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CROSS-CULTURAL VALIDATION OF THE FACTORIAL STRUCTURE OF A LOGISTICS STRATEGY MODEL: A THREE-COUNTRY STUDY

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ABSTRACT

In 2011, McGinnis, Kohn, and Kara reported the effects of overall logistics strategy (OLS) on logistics coordination effectiveness, customer service effectiveness, and organizational competitive responsiveness. This manuscript empirically compares the three dimensions of the Bowersox Daugherty typology to logistics strategies among U.S., Turkish, and Guatemalan companies. US, Turkish, and Guatemalan subjects (logistics managers) were chosen to test the underlying factor structure and measurement equivalences of the scales used. Using confirmatory factor analysis (CFA), findings indicate that the three dimensions of the Overall Logistics Strategy (OLS) - Process Strategy, Market Strategy, and Information Strategy - hold in all three country environments studied. However, structural equation modeling shows nonequivalent relationships between OLS and independent variables; logistics coordination effectiveness, customer service commitment, and organizational competitiveness for one of the three countries. We evaluate these findings in light of recent research into logistics strategy research on U.S. firms. Insights for those interested in comparative logistics strategies are provided.

INTRODUCTION

For over twenty years, a substantial amount of empirical research has investigated the potential of the Bowersox/Daugherty (1987) typology and validated it as a useful framework for studying logistics strategy in the United State and Canada. In comparison to cross-cultural research in other disciplines, such as management and marketing, a review published by Luo, Van Hoek, and Ross (2001) suggests that cross-cultural logistics is at best in its infancy stage. Considering the speed of globalization, a firm's ability to manage logistics in cross-country environments could become an important success factor. Although, globalization offers significant opportunities for

many MNCs to shift their manufacturing and distribution around the world, and especially towards developing and emerging markets, global manufacturing strategies may not be effective if not supported by successful logistics strategies. Therefore, we strongly believe that cross-cultural logistics studies have significant potential to enrich our understanding of logistics systems and strategies applicable in different national environments. Such studies provide critical logistics knowledge which could have important international logistics management implications.

A recent study by McGinnis, Kohn, and Kara (2011) reported the role of overall logistics strategy (OLS) on logistics coordination

effectiveness, customer service effectiveness, and organizational competitive responsiveness. Using multi-year data collected in the US, their findings showed that overall logistic strategy as conceptualized by the Bowersox/Daugherty dimensions, had significant effect on firm competitiveness through the links of logistics coordination and customer service. However, even though the best way to measure overall logistic strategy (OLS) may be important to researchers and practitioners, whether or not the OLS should be assumed to be universal, is even a more important empirical question that deserves research attention. Therefore, our interest in this study is to explore whether the Bowersox/Daugherty typology is a useful instrument for examining logistics strategies in countries of different sizes, cultures, and economic systems.

The authors postulate that a multi-country study of U.S., Turkey, and Guatemala would furnish an intriguing study of how logistics systems are assessed in three nations through the lens of one common measurement instrument. Furthermore, such a study would provide a strong validation of the dimensionality and structural relations identified in the recent McGinnis, Kohn, and Kara (2011) study. We emphasize that the differences in each country's geographic size, population size, labor force make-up, infrastructure, and economic system provides an excellent platform for evaluating the validity of the research instrument, as well as providing insights into logistics strategies and outcomes in three heterogeneous countries.

This current research adopts the perspective that the Bowersox and Daugherty typology provides a strong conceptual basis consistent across countries with regards to salient dimensions of logistics strategy. These dimensions should be coordinated at many levels of the organization to achieve competitive responsiveness regardless of the country environment. Through this research we hope to uncover the applicability of logistics management strategy and understand the role logistics management strategy plays in

maintaining and enhancing competitive advantage responsiveness in cross-country environments. Using a confirmatory factor analysis and a structural model, we assess the validity of three dimensions of Bowersox and Daugherty typology and their simultaneous relationship to logistics coordination, customer service effectiveness, and overall organizational competitive responsiveness in three different countries. The model adapted from McGinnis, Kohn, and Kara (2011) uses a second-order factor, called overall logistics strategy, to represent the three dimensions of the Bowersox and Daugherty typology and ultimately assesses its impact on firm competitiveness.

LITERATURE REVIEW

Managers are required to know the strategies that are used to sell their product lines, operate their business model and address the demand variables that are operating in their environments (Wanke and Zinn, 2004). Studying the approaches to a firm's decision-making process and typologies can assist managers with future decision challenges. While researchers have found ample data among large firms to confirm and support the Bowersox and Daugherty (1987) logistics management decision making typology (Clinton and Closs, 1997; McGinnis and Kohn, 1990, 1993, 1997 and 2002) there has been no substantive research focusing on the relevance of Bowersox/Daugherty typology in different country environments. As such, there is a gap in the literature relating this typology and its applicability to different cultural environments of the developing and emerging markets.

Bowersox/Daugherty Typology and Research Variables

Bowersox and Daugherty (1987) completed a comprehensive study of logistics integration in 1987. In this research they identified three distinctly different logistics management strategy types that firms have used in their decision-making. These decision types are

process strategy, market strategy, and information strategy.

The three components that comprise the Bowersox/Daugherty typology were tested by McGinnis and Kohn (1993, 1997 and 2002). In these studies McGinnis and Kohn sampled subjects from large U.S. manufacturing firms. This empirical research found that process and market strategies were emphasized when logistics strategies were intense. It was also found that both strategies were present at moderate levels when firms used a balanced strategy approach, and that both strategies were present at low levels when firms used an unfocused strategy. All of their studies combined, indicated that the three dimensions (logistics process strategy, market strategy and information strategy) are important and have an effect on firm's successful management activities. They did, however, find that it is more likely that the three dimensions of the logistics strategy will be combined rather than used separately as Bowersox and Daugherty (1987) originally indicated.

In 1997 Clinton and Closs completed a major study testing the Bowersox and Daugherty typology. They sampled 818 U.S. and Canadian firms. The results of their study indicated that there was a clear overlap among the three strategies (information, market and process). They concluded that this is to be expected because logistics has to perform the same activities regardless of the overall logistics strategy. As such, with the typology demonstrating its importance in logistics management, it seemed only appropriate that more investigation should be done focusing on small firms since these business types constitute the largest employer of human resources and rely on logistics heavily to accomplish their goals. The research reported in this manuscript examined a sample of small firms to ascertain whether process, market, and information strategies can effectively describe logistics strategy in this wider context, and especially in the international environment.

The independent variables used in the research reported in this paper are based on the Bowersox/Daugherty (1987) typology discussed earlier and are summarized as follows:

- **Process Strategy:** Management of traditional logistics activities with a primary goal of controlling costs,
- **Market Strategy:** Management of selected traditional logistics activities across business units with the goal of reducing complexity faced by customers, and
- **Information Strategy:** 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.

The dependent variables used in this research were:

- **Logistics Coordination Effectiveness:** The extent that the organization coordinates logistics activities internally, as part of its overall strategic planning, and though-out its supply chain (customers, suppliers, and other channel members).
- **Customer Service Commitment:** The extent that customer services is emphasized through employee training, coordinated with other logistics activities, and used as a source of competitive edge.
- **Company/Division Competitiveness:** The extent that the organization quickly and effectively responds to, relative to competitors, supply chain (suppliers and customers) needs, competitor strategies, develops new products; and is considered a strong, moderate, or weak competitor in most of its markets.

All six variables are represented by scales that have been replicated, appear to fit the construct name, and have relevant levels of reliability, and are discussed in detail by McGinnis, Kohn, and Spillan (2010).

Recently, Chen *et al.* (2009) addressed the role of integration across the supply chain and its effectiveness on firm performance. Utilizing the process approach in supply chain, they argued that effective integration can be achieved through processes across the supply chain. While the importance of logistics strategy and process integration has been emphasized in previous studies, empirical analysis on the effect of logistics strategy and logistics integration is surprisingly rare. We attempt to address this gap in the literature by decomposing logistics integration into two components: logistics process integration (Chen *et al.*, 2009) and logistics information integration. Logistics process integration is defined as “a set of continuous restructuring activities aimed at seamlessly linking relevant business processes and reducing redundant or unnecessary processes within and across firms. We define

logistics information integration as the set of practices (such as electronic data interchange or integrated computer systems) associated with designing and development of information systems across firms.

Country Profiles

As shown in Table 1, the United States is much larger in area than both other countries (9,161,666 sq km/3,794,083 sq mi), with a varied climate, has a population of approximately 307.2 million, is 82% urban, a GDP of US\$ 14,800 billion, 226,427 km/140,699 mi of railroads, and 4,209,835 km/2,615,942 mi of paved roads.

According to findings presented by Hofstede (2001), and shown as Table 2, the United States culture is moderate on Power Distance, low-moderate on Uncertainty Avoidance, high on Individualism, and high on masculinity.

TABLE 1
SELECTED COMPARISONS OF
THE UNITED STATES, GUATEMALA, AND TURKEY

Category	United States	Guatemala	Turkey
Area (sq km/sq miles)*	9,826,675/3,807,983	108,889-42,042 (Slightly smaller than Tennessee)	783,562/302,533 (Slightly larger than Texas)
Population*	307,212,123 est.	13,276,517 est.	78,785,548 est.
Percentage of Population Urban*	82%	49%	70%
Make up of Labor Force*	Agriculture: 1.2% Agriculture: 50% Agricultural: 29.5%	Industry: 21.9% Industry: 15% Industry: 24.7%	Services: 76.9% Services: 35% Services: 45.8%
Gross Domestic Product*	\$14.26 trillion est.	\$69.21 billion est.	\$960.5 billion est.
Climate*	Varied	Tropical	Temperate
Railroads (km/miles)*	226,427/140,699	332/206	8,699/5398
Paved Roads (km/miles)*	4,209,835/261,594	4,893/3,040	313,151/194,559
2008 Public-sector Corruption Index.	7.1: 22 of 178 countries.	3.2: 91 of 178 countries.	4.4: 56 of 178 countries.

*Source: *United States Central Intelligence Agency World Factbook* (www.cia.gov)

**Source: *Transparency International* (www.transparency.org). Index scores range between 9-10 = Very Clean to 0-.9 = Highly Corrupt.

Guatemala provides an excellent example of a country that contrasts with the United States. According to the *United States Central Intelligence Agency World Factbook* (www.cia.gov, 2010), Guatemala is slightly smaller than Tennessee (108,889 sq km/42,042 sq mi), tropical, has an estimated population of **14,361,666**, is 49% urban, a GDP of \$69 billion, 332 km/200 mi of railroads, and 4,863 km/2,872 mi of paved roads. Culturally, Guatemala is relatively high on Power Distance, Uncertainty Avoidance, low on Individualism, and moderate on Masculinity.

As result of having the highest birth rate in Western Europe, Turkey has a very young population. It has significantly skilled and competitive labor, a massive domestic market, a unique geographical location, and a forceful private sector with close regional connections. The 2009 Census of Turkey counts its population at 72.5 million, with a growth rate of 1.45 percent per annum. Two-thirds (67 percent)

of the population are in the group of those 15- to 64-years-old. (Turkish Statistical Institute, 2010). Turkey is slightly larger than Texas (783,562 sq km /302,533 sq mi). Turkey is also one of the countries in the world with a fast urbanization rate, at an average yearly annual rate of 1.9 percent between 2005 and 2010 (McGinley, 2009). There is a great movement into the cities from rural areas, which is producing the urban population to rapidly increase. Turkey has now reached almost one trillion dollars of GDP, and has 8,699 km/5398 mi of railroads, and 313,151 km/ 194,559 mi of paved roads. Turkey's culture is summarized as high on Power Distance, medium-high on Uncertainty Avoidance, moderate in Individualism, and moderate on Masculinity.

A careful review of the information presented in Tables 1 and 2 reveals three disparate environments for examining logistics strategy. The United States could be summarized as geographically large, with a population

TABLE 2
A COMPARISON OF AMERICAN, GUATEMALAN, AND TURKISH WORK PLACE CULTURES

Dimension Index/ Interpretation	United States	Guatemala	Turkey
Power Distance	40/38 (Moderate)	95/2-3 (High)	66/18-19 (High)
Uncertainty Avoidance	46/43 (Low-moderate)	101/3 (High)	85/16-17 (Medium-high)
Individualism/ Collectivism	91/1 (High)	6/53 (Low)	37/28 (Moderate)
Masculinity/ Femininity	62/15 (High)	37/43 (Moderate)	45/32-33 (Moderate)
Long-Term/ Short-Term Orientation	29/27 (Short-term oriented)	NA	NA

Source: Adapted from: Geert Hofstede (2001). *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations*, 2nd Edition. Thousand Oaks, CA. Sage Publications. Appendix 5.

employed predominately in services, an average Gross Domestic Product of approximately \$45,000 per capita, with a varied climate, and extensive transportation infrastructure appropriate for the country's size, and a moderately low level of public sector corruption. The United States culture is relatively egalitarian, more likely to be risk taking, individualistic, and results oriented.

Guatemala is small geographically, with a population employed predominately in agriculture, an average Gross Domestic Product of approximately \$5,200 per capita, with a tropical climate, a modest transportation infrastructure, and an above average level of public sector corruption. Its culture is relatively hierarchical, more likely to avoid risk, collectivistic, and more likely to balance relationships and results. Turkey is geographically moderate in size with a population predominately working in industry and services, an average Gross Domestic Product per capita of approximately \$12,000, a temperate climate, a well-developed transportation infrastructure, and an average level of public sector corruption. Turkey's culture is relatively hierarchical, between the United States and Guatemala on Risk Avoidance and on Individualism/Collectivism, and balanced on relationships and results.

As seen from Tables 1 and 2, as well as the summaries presented in the previous paragraphs, the results of an assessment of orientations toward logistics strategy in these three cultures should not be taken as a foregone conclusion. An ethnocentric perspective of a United States practitioner or academic might be "logistics strategy (and supply chain management) will be the same, or differ little, regardless of the economic/cultural situation." However, a polycentric perspective might argue that "Logistics strategy (and supply chain management) will be unique to each economic/cultural situation, and logistics strategy will differ according to the economic/cultural characteristics of the situation." Finally, a

geocentric perspective might argue that "The fundamentals of logistics strategy (and supply chain management) are similar and will be tailored to the needs of the economic/cultural situation."

STUDY METHODOLOGY

The following sections examine Measures, and Data Collection.

Measures and Questionnaire Development

To conceptualize the factors of our research model, we used scales adapted from McGinnis, Kohn, and Spillan (2010) study. The questionnaire was divided into three parts. In the first part, the overall logistics strategy of the companies were measured by three dimensions; *process strategy*, *market strategy* and *information*. Respondents were requested to determine their level of agreement with three statements for process, market and information strategies for their company /division on a five point -type scale (1 = definitely agree, 5=definitely disagree). In the second part of the questionnaire questions were asked in order to measure the relationships among logistics strategy constructs that are hypothesized to contribute logistics coordination effectiveness measured by three statements. Similar Likert scale measures (1 = definitely agree, 5=definitely disagree) in the first section of the questionnaire were used in the second section as well. In the third part of the questionnaire, we included statements to measure customer service commitment and company division competitiveness using the same Likert Scale as previously used in the first and second part of questionnaire.

Bilingual associates translated the designed questionnaire into both Turkish and Spanish. To ensure the quality of the translation, we used back translations to check for any discrepancies and translation errors in both countries. The questionnaires were pre-tested with a small group of participants in both Turkey and Guatemala before the questionnaire's administration. In both countries the results

TABLE 3
INDEPENDENT AND DEPENDENT VARIABLES¹

	Scale items	Average Cronbach Alphas		
		USA	Guatemala	Turkey
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	.651	.524	.856
	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.	.741	.624	.894
	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).	.629	.739	.903
DEPENDENT VARIABLES*	Logistics Coordination Effectiveness (LCE) 4.1. The need for closer coordination with suppliers, vendors, and other channel members has fostered better working relationships among departments within my company. 4.2. In my company logistics planning is well coordinated with the overall strategic planning process. 4.3. In my company division logistics activities are coordinated effectively with customers, suppliers, and other channel members.	.609	.733	.818
	Customer Service Coordination (CSC) 5.1. Achieving increased levels of customer service has resulted in increased emphasis on employee development and training. 5.2. The customer service program in my company/division is effectively coordinated with other logistics activities. 5.3. The customer service program in my company/division gives us a competitive edge relative to our competition.	.695	.634	.830
	Company/Division Competitive Responsiveness (COMP) 6.1. My company/division responds quickly and effectively to changing customer or supplier needs compared to our competitors. 6.2. My company/division responds quickly and effectively to changing competitor strategies compared to our competitors. 6.3. My company/division develops and markets new products quickly and effectively compared to our competitors. 6.4. In most of its markets my company/division is a very strong competitor.	.733	.532	.907

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

were satisfactory with respect to the meaningfulness and the applicability of the questions in those country environments. The three independent and three dependent variables used in this research are presented in Table 3. Included in Table 3 are the items for each variable, and the scale reliabilities in each of the three countries (United States, Guatemala, and Turkey). Previous research (Kohn and McGinnis, 1997b) has concluded that the six variables are valid when studying logistics strategy using logistics managers in manufacturing firms for subjects.

Data Collection

Data for the research was collected using the developed questionnaire containing the above explained measures. The data for the U.S. was collected in manufacturing firms who were members of the Council of Supply Chain Management Professionals (CSCMP). Respondents from manufacturing companies were titled managers or higher in logistics, distribution, or supply chain management and were sampled via mail questionnaires with a pre-notification letter, the questionnaire with a cover letter, and a follow-up letter.

Data for Turkey was collected using a self-administered questionnaire that was distributed to 500 SMEs (Small-Medium enterprises) operating in the manufacturing sector within the city of Istanbul. This sample was selected randomly from the database of the Turkish Small Business Administration (KOSGEB). As of 2008, the KOSGEB database included a total of 12,270 SMEs in Istanbul. This accounts for nearly 28% of all SMEs registered throughout Turkey.

Requests were made for the survey to be done by a senior officer/executive in charge of logistics, distribution and supply chain management. The responses indicated that a majority of the respondents completing the questionnaire were in fact high level members of logistics departments. Of the 500 surveys posted, a total of 232 questionnaires were returned after one

follow-up. 18 questionnaires were excluded due to missing values. The overall response rate was 43% (216/500), which was judged acceptable for subsequent analysis. An evaluation of the yearly sales volume, number of employees and sub-industry variation showed no significant differences between the responding and non-responding managers. Thus, the surveys satisfactorily characterized the total sample group of manufacturers.

In Guatemala researchers worked through the Ministry of Economics as a means of collecting data. Ministry of Economics staff was trained by the researchers on what the survey contents were, how to complete the survey and how to respond to questions from the respondents. In order to collect data The Ministry of Economics staff conducted face-to-face interviews with logistics, distribution and supply chain managers from midsize and large companies located in nine major regional centers in Guatemala. From these interviews staff were able to collect a total of one hundred and eighty (180) completed, usable surveys. The selected firms came from a large geographic area, with interviews taking place in several different areas including Guatemala City, Escuintla, Villa Nueva, Quetzaltenango, Cobán, Salamá, Chiquimula, Sacatepéquez and Petén. A total of 174 questionnaires were retrieved, but, only 156 usable questionnaires were attained due to incompleteness and other survey operations problems.

ANALYSIS AND RESULTS

The first step was to check the construct reliabilities for all three countries. Table 3 discussed earlier also shows comparative average construct reliabilities. Although some of the reliability scores were below the suggested levels in the literature, in general we can make a case that these scores are satisfactory for testing and validating the structure reported in McGinnis, Kohn, and Kara (2011). In addition, as coefficient values are relatively receptive to the number of items in the constructs, particularly when constructs have fewer than ten

items (as in the case of the research model), it is common to find quite low coefficient alpha around 0.50 (Pallant, 2007).

With the intention of evaluate whether the correlations among variables are suitable for factor analysis, we examined the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO-MSA) (Kaiser, 1970). Table 4 shows the results for KMO tests for sampling adequacy and Bartlett's test for sphericity for the 3 data sets of the US, Guatemala, and Turkey as well as the mean scores for the constructs in all three countries. The value of KMO-MSA was 0.832 for the US sample, .900 for Guatemalan sample and 0.663 for the Turkish sample indicating the data were appropriate for factor analysis. All

KMO results were above .50 which is the minimum cut off for factor analysis. Additionally all levels of significance for Bartlett's test for sphericity were less than .005. KMO results along with the Bartlett results indicate the data is suitable for factor analysis.

Confirmatory Factor Analysis

To confirm the underlying factor structure, the authors conducted CFA on all datasets using AMOS. We assessed the goodness of the fit of the models using various fit indices testified to in previous studies, including the χ^2 statistic, normed fit index (NFI), non-normed fit index, (NNFI), comparative fit index (CFI) goodness of fit index (GFI); Standardized Root Mean, Square Residual (SRMR); and Root Mean Square Error

TABLE 4
AVERAGE VALUES OF INDEPENDENT AND DEPENDENT VARIABLES:
USA, GUATEMALAN, AND TURKISH MANUFACTURING FIRMS

Variables	USA Data Average 1990-2008*	Guatemala Data Average, 2010	Turkish Data Average, 2010
Independent Variables			
1. PROCSTR**	2.332	2.245	2.071
2. MKTGSTR**	2.541	2.057	2.394
3. INFOSTR***	2.769	2.107	2.398
Dependent Variables			
1. LCE**	2.580	2.098	2.056
2. CSC**	2.5205	2.166	2.461
3. COMP**	2.3969	2.1090	2.6157
KMO Measure of Sampling Adequacy	0.832	0.900	0.663
Bartlett's Test of Sphericity	0.000	0.000	0.000

*Adapted from Adapted from: McGinnis, Michael A., Jonathan W. Kohn, and John E. Spillan (2010), "A Longitudinal Study of Logistics Strategy: 1990-2008," *Journal of Business Logistics*, Vol. 31, No. 1, pp. 217-235. **Scales: 1 = Strongly Agree, 2 = Agree, 3 = Neither Agree nor Disagree, 4 = Disagree, 5 = Strongly Disagree. *** Significant differences among three countries

of Approximation (RMSEA). The two-step approach suggested by Anderson and Gerbing (1988) was used to first examine the measurement model and then the structural model. In the measurement model, the relationship between the nine logistics strategic orientations and the three first order factors were examined to understand how well the relationships fit the data. In the structural model, we examined the relationship between the three first order factors (PROCSTR, MKTGSTR, and INFSTR). The findings supported the underlying factor structure of the 19 items with correlated factors.

The results of the estimation of the first order factor model revealed very strong results for all datasets used as indicated by several different measures (1). As suggested by McGinnis, Kohn, and Kara (2011), we allowed two of the error terms to be correlated. The figures of GFI and CFI, were all larger than or equal for all three countries (2).

The normalized chi-square (chi-square/degrees of freedom) of the CFA model was smaller than the recommended value of 3.0, the RMR was smaller than 0.05, and the RMSEA were smaller

than or very close to 0.08 (3). Although the χ^2 value for two of the datasets were significant, due to the sensitivity of this measure, it was not considered a major concern since the other fit indices showed strong model fit. Accordingly, the results in Figure 1 showed that all loadings in the model were significant, leading us to conclude that the relationships between the items and latent factors were confirmed by the three datasets obtained from different countries.

The last step in the process to confirm the underlying structure of the model was to evaluate the relationship between the three first order factors and a second order factor named "overall logistics strategy." The purpose here is to understand how the three factors contributed to an overall construct. The results of the second order confirmatory factor analyses for all three datasets showed very good fit indices (4).

Structural Models

The structural model was used to test the hypotheses of all six factors tested in the measurement model. The hypothesized structural models for three datasets are shown in Figure 2. Inspection of Figure 2 revealed that the all linkages were significant and the directions of

$$(\chi^2_{USA}=31.058, \chi^2_{GUATEMALA}=48.65, \text{ and } \chi^2_{TURKEY}=38.40) \quad (1)$$

$$GFI_{USA}=0.962; CFI_{USA}=0.970; GFI_{GUATEMALA}=0.940; CFI_{GUATEMALA}=0.941; GFI_{TURKEY}=0.962; CFI_{TURKEY}=0.988) \quad (2)$$

$$(RMSEA_{USA}=0.049; RMSEA_{GUATEMALA}=0.082 \text{ and } RMSEA_{TURKEY}=0.059) \quad (3)$$

$$(\chi^2_{USA}=31.058; GFI_{USA}=0.962; CFI_{USA}=0.970; RMSEA_{USA}=0.049; \chi^2_{GUATEMALA}=27.89; GFI_{GUATEMALA}=0.940; CFI_{GUATEMALA}=0.941; RMSEA_{GUATEMALA}=0.082; \chi^2_{TURKEY}=36.37; GFI_{TURKEY}=0.962; CFI_{TURKEY}=0.988; RMSEA_{TURKEY}=0.059) \quad (4)$$

FIGURE 1
FIRST ORDER CONFIRMATORY FACTOR ANALYSIS OF OVERALL LOGISTICS
STRATEGY
A. USA DATA

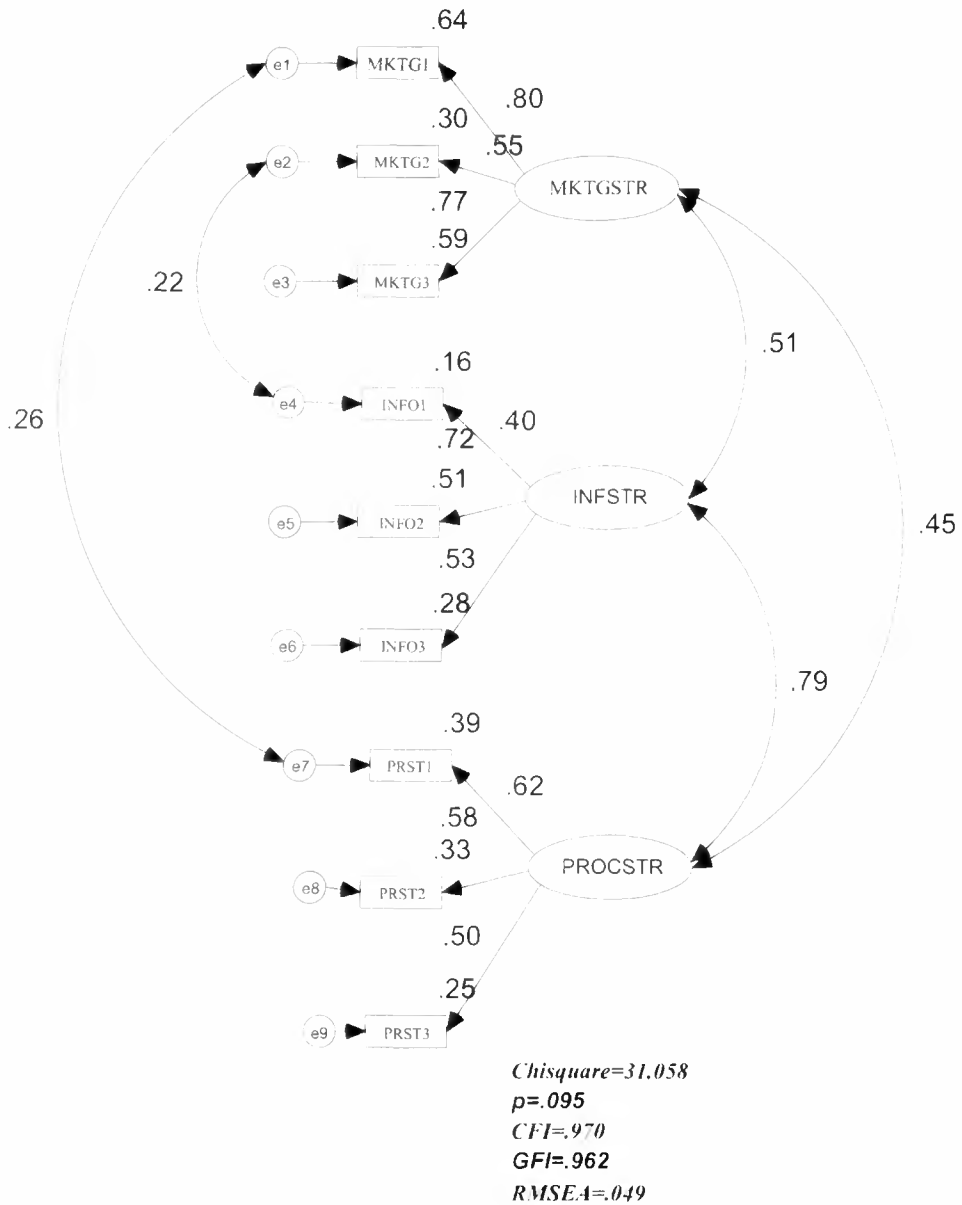


FIGURE 1
B. GUATEMALA DATA

First Order Confirmatory Factor Analysis for Overall Logistics Strategy Guatemala Data

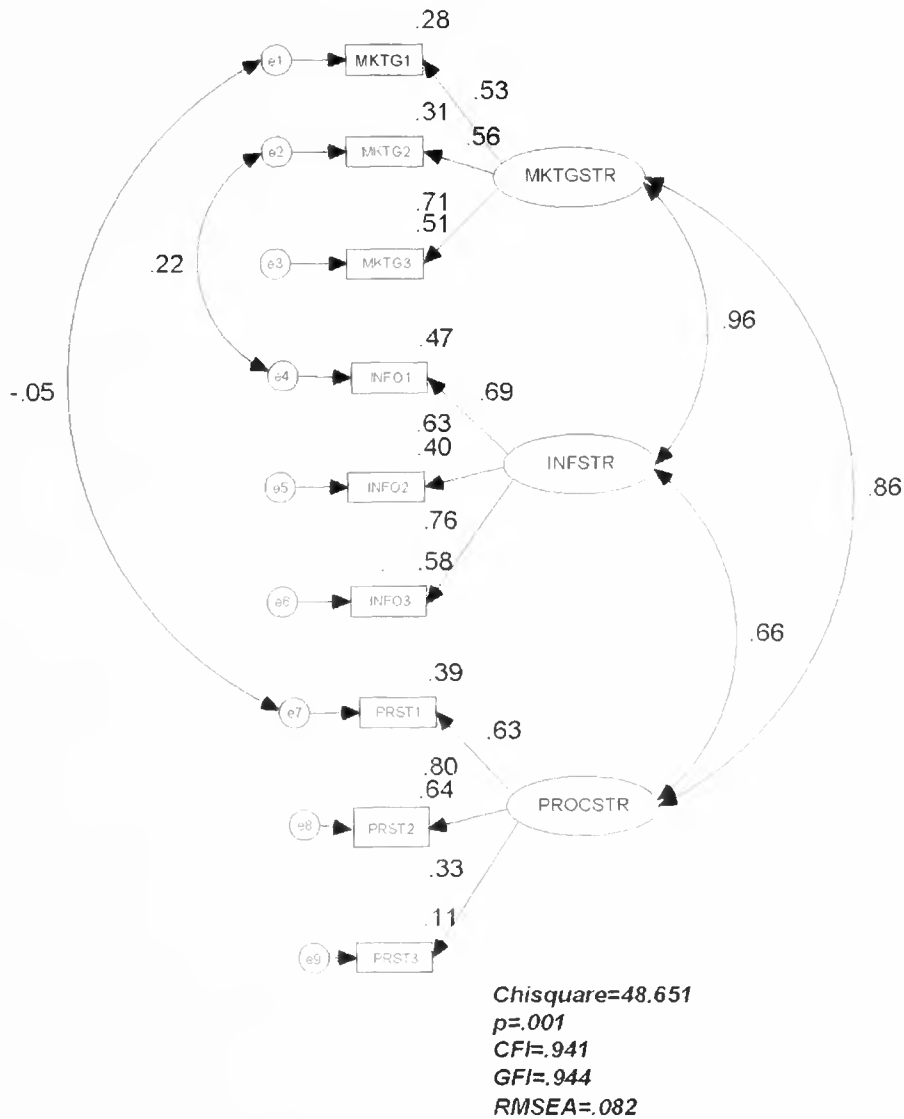


FIGURE 1
C. TURKISH DATA

First Order Confirmatory Factor Analysis for Overall Logistics Strategy Turkish Data

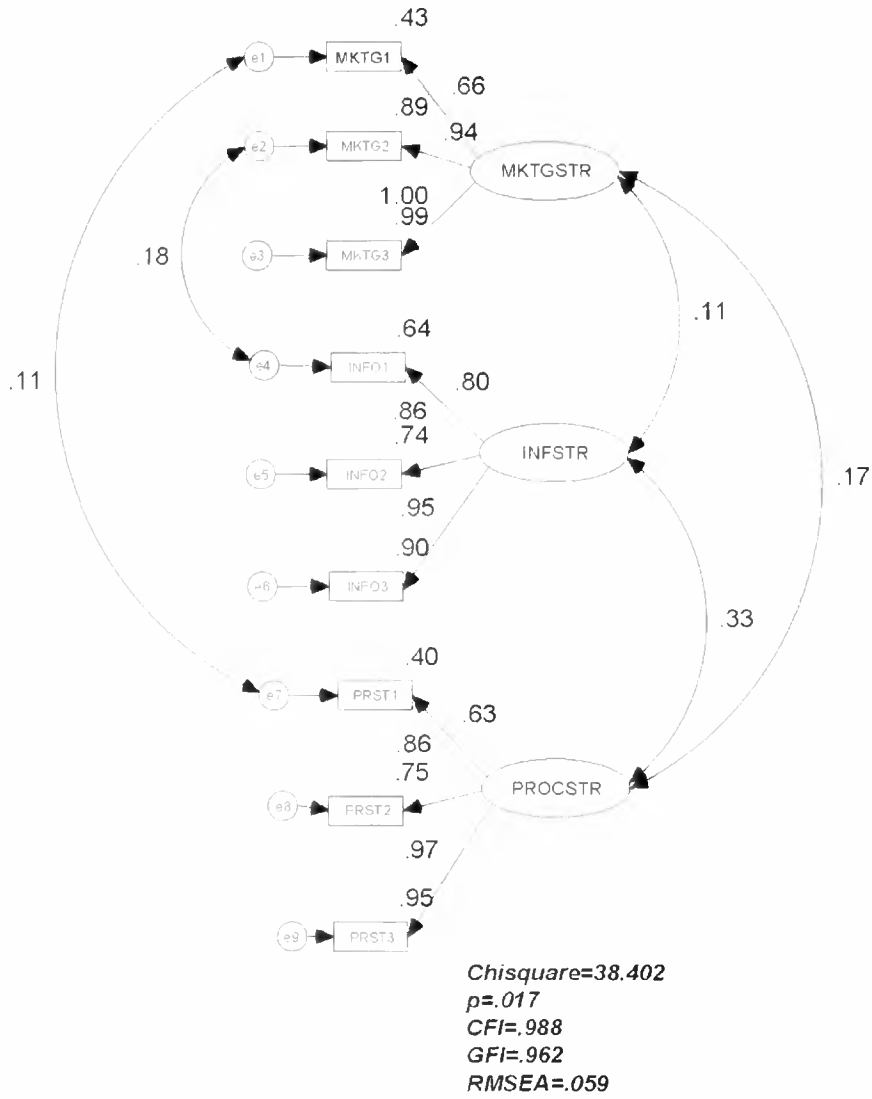
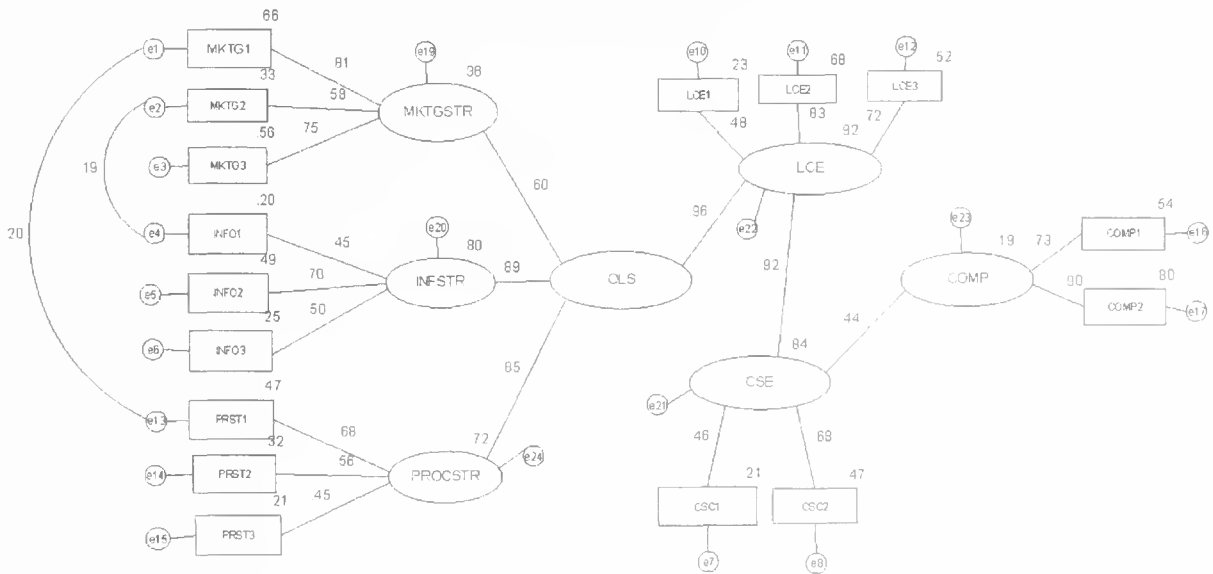
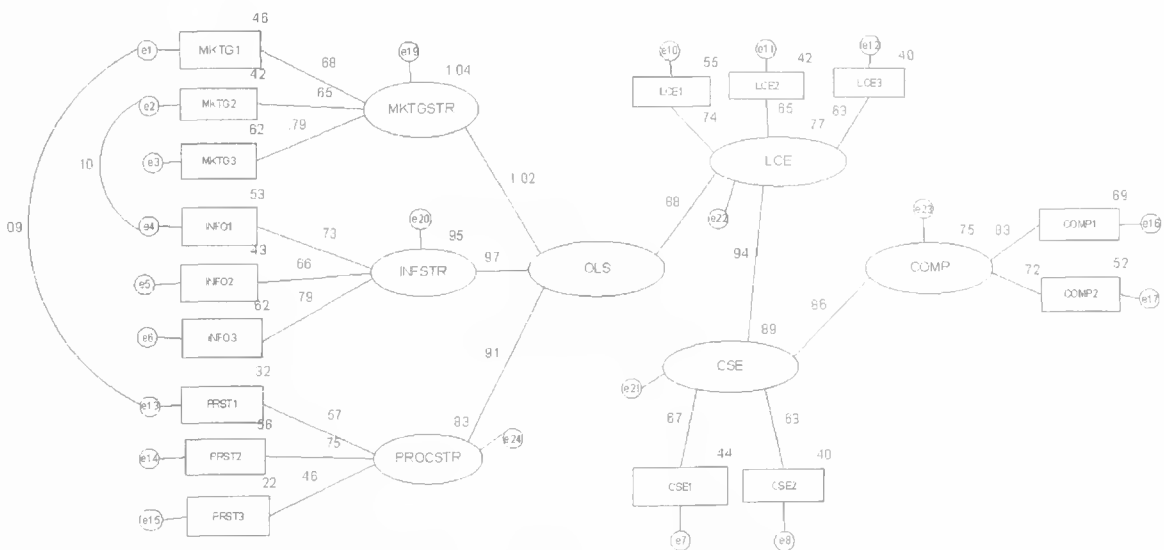


FIGURE 2
SEM FOR OVERALL LOGISTICS STRATEGY AND COMPETITIVENESS
A. USA DATA



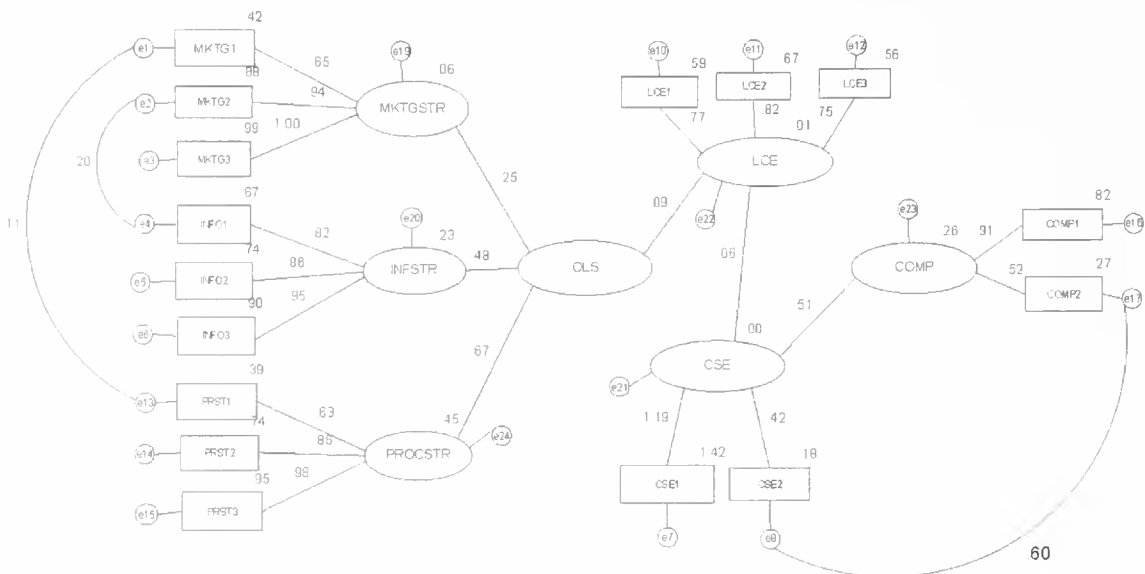
Chisquare=125.971, p-value=.022, GFI=.916, CFI=.960, RMSEA=.043

FIGURE 2
B. GUATEMALA DATA



Chisquare=192.600, p-value=.000, GFI=.867, CFI=.910, RMSEA=.081

FIGURE 2
C. TURKISH DATA



Chisquare=170.718, p-value=.000, GFI=.912, CFI=.962, RMSEA=.061

relationships were as hypothesized for the US and Guatemala datasets. Although the model fit is considered acceptable, only one of the hypothesized links for Turkish data was significant. In other words, it seems like OLS and LCE did not have any significant influence on CSC. Only CSC had significant influence on competitiveness of Turkish companies.

Overall, the US and Guatemala datasets supported the hypothesized relationship directions and strength of the hypothesized relationships, while Turkish dataset did not provide the expected support. While this may be due to some other factors not examined in the study, one could speculate that there might be fundamental differences among these constructs in the Turkish market environment. However, the authors conclude that the agreement on the consistency of direction of the relationships in factor structures in all three datasets, and support for hypothesized structural relationships in two out of three datasets, provides encouragement

regarding the relationship of logistics strategy and Organization Competitive Responsiveness in international environments.

DISCUSSION AND IMPLICATIONS OF FINDINGS

The results of this study provide helpful insights to logistics/supply chain management practitioners regarding effective management of logistics strategy and contributions to organizational competitiveness. First, overall logistics strategy (OLS) does not seem to differ among disparate cultures. As discussed earlier, the three components of OLS (process, market, and information) appear to be consistent across the three cultures examined. However, agreement regarding the lack of significance between OLS and logistics coordination effectiveness (LCE), and the lack of significance between LCE and customer service coordination (CSC) in Turkey provides some pause regarding the premise that logistics/supply chain strategy necessarily leads to organizational

competitiveness. In the Turkish data the lack of significance between OLS and LCE do not indicate a lack of significance between CSC and organizational competitive responsiveness (COMP). This indicates that customer service contributes to organizational competitive responsiveness regardless of whether there is a close relationship between the overall logistics strategy (OLS) and the commitment to customer service (CSC). These findings suggest that, at least in the Turkish data, that the goals of customer service coordination may be achieved across the organization, as suggested by Chen *et al.*, 2009, rather than as a result of a focus by one component of overall strategy, such as OLS. While an organizational focus on customer service is the goal of logistics and supply chain management, it may be possible that an organization may be focused on customer service independent of OLS. Stated another way, an organization (or culture) with a commitment to customer service may not require the logistics strategy to facilitate that commitment. Further research into logistics strategy in other cultures may provide further insight into the strength of logistics/supply management's role in customer service and organizational competitive responsiveness.

Our findings show that given the Bowersox/Daugherty dimensions of logistics strategy are invariant across the cultures/countries studied and that the measures of logistics strategy assessed by three dimensions hold in all three countries. These results suggest that the assumed links between logistics strategy and organizational competitiveness did not hold in all cultures. In other words, even if overall logistics strategy may be comprised of process, market, and information dimensions, its impact on overall organizational competitiveness may vary across the nations.

In the case of the Turkish model, although not significant, the relationships between the constructs were in the hypothesized direction with CSC showing the strongest effect on the

organizational competitiveness. At first glance, one might question this finding and argue against the validity of the structural model. However, the Turkish economy is going through a tremendous liberalization and is considered a major emerging market. Therefore, it is the high volatility market in terms of structural realignments, and this may result in an emphasis on customer service and competitive responsiveness being integral to strategy as the Turkish economy emerges into an already competitive global economy. Second, because many Turkish logistics activities are still performed using traditional inefficient systems, an emphasis on customer service and competitive responsive may be resulting in logistics management in Turkish organizations being bypassed by organizational priorities and strategies. This might have led to a significant variation among the participants in terms of their understanding and expectations of logistics strategy. Finally, it is possible that the current structural model might not have captured the effects of logistics strategy on overall competitiveness due to the rapid changes taking place in the economy, Turkish business strategies, and lags in the role of logistics in Turkey.

CONCLUSIONS

The purpose of this study was to explore whether the Bowersox/Daugherty typology is a useful instrument for examining logistics strategies in countries of different sizes, cultures, and economic systems. We mentioned at the outset of this study that globalization has altered the management activities and practices of many world wide companies. With supply chain management at the center of business activity, it is imperative that managers find and use new ideas that will help them become more competitive in highly competitive markets. Finding new insights into how they can manage their manufacturing and supply chains is essential for goal attainment, profitability and sustainability.

Our findings indicate that there are some similarities and some differences in how managers conceive the issues of logistics and how they process them and execute them in their daily practice. This is not unusual nor is it a negative outcome. We would expect that in different cultures managers would see some processes, some strategies and information exchanges differently. It is important to note that the fact that there is consistency in direction and relationship of constructs means that the Bowersox/Daugherty typology is a useful instrument for examining logistics strategies in different countries and our confirmatory factor analysis results validate the dimensionality of the model. We tested previous hypotheses regarding the effect of logistics strategy and logistics practices on firm's competitiveness in the context of cross sectional business firms. Therefore we can say that managers in different countries and cultures have some of the same ideas about the meaning of the logistics concepts and how they need to be implemented. This is very important to managers for a couple of reasons: (a) when considering out sourcing or expanding to a foreign land i.e. Guatemala or Turkey, managers can have a better understanding of how these countries will react to the logistical strategy, process and information issues that are present in their companies and countries, and (b) when exporting or importing goods, companies can have more insight into the relationships that are present in the three concepts studied in this research. Our findings suggest that logistics and supply chain management appear to be geocentric, where, as stated earlier, the fundamentals of logistics strategy (and supply chain management), while fundamentally similar, will be tailored to the economic/cultural situation. While overall logistics strategy may be a driving force for competitive responsiveness in many cultures, it appears that competitive responsiveness in some cultures will originate elsewhere. To what extent these statements hold will be the result of further research into logistics strategy in additional cultures.

SUGGESTIONS FOR FUTURE RESEARCH

Future research into logistics/supply chain management should seek opportunities to explore practices in other countries/cultures. Little is known of comparative logistics/supply chain management in the various countries of Asia and the subcontinent of India. Further, logistics and supply chain management practices, and their impact on customer service and organizational competitive responsiveness have not been systematically studied. Further research into logistics and supply chain management may benefit from expanding the understanding of logistics/supply chain management decision making by including antecedents and moderating factors (such as competition, market turbulence, and differences in business environment) into the design.

In addition to further study of logistics/supply chain management in other nations/cultures, additional insight could be gained by examining the relevance of the Bowersox/Daugherty typology to nonmanufacturing industries including retailing, healthcare, financial services, transportation firms, and food service. These industries may provide a different perspective on the process, market, and information strategy in different environments.

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