reported by Keller, et al. (2002). In addition, all scales exhibited stable levels of reliability over their use in several empirical studies and offered adequate face validity to warrant their continued use.

Table 1 summarizes the three independent variable scales titled Process Strategy, Market Strategy, and Information Strategy (also referred to as channel strategy). Each scale was comprised of three questionnaire items that had been previously used in several empirical studies. Further inspection of Table 1 reveals that the average reliability coefficient (alpha) for the scale Process Strategy over three studies in 1990, 1994, and 1999 was 0.638, above the range of 0.50 to 0.60 considered adequate by Nunnaly (1967) and just below the value of 0.70 suggested by Nunnally and Bernstein (1994). Because the range of alphas was 0.579 to 0.710 in the previous three studies the authors concluded that reliability was adequate for use in the current study. Finally, the average alphas (Market Strategy = 0.730 and Information Strategy = 0.605) for three previous studies indicated that those scales would be defensible independent variables for this research. A review of results from the 2006 (small firm) and 2008 (large firm) studies further supported the relevance of the three scales as independent variables.

TABLE 1
INDEPENDENT VARIABLES

Scale 1: Process Strategy (PROCSTR)*

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

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

PS-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.

Scale 2: Market Strategy (MKTGSTR)*

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

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

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

Scale 3: Information Strategy (INFOSTR)*

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

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

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

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

Coefficient of Reliability - Alpha

	Process Strategy	Market Strategy	Information Strategy
1990	.626	.811	.520
1994	.710	.642	.727
1999	.579	.737	.568
2006	.726	.685	.856
2008	.609	772	.699

The three dependent variables are shown in Table 2. Two of the scales, Logistics Coordination Effectiveness and Customer Service Commitment were comprised of three items while the third scale, Company/Division Competiveness, consisted of four items. Examination of alpha averages and ranges for the three scales for 1990, 1994, and 1999 (Logistics Coordination Effectiveness average alpha = 0.632, range = 0.539 to 0.708; Customer Service Commitment alpha average = 0.708, range = 0.673 to 0.729; Company/Division Competitiveness alpha average = 0.740, range = 0.675 to 0.862) resulted in the authors' conclusion that these scales were adequate for purposes of this research. Further examination of the alphas of these three scales for the 2006 (small firm) and 2008 (large firm) did not alter that conclusion.

A second evaluation of the six scales was conducted to assess whether there was any systematic bias between the responses to the 2006 (small firm) and the 2008 (large firm) questionnaires. As shown in Table 3 means of the scale scores did not vary significantly between the two questionnaires. Mean responses of the nineteen items that comprise the six scales was conducted to further assess the 2006 and 2008 data. As shown in the Appendix, the means of six of nineteen items were significantly different, alpha <0.05, without any systematic pattern relative to the scales. Based on these results the authors concluded that there was no pattern of differences that would prohibit a comparison of logistics strategies of small and large manufacturing firms using the 2006 and 2008 data.

From the results shown in Tables 1, 2, and 3 the authors concluded that the 2006 data (from small U.S. manufacturing firms) and the 2008 data (from large U.S. manufacturing firms) provides a reasonable basis for comparing logistics strategies of small and large firms.

TABLE 2
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.

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.

COMPANY/DIVISION COMPETITIVENES (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		Moderately Strong		Weak
Competitor		Competitor		Competitor
1	2	3	4	5

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

DEPENDENT VARIABLES

Coefficient of Reliability - Alpha

	Logistics Coordination Effectiveness	Customer Service Commitment	Company/Division Competitiveness
1990	.539	.723	.684
1994	.649	.729	.862
1999	.708	.673	.675
2006	.582	.706	.740
2008	.538	.653	.701

Table 3
COMPARISON OF MEANS OF SCALE SCORES*:
2006 (SMALL U.S. MANUFACTURING FIRMS) &
2008 (LARGE U.S. MANUFACTURING FIRMS)

	N/ Means**/ Standard Deviations		Mean Differences Significant
Scales	2006	2008	<0.05?
Process Strategy (PROCSTR)	124/ 2.24/ 0.665	50/ 2.19/ 0.660	NO
Market Strategy (MKTGSTR)	117/ 2.62/ 0.651	49/ 2.41/ 0.968	NO
Information Strategy (INFOSTR)	116/ 2.74/ 0.719	49/ 2.85/ 0.758	NO
Logistics Coordination Effectiveness (LCE)	128/ 2.62/ 0.636	50/ 2.58/ 0.609	NO
Customer Service Commitment (CSC)	127/ 2.41/ 0.673	50/ 2.63/ 0.772	NO
Company/Division Competitiveness (COMP)	119/ 2.39/ 0.602	48/ 2.42/ 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.

The balance of the analysis was conducted in two steps. First cluster analysis was conducted on the independent variables to ascertain whether logistics strategies were homogenous within (a) small firms and (b) large firms. Data was analyzed using SPSS 15.0 for Windows. The program selected was Two-step Cluster. Output included cluster frequencies, scale means and standard deviations, and the assignment of each respondent to one of the clusters. Clusters were named using a criteria based on means of the scale scores. "Intense Logistics Strategy" was defined as a cluster in which one or more scale average scores was less than 2.000, keeping in mind that low scores were

considered in agreement with item statements and high scores were associated with disagreement. "Moderate Logistics Strategy" was defined as a cluster in which none of the scales were below 2.000 or greater than 2.999. Finally, "Passive Logistics Strategy" was defined as a cluster where one or more scale averages was greater than 2.999.

In the final step of this analysis cluster membership was used to assess respondent perceived attitudes toward the three dependent variables, Logistics Coordination Effectiveness, Customer Service Commitment, and Company/Division Competitiveness.

As shown in Table 4, the 2006 (small firm) respondents were classified into three clusters. Cluster mean differences were assessed for small firms using One-way Analysis of Variance. Post hoc analysis of the ANOVA output revealed that all means were significantly different with p values <0.05. The authors concluded that the three logistics strategies for small firms were distinct with no commonality in the independent variables. Forty-four (39.3%) respondents were classified as having "Intense" logistics strategies. All three independent variables (process, market, and information strategies) had scale means that were significantly lower than the other two strategies. Average score means for these respondents were near "agree". This means that those respondents placed positive emphasis on all three independent variables.

Forty-eight (42.9%) small business respondents were grouped into "Moderate" strategies. Scale score means for all three independent variables were between "agree" and "neither agree nor disagree", indicating modest emphasis on the three independent variables. Twenty respondents (17.9%) were classified as having "Passive" logistics strategies. Scale score averages for process, market, and information strategies were 3.0 (neither agree nor disagree) or higher (tending toward disagreement).

Large firm respondents (see Table 4) were classified into two logistics strategy groups. Thirty-five respondents (71.4%) were classified as having "Intense" logistics strategies and fourteen (28.6%) were classified as having "Passive" logistics strategies.

Further analysis of means of small and large firm means for "Intense Logistics Strategy" and "Passive Logistics Strategy" provided additional insights. See the "Comparison of Differences of Mean Scale Scores" portion of Table 4. This analysis revealed that, when logistics strategies were "Intense" small firms' scale score means for Process Strategy and Information Strategy were significantly more important than large firms. Further, the scale score means for Market Strategy did not vary by an amount greater than due to chance. However, when logistics strategies were "Passive" scale score means between small and large firms for Process Strategy, Market Strategy, and Information Strategy did not vary by an amount greater than that due to chance.

The results shown in Table 4 indicate that logistics strategies in small firms group into three categories while logistics strategies in large firms group into two categories. This suggests that small firms may be able to stay closer to their markets and tailor their strategies more closely to specific needs of those markets. In addition, small firm "Intense" strategies emphasize cost (Process Strategies) and coordination information flows in the channel (Information Strategy) to a greater extent than in large firms. Again, this may be due to the ability of small firms to better focus their strategies on the needs of their markets.

This observation is further reinforced by the size of "Moderate" logistics strategies in small firms, which are less focused than "Intense" strategies but are definitely not "Passive". Finally, comparison of "Passive" strategies in small and large firms (Shown in Table 4) reveals a similar focus in small and large firms.

Overall, logistics strategies in small and large manufacturing firms differ in degree rather than type. In small firms overall logistics strategies are more finely segmented than in large firms. However, gradations in strategy from "Intense" to "Passive" are similar in both large and small firms. The following paragraphs discuss outcomes of logistics strategies in small and large firms.

TABLE 4
COMPARISON OF CLUSTER ANALYSES RESULTS OF LOGISTICS STRATEGIES: 2006 (SMALL U.S. MANUFACTURING FIRMS) & 2008 (LARGE U.S. MANUFACTURING FIRMS)

2006 – National Sample of Small U.S. Manufacturing Firms, N = 112

Cluster**	PROCSTR Mean*/Standard Deviation	MKTGSTR Mean/ Standard Deviation	INFOSTR Mean/Standard Deviation
1. Intense Logistics Strategy, N = 44	1. 674/0.397	2. 227/0.579	2.152/0.424
2. Moderate Logistics Strategy, N = 48	2. 542/0.433	2. 625/0.387	2. 813/0.329
3. Passive Logistics Strategy, N = 20	3. 000/0.405	3. 450/0.475	3.817/0.587
Significance	0.000	0.000	0.000

2008 – National Sample of Large U.S. Manufacturing Firms, N = 49

Cluster**	PROCSTR Mean**/Standard Deviation	MKTGSTR Mean/ Standard Deviation	INFOSTR Mean/Standard Deviation
1. Intense Logistics Strategy, N = 35	1.895/0.456	2.000/0.741	2.610/0.688
2. Passive Logistics Strategy N = 14	2.905/0.561	3.429/0.672	3.476/0.550
Significance	0.000	0.000	0.000

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

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 or >2.999.
Passive Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or
INFOSTR >2.999 or greater.

COMPARISON OF DIFFERENCES OF MEAN SCALE SCORES

Intense Difference Between (Small - Large) Mean Scale Scores			
	Process	Market	Information
t-value (small-large)	-2.265	1.487	-3.451
p-values	0.026	0.141	0.001
Conclusion	Sig.*	Not Sig.	Sig.*

*Process strategy in small firms is more important than in larger firms.
*Information strategy in small firms is more important than in larger firms.

Passive Difference Between (Small - Large) Mean Scale Scores			
	Process	Market	Information
t-value (small-large)	0.542	0.101	1.730
p-values	0.591	0.920	0.093
Conclusion	Not Sig.	Not Sig.	Not Sig.

The logistics strategy clusters developed from the independent variables and shown in Exhibit 4 were used to assess respondent perceptions of the dependent variables. As shown in Table 5 "Logistics Coordination Effectiveness" (LCE) and "Customer Service Commitment" (CSC) are highest in importance when logistics strategies are "Intense" and lowest in importance when logistics strategies ware "Passive" for both small and large firms. However, the effect of logistics strategy on "Company/Division Competitiveness" (COMP) is less clear. As shown in Table 5, in small firms the means of COMP were not significantly different between "Intense" and "Moderate" logistics

strategies but were significant for "Passive" logistics strategies.

Further examination of Table 5 reveals that the outcome differences between small and large firms were modest. There was one significant difference at alpha = 0.05 for CSC when logistics strategies were "Intense" (CSC was more important to small firms). Overall, logistics strategy outcomes in small and large firms were similar. It was concluded that differences in logistics strategy outcomes were modest when comparing small and large manufacturing firms.

TABLE 5

COMPARISON OF OF LOGISTICS STRATEGIES AND DEPENDENT VARIALBES
2006 (SMALL U.S. MANUFACTURING FIRMS) &
2008 (LARGE U.S. MANUFACTURING FIRMS)

2006 – National Sample of Small U.S. Manufacturing Firms, N = 112

Cluster*	LCE Mean**/Standard Deviation	CSC Mean/ Standard Deviation	COMP Mean/Standard Deviation
1. Intense Logistics Strategy, N = 44	2.349/0.561	2.053/0.579	2.174/0.544
2. Moderate Logistics Strategy, N = 48	2.722/0.635	2.549/0.556	2.438/0.639
3. Passive Logistics Strategy, N = 20	3.117/0.475	3.000/0.764	2.790/0.509
Significance	0.000	0.000	0.001***

*See Exhibit 4 for criteria for cluster classification

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

***Means for Clusters 1 and 2 not significantly different <0.05 with Tukey B Post Hoc Test.

2008 – National Sample of Large U.S. Manufacturing Firms, N = 49

Cluster*	LCE CSC Mean**/Standard Deviation	COMP Mean/ Standard Deviation	Mean/Standard Deviation
1. Intense Logistics Strategy, N = 44	2.371/0.497	2.400/0.695	2.324/0.644
2. Passive Logistics Strategy N = 14	3.143/0.518	3.214/0.687	2.661/0.655
Significance	0.000	0.001	0.108***

*See Exhibit 4 for criteria for cluster classification

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

***Means of Clusters 1 and 2 not significantly different <0.05.

COMPARISON OF DIFFERENCES OF MEAN SCALE SCORES

Intense Difference Between Small - Large Mean Scale Scores			
	LCE	CSC	COMP
t-value (Small-Large)	-0.185	-2.371	-1.101
p-values	0.854	0.020	0.275
Conclusion	Not Sig.	Sig.**	Not Sig.

**Customer Service Commitment in small firms was greater than large firms.

Passive Difference Between Small - Large Mean Scale Scores			
	LCE	CSC	COMP
t-value (Small-Large)	-0.149	-0.853	0.618
p-values	0.882	0.400	0.541
Conclusion	Not Sig.	Not Sig.	Not Sig.

FINDINGS

Any analysis and findings must be presented as tentative but forms the basis for additional testing. However, these findings provide insights into similarities and differences in logistics strategies between small and large U.S. manufacturing firms

Similarities

The similarities of logistics strategies in small and large U.S. manufacturing firms were extensive. The coefficients (alphas) of the six scales, as shown in Tables 1 and 2, varied between small firm and large firm respondents by amounts comparable to or less than the variation among those of large firms respondents in four (1990, 1994, 1999, and 2008) empirical studies (McGinnis, Kohn, and Spillan, 2010). Mean responses to all six scales did not vary significantly between small and large firm respondents (see Table 3). This indicates that the subjects in both small and large manufacturing firms have similar perceptions of logistics strategy

and of logistics strategy outcomes. The authors concluded that the scales used in this research are applicable to U.S. manufacturing firms regardless of size. This finding is consistent with insights from Clinton and Closs (1997) that responses (on a different set of questionnaire items regarding logistics strategy) from Canadian manufacturing firms and merchandising firms did not vary substantially, which suggests that the scales used in this research may be robust in applications beyond U.S. manufacturing firms.

Examinations of Tables 3 and 4 reveal that Process Strategy is perceived as most important overall, in each logistics strategy cluster in small manufacturing firms, and each logistics strategy cluster of large manufacturing firms. This finding is consistent with the results of research discussed in the literature review and suggests that the control of costs and rationalizing complex logistics activities is a priority of logistics strategy regardless of firm size.

Additional examination of Table 4 indicates that logistics strategies of both large and small U.S. manufacturing firms can be clustered into similar categories. Further examination of Table 4 reveals that, with one exception, the values of the three logistics strategy dimensions (Process, Market, and Information) do not vary between small and large firms regardless of logistics strategy intensity. The exception is that, when logistics strategy is intense, Process Strategies are significantly more important in small firms than in large firms. Based on these results the authors concluded that perceptions of logistics strategy do not differ substantially between logistics managers in small and large manufacturing firms.

The effect of logistics cluster grouping on dependent variables, Logistics Coordination Effectiveness (LCR), Customer Service Commitment (CSC), and Company/Division Competitiveness (COMP), as shown in Table 5, is similar for small and large manufacturing firms. Further examination of Table 5 reveals that, with one exception, when strategy intensity levels are the same the values of the three outcome variables do not vary significantly between small and large firms. The exception is that, when the logistics strategy is intense, logistics managers in small firms place greater emphasis on Customer Service Commitment, apparently because of its importance as a source of competitive advantage to small firms.
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In summary, logistics strategies and perceived logistics strategy outcomes appear to be similar in small and large firms except when the logistics strategy is "Intense". In this scenario logistics managers in small firms are more likely to place greater emphasis on cost management (Process Strategy) and have higher levels of commitment to customer service (Customer Service Commitment).

Overall, no systematic patterns of differences in means of scale score means for Process, Market, and Information strategies or Logistics Coordination Effectiveness, Customer service commitment, and Company/Division

Competitiveness were found that would lead to the conclusion that small and large U.S. manufacturing company logistics strategies are fundamentally different. This supports a conclusion that small and large U.S. manufacturing firms' logistics strategies are not fundamentally different.

Differences

The most significant difference between small and large U.S. manufacturing firms, as shown in Table 4, is the number of logistics strategy clusters. Respondents in small firms grouped into three strategies. They were "Intense" (39.3% of respondents), "Moderate" (42.9%), and "Passive" (17.9%) logistics strategies (percentages do not add to 100 due to rounding). Large firm respondents grouped into two logistics strategies, "Intense" (71.3%) and "Passive" (28.6%). Again, percentages do not add to 100 due to rounding. The greater gradation of logistics strategies of small firms may be due to (a) greater small firm awareness of market subtleness, and/or (b) greater variations of overall strategies among small firms, and/or (c) an ability of small firms to tailor logistics strategies more closely to customer requirements.

Forty four (39.3%) small firms were grouped into the "Intense Logistics Strategy" category while thirty-five (71.4%) of large firm respondents were grouped into that category. This may suggest that (a) small manufacturing firms are less sophisticated in their logistics management, and/or (b) logistics is of less overall importance in small firms, and/or (c) small firms face less supply chain complexity. The authors suspect that (c) is the reason that small firms are less likely to need an "Intense Logistics Strategy".

Examination of the results shown in Table 5 indicate that, when logistics strategies are "Intense" small firms place greater emphasis on "Customer Service Commitment" (CSC) than do large firms. This suggests that small firms may place greater emphasis on customer service than large firms because (a) high levels of customer service may

differentiate some small firms from their larger competitors, (b) of the need to focus on the needs of a limited number of important customers, and (c) of a response to the demands of their customer base.

Overall Findings

Based on an assessment of the similarities and differences of small and large manufacturing firms the following conclusions were reached regarding the six null hypotheses:

H_1: The importance of Process Strategy is equally relevant in small and large manufacturing firms. This hypothesis was partially supported by results shown in Tables 3 and 4. The means of Process Strategy were not significantly different between small and large firms overall (Table 3) nor when logistics strategies were "Passive" (Table 4). Process Strategy was significantly more important in small firms when the logistics strategy is "Intense" (Table 4).

H_2: The importance of Marketing Strategy is equally relevant in small and large manufacturing firms. This hypothesis was supported by the results shown in Tables 3 and 4.

H_3: The importance of Information Strategy is equally relevant in small and large manufacturing firms. This hypothesis was partially supported by results shown in Tables 3 and 4. Information Strategy was not significantly different between small and large firms overall (Table 3) nor when logistics strategies were "Passive" (Table 4). Information Strategy is more important in small firms when the logistics strategy is "Intense" (Table 4).

H_4: The importance of Logistics Coordination Effectiveness is equally relevant in small and large manufacturing firms. This hypothesis was supported by the results shown in Tables 3 and 5.

H_5: The importance of Customer Service Commitment is equally relevant in small and large

manufacturing firms. This hypothesis is partially supported by Tables 3 and 5. The means of Customer Service Commitment were not significantly different overall (Table 3) nor when logistics strategies were "Passive" (Table 5). Customer Service Commitment was significantly more important in small firms when logistics strategy was "Intense" (Table 5).

H_6: The importance of Company/Division Competitiveness is equally relevant in small and large manufacturing firms. This hypothesis was supported by the results shown in Tables 3 and 5.

The results suggest more similarities between small and large firm logistics strategies and outcomes than differences. Two independent variables (Process Strategy and Information Strategy) were more important; one dependent variable (Customer Service Commitment) was of greater importance in small firms when strategies were "Intense" (note that in this study $1 =$ strongly agree, $5 =$ strongly disagree); the three independent and three dependent variables did not vary overall (Table 3); and nine of twelve comparisons (Tables 4 and 5) were not significant at alpha $= 0.05$.

When differences between logistics strategies of small and large U.S. manufacturing firms occur, they are likely to occur when logistics strategies are "Intense". According to the results when logistics strategies are "Intense" small firms are likely to place more importance on Process and Information strategies and have a better Customer Service Commitment outcome than large firms. When logistics strategies are "Passive" the levels of importance placed on Process, Market, and Information strategies and the outcomes of Logistics Coordination Effectiveness and Competitiveness are likely to be similar.

CONCLUSIONS

When considered within the context of previous research into the Bowersox/Daugherty typology the findings of this research contribute to a further understanding of logistics strategy. First, logistics

strategies in small and large U.S. manufacturing firms differ in degree rather than type. Process (control costs), Market (reduce complexity faced by competitors), and Information (facilitate coordination in the channel) strategies are evident in small and large firms. While the roles of these three dimensions are not perfectly aligned, the similarities are great enough to conclude that logistics strategies in small and large U.S. manufacturing firms are similar. Second, perceived logistics strategy outcomes of small and large manufacturing firms are similar. Increased levels of Logistics Coordination Effectiveness, Customer Service Commitment, and Company/Division Competitiveness were (with one exception) associated with greater intensity of logistics strategy in small and large firms. This suggests that outcomes of logistics strategies do not differ substantially as firm size varies. Given that logistics strategies and logistics strategy outcomes are similar between small and large U.S. manufacturing firms it was concluded that the Bowersox/Daugherty typology is applicable to manufacturing firms regardless of size.

This research implies that the focal points of logistics in small and large firms are cost management (Process Strategy), reducing complexity faced by customers (Market Strategy), and coordination within the channel (Information Strategy). While the emphasis on these three components of logistics strategy may vary due to factors such as overall strategy of the firm, the degree of competition faced, and the relative importance of the firm's competitive advantages (cost, differentiation, or both), these factors may affect logistics strategy more than firm size.

Implications for Practice

Balancing the relationship among process strategy, market strategy, and information strategy, is challenging. It will require substantial coordination of logistics/ supply chain managers with firms' management team, channel members, suppliers, and other stakeholders. It will also require that the firm's management constantly read and re-read

its environments over time to understand competitive threats and opportunities for logistics strategy innovation. Logistics/supply chain managers in firms of all sizes (small and large) can benefit from understanding the dynamics of cost management, reducing the complexity faced by customers, and using information to better coordinate channel activities when tailoring logistics strategies for their firms.

Small businesses can benefit from a greater understanding of logistics strategy's components and how they can be exploited to improve competitiveness in their markets. Overall, logistics strategy consists of managing costs (Process), simplifying complexity faced by customers (Market), and coordination of information flows (Information) to improve logistics coordination and customer service as a means of maintaining (or improving) competitiveness. This research suggests that the small firms manage the logistics strategy to maximize customer service through emphasis on Market (reduce complexity faced by customers) and Information (close coordination with customers and suppliers) strategies. While Process (cost control) is also likely to be important to small businesses, it is unlikely to be paramount, relative to Market and Information strategies.

Implications for Education, Training, and Research

Logistics/supply chain educators can use the insights from this research to focus on three dimensions of logistics/supply chain management and their relevance regardless of the firm's size. At the basic level emphasizing the three components of logistics strategy (Process, Market, and Information) provide fundamentals that should serve the student well whether or not they pursue further studies in logistics/supply chain management. At the advanced level; process, market, and information strategies can be the basis for integrating logistics/supply chain management with other areas of the firm. Finally, graduate students should benefit from the insights provided by the Bowersox/Daugherty typology in

developing research agendas and teaching strategies.

Future research opportunities include extensions of logistics decision making by including antecedents and moderating factors (such as competition, market turbulence, and differences in business environment) into the design. Future research should also examine the relevance of the Bowersox/Daugherty typology to small and large firms in nonmanufacturing industries including retailing, healthcare, financial services, transportation firms, and food service. These industries may provide different perspectives on process, market, and information strategies as well as logistics coordination, customer service, and competitiveness.

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APPENDIX 1
COMPARISON OF 2006 AND 2008 ITEM MEAN SCORES:*

INDEPENDENT VARIABLES

Items	N/Means*/ Standard/ Deviations 2006	2008	Mean Differences Significant <0.05?
Scale 1: Process Strategy (PROCSTR)*			
PS-1　In my company/division, management emphasizes achieving maximum efficiency from purchasing, manufacturing, and distribution.	128/1.92/0.790	50/1.94/0.818	NO
PS-2　A primary objective of logistics in my company/division is to gain control over activities that result in purchasing, manufacturing, and distribution costs.	127/2.15/0.746	50/2.12/0.824	NO
PS-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.	124/2.61/0.969	50/2.50/0.995	NO
Scale 2: Market Strategy (MKTGSTR)*			
MS-1　In my company/division, management emphasizes achieving coordinated physical distribution to customers served by several business units.	117/2.91/0.820	49/2.53/1.209	YES

0.093

MS-2   A primary objective of logistics in my company/division is to   126/2.22/.0838 50/2.36/1.139   NO
reduce the complexity our customers face in doing business with us.

MS-3   In my company/division, logistics facilitates the coordination   121/2.72/0.868 49/2.31/1.158   YES
of several business units in order to provide competitive customer service.

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Scale 3: Information Strategy (INFOSTR)*
IS-1   In my company/division, management emphasizes   118/2.83/0.840   49/2.78/0.941   NO
coordination and control of channel members (distributors, wholesalers,
dealers, retailers) activities.

IS-2   A primary objective of logistics in my company/division is to   124/2.54/0.914 50/2.64/1.005   NO
manage information flows and inventory levels throughout the
channel of distribution.

IS-3   In my company/division, logistics facilitates the management   119/2.87/0.780 50/3.16.0.912   YES
of information flows among channel members (distributors, wholesalers,
dealers, retailers).

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

DEPENDENT VARIABLES

	N/Means*/ Standard/ Deviations		Mean Differences Significant
Items	2006	2008	<0.05?
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.	130/2.53/0.900	50/2.30/0.647	NO
LC-2 In my company logistics planning is well coordinated with the overall strategic planning process.	130/2.76/0.852	50/2.74/0.899	NO
LC-3 In my company/division logistics activities are coordinated effectively with customers, suppliers, and other channel members.	128/2.57/0.829	50/2.70/0.974	NO
CUSTOMER SERVICE COMMITMENT (CSC)*			
CSC-1 Achieving increased levels of customer service has resulted in increased emphasis on employee development and training.	128/2.30/0.865	50/2.60/0.926	YES
CSC-2 The customer service program in my company/division is effectively coordinated with other logistics activities.	128/2.57/0.770	50/2.72/1.089	NO
CSC-3 The customer service program in my company/division gives us a competitive edge relative to our competition.	128/2.36/0.849	50/2.58/0.992	NO

COMPANY/DIVISION COMPETITIVENES (COMP)*

COMP-1   My company/division responds quickly and effectively   127/2.06/0.759   49/2.53/1.023   YES
to changing customer or supplier needs compared to our competitors.

COMP-2   My company/division responds quickly and effectively   126/2.43/0.784   49/2.67/0.851   NO
to changing competitor strategies compared to our competitors.

COMP-3   My company/division develops and markets new products   123/2.81/0.872   49/2.65/0.830   NO
quickly and effectively compared to our competitors.

COMP-4   In most of its markets my company/division is a: 123/2.34/0.848   50/1.84/0.912   YES
Very Strong   Moderately Strong   Weak Competitor
1   2   3   4   5

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