An empirical assessment of logistics/supply chain management in two Latin American countries

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ABSTRACT

The Bowersox Daugherty (1987) logistics strategy typology (Process Strategy, Market Strategy, and Information Strategy) is an important conceptual framework for studying logistics/supply chain management strategy and its role on logistics/supply chain management outcomes. The purpose of this research is to empirically apply the typology in Peru and compare the findings with the previous research conducted in Guatemala. The three Bowersox/Daugherty dimensions are used to define the construct Overall Logistic Strategy (OLS), and then, the OLS was used to measure Organizational Competitiveness (COMP) through two intervening variables LCE (Logistics Coordination Effectiveness) and CSC (Customer Service Commitment). The results indicate that generally the logistics strategy in Peru is fundamentally similar to Guatemala's. In other words, the direction of the relationships among the conceptualized constructs tested in the SEM model was significant and explained a sizable variation in COMP in both countries. This provided additional support for the robustness of the structural model in different cultural environments. However, some differences are apparent. First, the importance of the three independent variables and three dependent variables appear to be greater to the Peruvian respondents than Guatemalan respondents. Second, on closer inspection Peruvian logistics data indicates relatively greater emphasis on information, coordination, customer service, and relatively less emphasis on cost efficiency, than Guatemalan managers. Managerial insights and suggestions for future research and discussed.

INTRODUCTION

Logistics management is the process of managing material, service, information and capital flows from the source, through the firm and to the customer (Logisticsworld, 2015). It is a critical part of an organization's corporate strategy (Heskett, 1977). One conceptual framework used in studying logistics/supply chain management is the Bowersox/Daugherty (1987) typology, which has been the basis for longitudinal research in the United States and a series of international markets. Collectively these studies have demonstrated that the Bowersox and Daugherty typology is applicable over time in the United States and in several other countries with different cultural backgrounds and economic development levels. As such, these recent empirical studies address the concerns of Luo, Van Hoek, and Ross (2001) who stated that cross-cultural logistics/supply chain management research has lagged in comparison to other business disciplines. The authors believe that the analysis contained in these studies validate the Bowersox/Daugherty typology as an effective model for the study of logistics/supply chain management across cultures.

Considering the speed of the globalization, a firm's ability to manage logistics in cross-country environments has become an important success factor. Although, globalization offers significant opportunities for multi-national corporations (MNCs) to shift their manufacturing and distribution around the world, especially in the 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/cross-country logistics studies have significant potential to enrich our understanding of logistics systems and strategies applicable in different national environments. These studies provide in depth logistics knowledge, which can have important international logistics management implications in helping managers to identify similarities, and would encourage similar strategies, or identify significant differences.

Kohn, McGinnis, and Kara's (2011) recent study 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 U.S., their findings demonstrated that the Bowersox/ Daugherty dimensions had a significant impact on the company's competitiveness through the links of logistics coordination and customer service. The purpose of this study is to explore whether the Bowersox/Daugherty typology is useful for examining logistics strategies in two dissimilar Spanish language countries in Latin America, namely Peru and Guatemala.

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

This current research adopts a perspective that the Bowersox and Daugherty typology provides a strong conceptual framework consistent across countries with regards to salient dimensions of logistics/supply chain management strategy. These dimensions should be coordinated at many levels of the organization to achieve competitive responsiveness regardless of the country's environment. Through this research the authors hope to discover the applicability of logistics/supply chain 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 equation model, we assess the validity of three dimensions of the Bowersox and Daugherty typology and their simultaneous relationship to logistics coordination, customer service effectiveness, and overall organizational competitive responsiveness.

This paper is organized into seven sections. The first two sections contain the introduction and literature review and they provide an overview of the conceptual framework for the study and briefly compare selected characteristics of Peru and Guatemala. Sections three and four contain the research methodology and data analysis. The fifth section discusses the similarities and differences in logistics/supply chain management between the two Latin American countries. The sixth section presents a discussion of the results and conclusions. The final section provides implications for logistics/ supply chain management practitioners, teachers, and researchers.

LITERATURE REVIEW AND AN OVERVIEW
OF PERU AND GUATEMALA

Literature Review
In 1987, Bowersox and Daugherty completed a comprehensive study of logistics integration. Their research focused on three distinctly different logistic management strategy types that firms have used in their decision-making. They are summarized as follows:

- The objective of Process Strategy is to manage flows to gain control over activities that "give rise to cost". In current terminology they are referred to as "cost drivers".
- The objective of Market Strategy is to reduce the complexity faced by customers. For example, this strategy may try to provide a single point of contact for customers that source multiple products from different divisions, or facilities, of the same firm.
- The objective of Information Strategy is to coordinate information flows throughout the channel of distribution to facilitate cooperation and coordination among channel (supply chain in today's vocabulary) members.

Three studies (McGinnis and Kohn, 1993, Kohn and McGinnis, 1997b, and McGinnis and Kohn (2002) have tested the three components of the Bowersox/Daugherty typology in large U.S. manufacturing firms. The researchers found that process and market strategies were emphasized when logistics strategies were intense. They also determined that both strategies existed at moderate levels when firms used a balanced strategy approach. Additionally, they found that these strategies were present only at low levels when firms used an unfocused strategy. These studies indicate that the three dimensions (logistics process strategy, market strategy and information strategy) together, and referred to as Overall Logistics Strategy (OLS), provide a basis for assessing logistics/supply chain management effects on firm competitiveness. One significant contribution of this research was that the three dimensions of logistics strategy would be more likely to be blended than used separately as Bowersox and Daughtery (1987) originally indicated.

Clinton and Closs's (1997) research using a sample of 818 U.S. and Canadian firms to assess the significance of the Bowersox/Daughtery typology concluded that there was a clear overlap of the three strategies (process, market, information). This is to be expected because logistics performs the same activities regardless of the overall logistics strategy. In addition, Spillan, Kohn, and McGinnis (2011) concluded that the strategies of small and large U.S. manufacturing firms vary in degree rather than type. Market, Process, and Information strategies were present in both small and large firms. Moreover, the authors concluded that the logistics

strategy outcomes of small and large firms were similar. It was concluded that the Bowersox/Daugherty typology was applicable to United States manufacturing firms regardless of size.

Recent studies have explored the value and suitability of the Bowersox/Daugherty typology in different cultures/countries (McGinnis, Harcar, Kara, and Spillan (2011); McGinnis, Spillan, Kara, and King, D., 2012; and Spillan,

McGinnis, Kara, and Yi (2013). These studies were conducted in China, Guatemala, Ghana, and Turkey. In each case confirmatory factor analysis was used to assess the validity of Overall Logistics Strategy (OLS) using Structural Equation Modeling (SEM) to test the validity of the overall model of OLS-LCE (Logistics Coordination Effectiveness)-CSC (Customer Service Commitment)-COMP (Organizational Competitiveness). In two of

TABLE 1
SELECTED COMPARISONS OF THE PERU AND GUATEMALA

Category	Peru	Guatemala	Source
Area (sq. km/sq. miles)	1,279,996/494,206 (Slightly smaller than Alaska)	108,889/42,042 (Slightly smaller than Tennessee)	*Guatemala Central Intelligence Agency World Factbook* (www/cia.gov. 2014)
Population	30,147,935 est.	14,647,083 est.	*Guatemala Central Intelligence Agency World Factbook* (www/cia.gov. 2014)
Percentage of Population Urban	77%	49%	*Guatemala Central Intelligence Agency World Factbook* (www/cia.gov. 2010)
Make up of Labor Force	Agriculture: 25.8% Industry: 37.5% Services: 56.3%	Agriculture: 13.5% Industry: 23.8% Services: 62.7%	*Guatemala Central Intelligence Agency World Factbook* (www/cia.gov. 2014)
Gross Domestic Product	$334 billion est.	$81.5 billion est.	*Guatemala Central Intelligence Agency World Factbook* (www/cia.gov. 2014)
Climate	Varied	Tropical	*Guatemala Central Intelligence Agency World Factbook* (www/cia.gov. 2014)
Railroads (km/miles)	1,907/1,183	332/206	*Guatemala Central Intelligence Agency World Factbook* (www/cia.gov. 2014)
Paved Roads (km/miles)	18,698/11,602	6,797/4,217	*Guatemala Central Intelligence Agency World Factbook* (www/cia.gov. 2014)
2013 Public-sector Corruption Index. An indication of domestic public corruption.	38/100: 83 of 177 countries. Higher number > less corrupt.	29/100: 29 of 180 countries.	*Transparency International* (www.transparency.org)

Websites accessed March 31, 2014.

these countries, China and Ghana, OLS was supported, but support for the overall model was mixed for the Guatemalan data and statistically insignificant for the Turkish data. McGinnis, Spillan, Kara, and King, (2012) analyzed empirical data collected in Ghana and found that the OLS-LCE-CSC-COMP model was supported. Finally, Spillan, McGinnis, Kara, and Yi, (2013) compared

TABLE 2
SUMMARY OF HOFSTEDE'S CULTURAL DIMENSIONS*

Dimension Name and Brief Description	Example Attributes of a Low Score	of a High Score	Dimension Scores Peru Subjects/ Guatemalan Subjects
Power Distance: The extent that those less powerful accept that power is distributed unequally.	Less concentration of authority, flat organization pyramids, subordinates expect to be consulted.	More concentration of authority, tall organization pyramids, subordinates expect to be told.	64/95
Uncertainty Avoidance: Extent to which members of a culture are comfortable or uncomfortable in unstructured situations.	Company rules may be broken, less resistance to change, acceptance of foreigners as managers.	Company rules should not be broken, more resistance to change, suspicion of foreigners as managers.	87/99
Individualism and Collectivism: The degree to which individuals look after themselves or are integrated into the group.	Employee commitment to organization low, personal relationships prevails over task and company, less control over job and working conditions.	Employee commitment to organization high, task and company prevail over personal relationships, more control over job and working conditions.	16/6
Masculinity and Femininity: The degree "toughness" versus "tenderness" within a culture.	Work to live, managers expected to use intuition, managers hold modest career aspirations.	Live to work, managers expected to be decisive, managers have ambitious career aspirations.	42/37
Pragmatism: *How people in the past as well as today relate to the fact that so much that happens around us cannot be explained.*	People are normative in their thinking, having concerns for establishing absolute truths. Emphasis is on traditions, less likely to save for the future, and likely to seek quick results.	People are guided by virtues and good examples. Long term orientation, more likely to save, priority on steady growth rather than quarterly profit	25/NA
Indulgence: **The extent to which people try to control their desires and impulses,** based on the way they were raised.	People have a tendency toward restraint, placing little emphasis on leisure time while controlling gratification of their desires. They perceive their actions are controlled by social norms and indulging themselves is somewhat wrong	People have a tendency toward indulgence, being willing to realize their desires and impulses and enjoying life and having fun. They are likely to place a higher degree on leisure time, act as they please, and spend money as they please.	46/NA

*Adapted from: www.gert-hofstede.com (Accessed May 14, 2014).

Chinese and United States data and found the both the OLS and the OLS-LCE-CSC-COMP were supported.

Peru and Guatemala Comparison

The following narrative briefly compares Peru and Guatemala on selected dimensions of geography, population, economics, infrastructure, and culture. A summary of these dimensions is presented as Tables 1 and 2.

Peru and Guatemala share a similar colonial history. Both countries had established cultures (Peru primarily Andean and Guatemala primarily Maya) until their conquests by Spain in the 16th century. Both gained their independence in the 19th century (cia.gov). Both have struggled with various forms of governance since independence.

Otherwise, the two countries differ. As shown in Table 1, compared to Guatemala, Peru is nearly twelve times as large geographically, has about double the population, has a higher percentage of urban population, has a workforce that is more agricultural and industrial, has a Gross Domestic Product about four times the size of Guatemala's, and has a varied climate (an arid lowland coastal region, the central high sierra of the Andes, the dense forest of the Amazon, with tropical lands bordering Colombia and Brazil) while Guatemala's is tropical. Finally, Peru's public sector is somewhat less corrupt than Guatemala's (www/transparency.org, 2014). An

examination of the two cultures using the Hofstede Cultural Dimensions (www.gert-hofstede.com, 2014) revealed that, except for Power Distance (less concentration of authority in Guatemala) both countries are similar in Uncertainty Avoidance, Individualism/Collectivism, and Masculinity/ Femininity.

Overall, the two countries are similar in having been Spanish colonies for about three centuries, share the Spanish language, do not differ greatly in terms of culture, and differ modestly in terms of public sector corruption. However, the two countries differ in geographical size, population size, size of GDP, level urbanization, work force make up, climate and infrastructure.

From a logistical point of view, we can also view the relationship of Guatemala and Peru through the lens of the logistics performance index. This index scores countries on their logistics performance according to six factors. These factors are important in evaluating the effectiveness of each country in terms of their overall logistical performance annually. The six factors include customs, infrastructure, international shipments, logistical competence, tracking and tracing, and timeliness. Both countries have very similar scoring records for the year ending 2014. The Logistics Performance Index in Table 3 summarizes a comparison of logistical performance sores. Very little variation exists between Guatemala and Peru.

TABLE 3
LOGISTICS PERFORMANCE INDEX (LPI)

Country	Year	LPI Rank	LPI Score	Customs	Infrastructure	Int. Shipments	Log. Competence	Tracking and Tracing	Timeliness
Guatemala	2014	77	2.80	2.75	2.54	2.87	2.68	2.68	3.24
Peru	2014	71	2.84	2.47	2.72	2.94	2.78	2.71	3.30

The scorecards demonstrate comparative performance—the dimensions show on a scale (lowest score to highest score) from 1 to 5 relevant to the possible comparison groups—of all countries (world), region and income groups. (Source: World Bank, 2014).

The authors believe that Peru and Guatemala would provide a good basis for comparing logistics/supply chain management strategies between two countries in a region that shares characteristics in the areas of history and culture but differ in many ways as described above.

Objectives of the Study:

One gap in this stream of cross-cultural logistics strategy research has been a lack of comparisons between countries in one geographical-cultural area. The authors were able to gather information in Peru, which could then be compared with previously gathered data from Guatemala. If the results from the two countries were similar then the authors thought that they would have more confidence in generalizing the Bowersox/Daugherty typology to the Latin-American region. Conversely, if the results from Peru and Guatemala were dissimilar then it would be concluded that the Bowersox/Daugherty model was not robust in that region.

Therefore, our interest in this study is to explore whether the Bowersox/Daugherty typology is a useful instrument for examining logistics strategies in two dissimilar Spanish language countries located in Latin America. The authors postulate that a two-country study of Guatemala and Peru would furnish an intriguing example of how logistics systems are assessed in two nations through the lens of one common measurement instrument. Furthermore, such a study would provide a strong validation of the dimensionality and the structural relations identified in the recent Kohn, McGinnis, 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 these heterogeneous countries.

METHODOLOGY

Measures and Questionnaire Development

To conceptualize the factors of our research model, we used two sets of scales adapted from the McGinnis, Kohn, and Spillan (2010) study. In the first set the overall logistics strategy of the companies was measured on three dimensions; *process strategy, market strategy* and *information strategy*. The second set focused on three dependent variables; *logistics coordination effectiveness, customer service effectiveness, and company/division competitiveness.* Respondents were requested to determine their level of agreement with three statements for process, market and information strategies for their company /division, for three statements regarding logistics coordination effectiveness, customer service effectiveness, and for four statements regarding company/division competitiveness on a five point -type scale (1 = definitely agree, 5=definitely disagree).

Data Collection

To collect data in Peru, the authors used the McGinnis and Kohn survey. Articles based on this instrument are found in McGinnis and Kohn (1993), Kohn and McGinnis (1997a), and later cited work. A bilingual associate translated the instrument into Spanish. Back translation was completed to check any discrepancy in addition to potential translation errors. One of the co-authors trained 27 students by explaining to them the purpose of the survey, what its contents were, how to complete the survey and how to respond to questions from the respondents. After the training, the students conducted face-to-face and e-mail interviews with representatives from small companies located in nine major regional centers in Peru. The students interviewed company representatives from 300 companies and received 138 usable responses. We believe that the respondents are a reasonable sample of Peruvian businesses involved in business logistics.

In Guatemala, as reported by McGinnis, Spillan, and Virzi (2012), one of the co-authors worked through the Ministry of Economics to collect data. Ministry of Economics staff was trained to

administer the survey. After the training was complete, the Ministry of Economics staff conducted face-to-face interviews with representatives from midsize and large companies located in nine major regional centers in Guatemala, providing a sample across a large geographic area and a substantial cross-section of the Guatemalan business sector.

The authors decided that the Peruvian and Guatemalan data were collected in a manner that enables a defensible basis for a comparison of logistics/supply chain management strategies in the two countries. The three independent variables and three dependent variables used in this research are presented as Table 4. Included in Table 4 are the items for each variable and the scale reliabilities in Peru and Guatemala. Previous research (Kohn and McGinnis, 1997b) has concluded that the six variables are valid when studying logistics strategy using logistics managers in manufacturing firms.

ANALYSIS AND RESULTS

The first step was to check the construct reliabilities. For purposes of comparison the results from the Peru survey and the previously gathered data for Guatemala (McGinnis, Spillan, and Virzi, 2012) are shown as Table 4. The alpha coefficients for reliability for the three independent variables (Process Strategy, Market Strategy, and Information Strategy) were higher for the Peru respondents. In the case of Process Strategy, the alpha for Peru was significantly higher (0.725) than for Guatemala (0.524). The alphas for the dependent variables varied between the two countries. For Logistics Coordination Effectiveness and Customer Service Commitment, Guatemala's alpha was higher (0.733 versus 0.684 and 0.634 versus 0.430 respectfully) while Peru's alpha for Company/Division was higher (0.752 versus 0.532) than Guatemala's. Overall, the authors concluded that the reliability of the six variables was adequate for further analysis.

Although some of the reliability scores were below the suggested levels (0.70) in the literature, in general we can make a case that these scores are satisfactory for testing and validating the structure reported in Kohn, McGinnis, and Kara (2011). Alpha is not a good indicator of unidimentionality and low levels of alpha can be attributed to the sample homogeneity (Bernardi 1994) and do not put the results in question. Usually 0.70 is desired but Schmitt (1996, p. 351) states that "…use of any cutoff value is shortsighted." Accordingly, when a measure has other desirable properties, the low alpha scores may not be a major impediment to its use (Schmitt, 1996). In addition, as coefficient values are relatively receptive to the number of items in the constructs, particularly when constructs have fewer than 10 items, as in the case in this research, it is common to find coefficient alphas around 0.50 (Pallant, 2007). For instance, almost all alphas reported in Rojas-Mendez and Davies (2005) study was below the cutoff suggested in the literature. The scale items used in our study have been previously used in several studies in the literature; have been considered as having sufficient content validity (Kohn and McGinnis, 1997a), and possessing adequate levels of reliability. All constructs have been previously described and discussed by Keller et al. (2002). Previous studies that used these scales also reported low alpha scores (Kohn, McGinnis, and Kara, 2011).

Based on the findings shown in Tables 3 and 4, the authors concluded that a comparison of modeling the Peru data using the Bowersox/Daugherty typology, and comparing those results with the previously modeled Guatemalan data (McGinnis, Harcar, Kara, and Spillan, 2011), would provide insights into differences and similarities of logistics/supply chain management strategies between two Latin American economies.

Table 5 provides further insights into the two data sets. First, the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO-MSA) (Kaiser, 1970) and Bartlett's test for sphericity was conducted for

TABLE 4
INDEPENDENT AND DEPENDENT VARIABLES[1]

	Reliability Coefficients	
Scales/Items*	Peru	Guatemala
Scale 1: Process Strategy (PROCSTR) 1. In my company/division, management emphasizes achieving maximum efficiency from purchasing, manufacturing, and distribution. 2. A primary objective of logistics in my company/division is to gain control over activities that result in purchasing, manufacturing, and distribution costs. 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	0.725	.524
Scale 2: Market Strategy (MKTGSTR) 1. In my company/division, management emphasizes achieving coordinated physical distribution to customers served by several business units. 2. A primary objective of logistics in my company/division is to reduce the complexity our customers face in doing business with us. 3. In my company/division, logistics facilitates the coordination of several business units in order to provide competitive customer service.	.684	.624
Scale 3: Information Strategy (INFORSTR) 1. In my company/division, management emphasizes coordination and control of channel members (distributors, wholesalers, dealers, retailers) activities. 2. A primary objective of logistics in my company/division is to manage information flows and inventory levels throughout the channel of distribution. 3. In my company/division, logistics facilitates the management of information flows among channel members (distributors, wholesalers, dealers, retailers).	.816	.739
Logistics Coordination Effectiveness (LCE) 1. The need for closer coordination with suppliers, vendors, and other channel members has fostered better working relationships among departments within my company. 2. In my company logistics planning is well coordinated with the overall strategic planning process. 3. In my company/division logistics activities are coordinated effectively with customers, suppliers, and other channel members.	.684	.733
Customer Service Effectiveness (CSE) 1. Achieving increased levels of customer service has resulted in increased emphasis on employee development and training. 2. The customer service program in my company/division is effectively coordinated with other logistics activities. 3. The customer service program in my company/division gives us a competitive edge relative to our competition.	.430	.634
Company/Division Competitiveness (COMP) 1. My company/division responds quickly and effectively to changing customer or supplier needs compared to our competitors. 2. My company/division responds quickly and effectively to changing competitor strategies compared to our competitors. 3. My company/division develops and markets new products quickly and effectively compared to our competitors. 4. In most of its markets my company/division is a (1=very strong competitor, 5=very weak competitor).	.752	.532

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

[1] 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.

the 2 data sets. In addition the mean scores for the constructs in both countries were assessed. The value of KMO-MSA was 0.845 for the Peruvian sample and 0.900 for the Guatemalan sample indicating the data were appropriate for factor analysis. All KMO results were above 0.50, which is the minimum cut off for factor analysis. Additionally all levels of significance for Bartlett's test for sphericity are less than 0.000. KMO results along with the Bartlett results indicate the data is suitable for factor analysis. Finally, the average values for five of six variables of the Peru data were numerically lower (stronger agreement) than for Guatemala, however, none of the averages of the six variables differed by an amount that was significant (alpha = 0.05).

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 used in previous studies, including the $\chi 2$ 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 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 hypothesized relationship between the 9 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

TABLE 5
AVERAGE VALUES OF INDEPENDENT AND DEPENDENT VARIABLES:
GUATEMALA FIRMS* AND PERU FIRMS**

	Latin American Countries Studies	
Constructs	Guatemala	Peruvian
Independent variables		
PROCSTR	2.227	1.899—lower***
MKTGSTR	2.067	2.046—lower
INFOSTR	2.078	2.220—higher
Dependent Variables		
LCE	2.035	1.969—lower
CSE	2.125	1.783—lower
COMP	2.129	2.069—lower
KMO Measure of Sampling Adequacy	0.900	0.845
Bartlett's test of sphericity	0.000	0.000

*N = 179; **N = 138

**Adapted from Adapted from: McGinnis, Michael A., John E. Spillan, and Nicholas Virzi (2012), "An Empirical Study Comparing Guatemalan and United States Logistics Strategies," *International Journal of Logistics Management*, Vol. 23, No. 1, pp. 77-95.

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

****A "lower" value indicates more strongly agree than the Guatemalan data. None of the differences were significant at alpha =0.05.

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 (Figure 1) revealed very strong results for all datasets used as indicated by several different measures ($\chi2$ GUATEMALA =48.65, and $\chi2$ PERU= 43.81). 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 to for all three countries (GFI GUATEMALA=0.944; CFI GUATEMALA=0.942; GFI PERU=0.937; CFI PERU=0.953).

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

FIGURE 1
FIRST ORDER CONFIRMATORY FACTOR ANALYSIS
(GUATEMALA AND PERU)
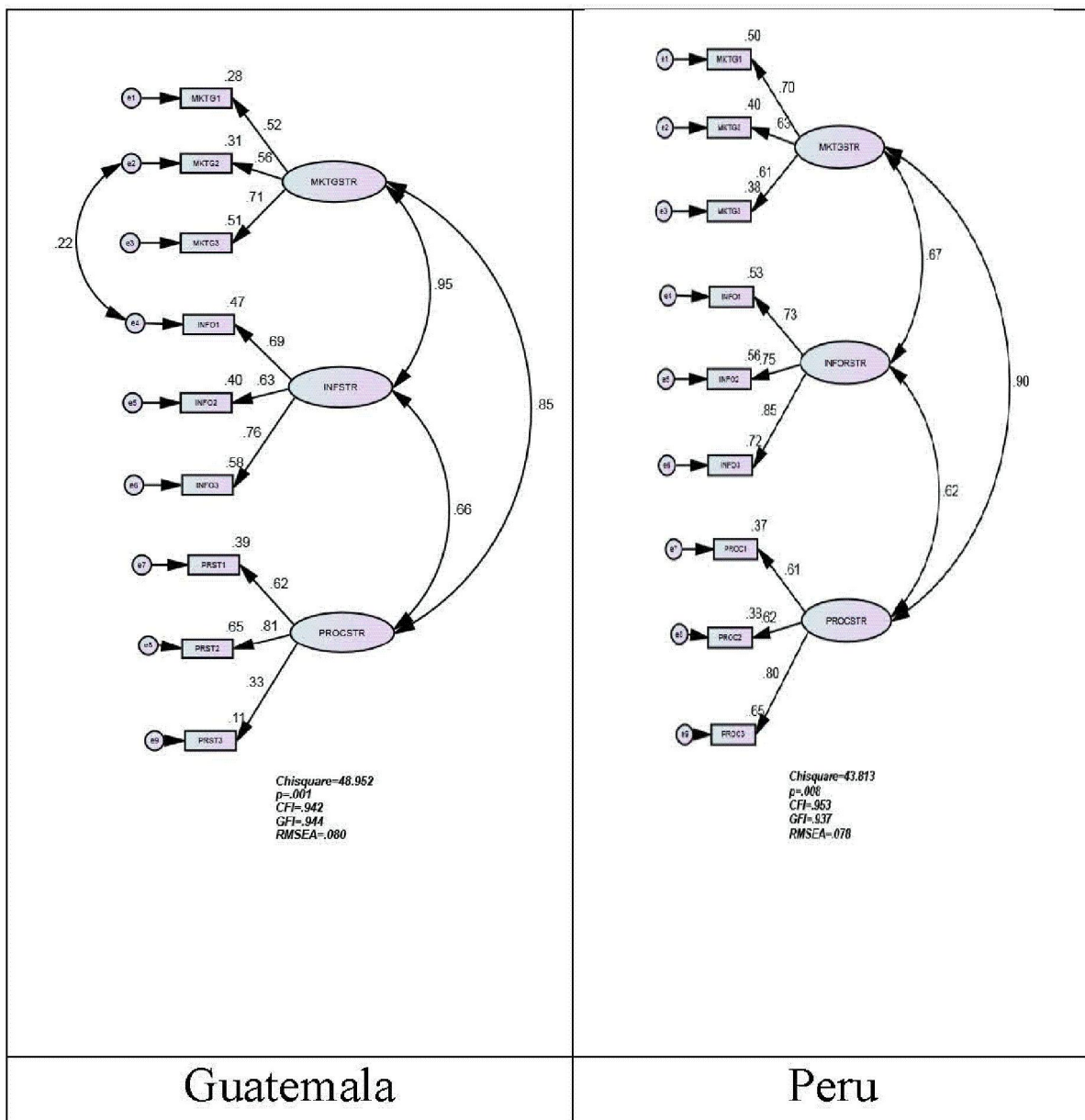
Guatemala | Peru

very close to 0.08 (RMSEA GUATEMALA=0.08 and RMSEA PERU=0.078). Although $\chi2$ 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 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.

Structural Equation 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 and 3. Inspection of these exhibits revealed that all linkages were significant and the directions of relationships were as hypothesized for the Guatemala and Peru datasets. The model fits for both datasets were good and above the acceptable levels mentioned in the literature (See Figure 2 and 3).

Overall, both Guatemala and Peru datasets supported the hypothesized relationship directions and strength of the hypothesized relationships. Figures 2 and 3 also display standardized coefficients for the linkages, and r^2 values for the variables. Finally, the values for Chi-square (193.616 AND 166.511), p-value (0.000), GFI (0.866 and 0.875), CFI (0.910 and 0.904), and RMSEA (0.08 and 0.072) indicate a good model fit for both datasets. As we discussed earlier, the Overall Logistics Strategy (OLS) construct is a second-order construct and its three dimensions (MKTGSTR, INFOSTR, and PROCSTR) are first-order factors measured by their respective indicators. Overall, both Guatemala and Peru data supported the hypothesized relationship directions and strength of the hypothesized relationships. The other three data sets (1990, 1994, and 2008) supported the directions of the hypothesized relationship directions and provided faint to modest support of the strength of the model's relationships.

DISCUSSION AND CONCLUSIONS

While Peru and Guatemala share similar histories regarding colonialism, and then independence from Spain; and generally share similar cultures, there are substantial differences regarding the two countries' geographic size, size of economy, make-up of their populations, climate, and infrastructure. These differences suggest that business practices, including logistics/supply chain management strategies, could differ substantially between the two countries. However, the results presented in this research suggest that the logistics/supply chain management strategies of the two countries share more similarities than differences.

Overall, logistics/supply chain management strategies are not greatly affected by substantial geographic, size of economy, population, and climate differences between Peru and Guatemala. These findings are not inconsistent with the findings of other cross-cultural research cited earlier. If confirmed by subsequent research, the findings reported here suggest that logistics/supply chain management strategies may be similar in other Spanish speaking Latin American countries.

The research reported in this manuscript offers opportunities for additional research in Latin America and within other regions of the world. For example, little is known about logistics/supply chain management strategy among countries in South East Asia, the European Union, Japan, and India. Perhaps further research would either further confirm the value of the Bowersox/Daugherty typology or facilitate the development of alternate frameworks that would be applicable across cultures and economies.

The author' summary of both countries fit the OLS→LCE→CSC→COMP model that has been previously tested longitudinally in the United States and cross culturally in Guatemala, Turkey, Ghana, and China. Two conclusions that can be drawn from this research are (a) logistics/supply

FIGURE 2
SEM FOR OVERALL LOGISTICS STRATEGY AND COMPETITIVENESS FOR GUATEMALA DATA
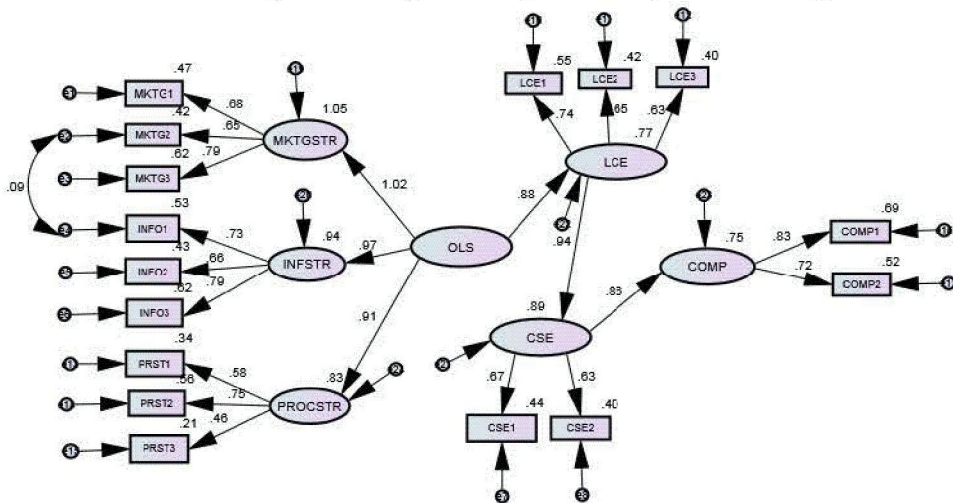
Chisquare=193.616, p-value=.000, GFI=.866, CFI=.910, RMSEA=.080

FIGURE 3
SEM FOR OVERALL LOGISTICS STRATEGY AND COMPETITIVENESS FOR PERU DATA
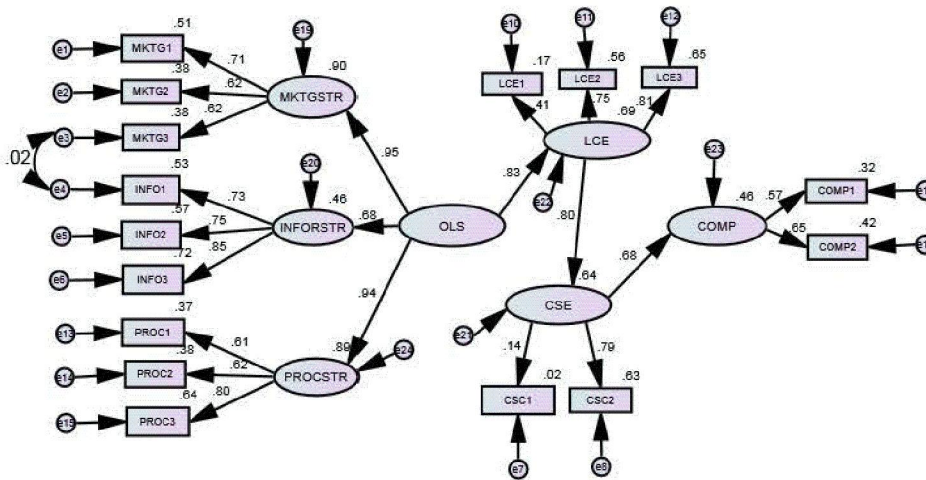
Chisquare=166.511, p-value=.000, GFI=.875, CFI=.904, RMSEA=.072

chain management strategy in Peru is comparable to that found in previous research and (b) both Peruvian and Guatemalan logistics/supply chain management strategies both fit the OLS→LCE→CSC→COMP model well. Additional comparisons reported in the Appendix A show similar, but not identical, patterns of logistics/supply chain management strategies in Peru and Guatemala. In both countries 40-45% of the logistics/supply chain management strategies were Intense, 42-47% of the strategies were Moderate, and 11-13% of the strategies were Passive. The results of this second research approach reinforce the previously stated findings that Peruvian and Guatemalan logistics/supply chain strategies, while not identical, are similar.

When the authors compared the results of Peruvian respondents to the Guatemalan respondents the differences were exhibited in two different ways. First, the means of independent and dependent variables were somewhat lower (Scale: 1 = Strongly Agree to 5 = Strongly Disagree), indicating that the Peruvian respondents placed greater importance on all independent and dependent variables, on average, than did the Guatemalan respondents. The differences in this could be because of the type of managers completing the survey or the perception of logistics that exist among the respondents that were interviewed. The authors decided that these differences did not substantially affect the results shown in Tables 3 and 4. Second, Process Strategy - PROCSTR (focus on controlling costs) was generally considered to be less important (higher average) than Market Strategy – MKTGSTR (management of logistics activities to reduce complexity faced by customers) and Information Strategy – INFOSTR (focus on managing activities to achieve greater inter-organizational coordination and collaboration throughout the channel). This contrasts with the findings of Peruvian logistics managers where PROCSTR was generally more important than MKTGSTR, and MKTGSTR was less important than INFOSTR. A possible explanation for the

difference in the relative order may be due to the perception of supply chain management operations and support services among Peruvian managers when compared with Guatemalan managers. Greater emphasis might be placed on hard measures of performance (PROCSTR). However, the supplemental analysis shown in Appendix A reinforces the authors' conclusion that logistics/supply chain strategies in the two countries are similar.

Overall, the study of logistics strategy in Peru suggests that the approach is fundamentally similar to Guatemala's. In other words, the direction of the relationships among the conceptualized constructs tested in the SEM model were significant and explained a sizable variation in COMP in both countries, which provided additional support for the robustness of the structural model in different cultural environments. However, some differences are apparent. First, the importance of the three independent variables and three dependent variables appear to be stronger to the Peru respondents than Guatemalan respondents. Second, on closer inspection Peruvian logistics data places relatively greater emphasis on information (INFOSTR), coordination (LCE), customer service (CSC), and relatively less emphasis on cost efficiency (PROCSTR) and (MKTGSTR), than Guatemalan managers. Possible reasons include (a) information technology and communication along with fewer competitors may reduce the need to emphasize cost control, and (b) more sophisticated information systems can facilitate better communication, coordination, and customer responsiveness in more sophisticated communication economies. The authors believe that (a) may be the determining reason, since the Peruvian economy ranks 61 on the Global Competitiveness Index, while Guatemala ranks 86 on the same study (World Economic Forum, 2013).

RESEARCH IMPLICATIONS

The results of the analyses and country comparisons in this manuscript provide insight into logistics

strategy in two similar cultures but different economies. A comparison of the results from the Peru and Guatemala data suggest that logistics/supply chain management strategies do not differ substantially. This enabled the authors to make some generalizations regarding Peruvian and Guatemalan logistics/supply chain management strategies.

First, because the two economies are substantially different, the Bowersox/Daugherty typology appears to be an appropriate framework for comparative logistics research. Second, the relationships among the independent variables (PROCSTR, MKTGSTR, and INFOSTR) and the dependent variables (LCE, CSC, and COMP) were similar.

Differences between the findings in Peru and Guatemala studies may be due to size of the economy, size of population and manager's perceptions of logistics and supply chain differences. This suggests that future comparative logistics research should include an understanding of other contributing factors such as size of economy and management perception differences.

For logistics/supply chain management faculty, this research suggests that logistics frameworks, such as the Bowersox/Daugherty typology should not be considered as absolute. Rather, logistics frameworks should be considered as concepts that are likely to vary somewhat with the size of the economy, the nature of the economy (agricultural, industrial, post-industrial), and the culture of the population.

For logistics practitioners, these findings suggest that logistics strategies should consider whether an ethnocentric (do things the way we do it in our country), polycentric (tailor the logistics systems to be unique for each country where business is transacted), or geocentric (a logistics system that blends the needs of each country where business is conducted) approach is appropriate. Each of these approaches may be appropriate in different

situations. The crucial aspect is to consider these three options, and their respective advantages and disadvantages.

For researchers, the Bowersox/Daugherty typology appears to be one framework that can be useful when conducting comparative logistics research. The authors believe that this typology could be a useful tool for understanding logistics strategies in different countries. Further research should continue to assess the value of the Bowersox/Daugherty typology for comparative logistics research and examine differences, and the cause of differences, of logistics strategies between countries or economies.

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APPENDIX A

The purpose of the Appendix is to compare the cluster analysis of Peruvian logistics strategies with a previous assessment of Guatemalan logistics strategies.

Three independent variables were cluster analyzed to ascertain whether Peruvian logistics strategies were homogenous, and if not in what way were they heterogeneous. SPSS 16.0's Two Step Cluster was used in this step. As shown in Table A-1, three logistics clusters, named Intense Logistics Strategy (N=57), Moderate Logistics Strategy (N=65), and Passive Logistics Strategy (N=16) were identified. As shown in Table A-1, the means of Process, Market, and Information strategies (PROCSTR, MKTGSTR, and INFOSTR respectively) were significantly different, alpha<0.05, among the three logistics strategy clusters. Post hoc tests did not identify any pairing of independent variables. Post hoc analysis did not identify pairing of dependent variables. Within Clusters 1, 2, and 3 there were no pairs of PROCSTR, MKTGSTR, or INFOSTR that were significant at alpha<0.05 using the paired t-test of variables. Overall, the means of PROCSTR, MKTGSTR,

and INFOSTR were significantly different at alpha<0.05.

As a comparison, a similar analysis of Guatemalan data was adapted from McGinnis, Spillan, and Virz (2012) and is presented as Table A-2. Using the same criteria for Intense, Moderate, and Passive Logistics Strategies, it was observed that the percentages of Peru/ Guatemala respondents categorized as Intense Logistics Strategy (41.3/44.1%), Moderate Logistics Strategy (47.1/42.5%), and Passive Logistics Strategy (11.6/13.4%) were similar. The differences in percentages, ranging from 1.8% to 4.6%, did not suggest an underlying difference between logistics/supply chain management strategies between the two countries

TABLE A-1
RESULTS OF CLUSTER ANALYSIS OF INDEPENDENT VARIALBES
PERU RESULTS

Cluster*	PROCSTR Mean/Standard Deviation**	MKTGSTR Mean/Standard Deviation	INFOSTR Mean/Standard Deviation	Paired t-test of Variable Means
1. Intense Logistics Strategy N = 57 41.3%	1.3801/0.33593 High	1.6433/0.46658 High	1.7544/0.48192 High	No variable pairs significant <0.05, 2-tailed test.
2. Moderate Logistics Strategy N = 65 47.1%	2.1333/0.41999 Medium	2.1333/0.28137 Medium	2.3436/0.36309 Medium	No variable pairs significant <0.05, 2-tailed test.
3. Passive Logistics Strategy N = 16 11.6%	2.7917/0.65405 Low	3.1250/0.69788 Low	3.3750/0.88506 Low	No variable pairs significant <0.05, 2-tailed test.
Combined N=138	1.8986/0.63758	2.0459/0.62158	2.2198/0.70394	No variable pairs significant <0.05, 2-tailed test.
Significance***	0.000	0.000	0.000	

*Cluster Classification:
  Intense Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or
                    INFOSTR <2.000.
  Moderate Logistics Strategy: Values of PROCSTR, MKTGSTR, and
                    INFOSTR = 2.000 to 2.999.
  Passive Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or
                    INFOSTR = 3.000 or greater.
**Scales: 1 = Strongly Agree through 5 = Strongly Disagree.
***Variable means tested using Duncan post hoc test.

Next, the means of dependent variables Logistics Coordination Effectiveness (LCE), Customer Service Commitment (CSC), and Company/Division Competitiveness (COMP) were tested for significant differences among the three logistics strategy clusters. As shown in Table A-3, LCE, CSC, and COMP were each significantly different, alpha<0.05, among the clusters.

Post hoc analysis did not identify pairing of dependent variables. Within Clusters 1, 2, and 3

TABLE A-2
RESULTS OF CLUSTER ANALYSIS OF INDEPENDENT VARIABLES
GUATEMALA RESULTS[1]

Cluster*	PROCSTR Mean/Standard Deviation**	MKTGSTR Mean/Standard Deviation	INFOSTR Mean/Standard Deviation	Paired t-test of Variable Means
1. Intense Logistics Strategy N = 79 44.1%	1.7426/0.41671 Highest	1.4895/0.35740 Highest	1.5063/0.40240 Highest	PROCSTR significant <0.05, 2-tailed test from MKTGSTR and INFOSTR.
2. Moderate Logistics Strategy N = 76 42.5%	2.4430/0.61917 Medium	2.219/0.42760 Medium	2.2061/0.56560 Medium	PROCSTR significant <0.05, 2-tailed test from INFOSTR.
3. Passive Logistics Strategy N = 24 13.4%	3.1389/0.51935 Lowest	3.3194/0.54266 Lowest	3.5556/0.63449 Lowest	PROCSTR significant <0.05, 2-tailed test from INFOSTR.
Combined N=179	2.2272/0.71319	2.0670/0.74063	2.0782/0.82917	PROCSTR significant <0.05, 2-tailed test from MKTGSTR and INFOSTR.
Significance***	0.000	0.000	0.000	

NOTE: Percentages do not add to 100 due to rounding
*Cluster Classification:
Intense Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR <2.000.
Moderate Logistics Strategy: Values of PROCSTR, MKTGSTR, and INFOSTR = 2.000 to 2.999.
Passive Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR = 3.000 or greater.
**Scales: 1 = Strongly Agree through 5 = Strongly Disagree.
***Variable means tested using Duncan post hoc test.
[1]Exhibit A-2 was adapted from McGinnis, Spillan, and Virzi. (2012)

there were no pairs of LCE, CSC, or COMP that were significant at alpha<0.05 using the paired t-test of variables. Overall the means of LCE, CSC, and COMP were significantly different at alpha<0.05. The following paragraphs discuss the findings based on the analysis. An inspection of LCE, CSC, and COMP in the three clusters for both countries found that the values for Intensive Logistics Strategy differed very little. However, in all three strategies the data indicated that CSC was substantially more important (lower average values) in Peru with differences of LCE and COMP being slight. These results was consistent with the results of previous Guatemalan data shown in Table A-4

TABLE A-3
RESULTS OF CLUSTER ANALYSES:
WITH DEPENDENT VARIABLES
PERU RESULTS

Cluster*	LCE Mean/Standard Deviation**	CSC Mean/Standard Deviation	COMP Mean/Standard Deviation	Paired t-test of Variable Means
1. Intense Logistics Strategy N = 57 41.3%	1.6842/0.45172	1.5439/0.40645	1.7807/0.48658	No variable pairs significant <0.05, 2-tailed test.
2. Moderate Logistics Strategy N = 65 47.1%	2.0103/0.44084	1.8718/0.41538	2.1577/0.55299	No variable pairs significant <0.05, 2-tailed test.
3. Passive Logistics Strategy N = 16 11.6%	2.8125/0.94256	2.2708/0.64657	2.7344/0.7771	No variable pairs significant <0.05, 2-tailed test.
Combined N=138	1.9686/0.62379	1.7826/0.49923	2.0688/0.62911	No variable pairs significant <0.05, 2-tailed test.
Significance***	0.000	0.000	0.000	

*Cluster Classification:
    Intense Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR <2.000.
    Moderate Logistics Strategy: Values of PROCSTR, MKTGSTR, and INFOSTR = 2.000 to 2.999.
    Passive Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR = 3.000 or greater.

**Scales: 1 = Strongly Agree through 5 = Strongly Disagree.

***Variable means tested using Duncan post hoc test.

Overall, Peruvian logistics can be summarized as grouping into three distinct overall strategies. This result is not inconsistent with earlier in the United States (McGinnis, Kohn, and Spillan, 2010), Guatemala (McGinnis, Spillan, and Virzi, 2012), and China (Spillan, McGinnis, Kara, and Liu Yi (2013). Based on the analysis presented in this appendix the authors concluded that logistics/supply chain management strategies in Peru are not fundamentally different than those observed in Guatemala and in other countries studied in previous similar research.

TABLE A-4
RESULTS OF CLUSTER ANALYSES:
WITH DEPENDENT VARIABLES
GUATEMALA RESULTS[1]

Cluster*	LCE Mean/Standard Deviation**	CSC Mean/Standard Deviation	COMP Mean/Standard Deviation	Paired t-test of Variable Means
1. Intense Logistics Strategy N = 79 44.1%	1.6582/0.62012	1.7468/0.57044	1.7563/0.43111	No variable pairs significant <0.05, 2-tailed test.
Moderate Logistics Strategy N = 76 45.2%	2.1096/0.61677	2.2193/0.69826	2.2993/0.75169	No variable pairs significant <0.05, 2-tailed test.
2. Passive Logistics Strategy N = 24 13.4%	3.0417/0.92372	3.0694/0.83971	2.8125/0.68465	No variable pairs significant <0.05, 2-tailed test.
Combined N = 179	2.0354/0.80066	2.1248/0.79162	2.1285/0.71910	No variable pairs significant <0.05, 2-tailed test.
Significance***	0.000	0.000	0.000	

*Cluster Classification:
  Intense Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR <2.000.
  Moderate Logistics Strategy: Values of PROCSTR, MKTGSTR, or INFOSTR = 2.000 to 2.999.
  Passive Logistics Strategy: One or more values of PROCSTR, MKTGSTR, or INFOSTR = 3.000 or greater.
**Scales: 1 = Strongly Agree through 5 = Strongly Disagree.
***Variable means tested using Duncan post hoc test.

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[1]Table A-4 was adapted from McGinnis, Spillan, and Virzi. (2012)