LOGISTICS SALIENCE IN A CHANGING ENVIRONMENT

by

Zach G. Zacharia
Texas Christian University

and

John T. Mentzer
The University of Tennessee

Researchers in several disciplines, such as management strategy, organizational theory, and marketing, have noted the relationship between the relative influence and importance of different functions within the firm and how managers make decisions within the organizations (Enz 1988; Homburg, Workman, and Krohmer 1999; Salancik and Pfeffer 1974). One factor that affects the relative power/influence of a function is the nature of the tasks performed and the relative importance of these activities to the firm (Enz 1988). For example, finance tends to have greater influence compared to other functions in an investment banking firm, accounting has more influence in an accounting firm, and R&D has more influence in a pharmaceutical firm (Workman 1993). This paper addresses the question: What factors lead logistics to have greater influence/importance within the firm?

Logistics, over a number of years, has been an important component of business strategy and can provide a basis for a competitive profit edge (Heskett 1977). Increased focus on logistics has the potential to improve a firm's competitive position, especially for global manufacturing firms (Fawcett and Closs 1993). Logistics becomes important by providing competitive advantage through competence in delivery speed, reliability, responsiveness, and low cost distribution (Morash, Dröge, and Vickery 1996a). Integrating logistics into corporate strategy has a greater effect on customer value than any other process (Andraski and Novack 1996). Integrating logistics into overall organizational strategy is critical to reducing costs, entering new markets, creating customer service, and gaining competitive advantage (Williams et al. 1997). Logistics plays an important role in both organizational strategy and organizational environment (Kohn and McGinnis 1997). Wal-Mart and Levi Strauss focus on their distinctive logistics capabilities to maintain their competitive advantage (Lynch, Keller, and Ozment 2000). In other words, logistics plays a strategic role in many companies (Mentzer, Flint, and Hult 2001; Mentzer and Williams 2001).

Several researchers have examined the changing role/importance of logistics within the firm (Fawcett and Closs 1993; Mentzer, Flint, and Hult 2001; Mentzer and Williams 2001; Novack,

Rinehart, and Langley 1994, 1996). Novack, Rinehart, and Langley (1994) pointed out the need for logistics to gain importance within the firm by quantifying the value logistics provides to top management. Some researchers have found senior logistics executives believe logistics is important and adds value to the firm (Novack, Rinehart, and Langley 1994, 1996). Understanding the perception of logistics value within the firm is critical to the future of the logistics discipline. Future research should focus on perceptions of the importance of logistics (Novack, Rinehart, and Langley 1996).

Much of the literature has examined the value of logistics, but there is very little research that focuses on the possible reasons why logistics is considered important. Thus, this research is concerned with the reasons why logistics becomes more important in the firm. This paper adds to the body of research on the perception of logistics value within the firm by seeking to understand the influence and changing importance of logistics relative to other functions within the firm. This is defined as logistics salience (LS). Thus, the primary objective of this research was to develop and test a model of how logistics has become more salient in the firm.

Even though there seems to be anecdotal support for the concept of LS, there is little empirical research and theoretical development that delineates the factors that affect logistics salience. Understanding the factors that affect LS would help determine the potential benefits and value of investment in logistics technologies or the utilization of logistics for competitive advantage. This led to the following two research questions: (1) What factors in the external business environment affect the salience of logistics within the firm? and (2) What factors internal to the firm affect the salience of logistics?

LITERATURE REVIEW

The relevant literature related to contingency theory and resource dependence theory is reviewed to establish the antecedent justification for the LS model. This is followed by a review of the literature used to develop each of the constructs and hypotheses in the LS model.

Contingency Theory

The premise of contingency theory is that a wide variety of factors exists, all in combination with each other, that influence behavior in organizations (Pennings 1992). Contingency theory implies firms adapt to changes in their environment and managers subsequently select strategies that make their firms succeed (Fawcett and Closs 1993). Contingency theory suggests the performance implications of some strategy-related constructs are moderated by external factors (Homburg, Workman, and Krohmer 1999).

Lawrence and Lorsch (1967) suggested segmenting the organization into departments influences the cognitive orientation and behavior of organizational members in important ways. Organizations have the capability to modify themselves in basic structural ways and are interdependent within the environment (Lawrence and Lorsch 1967). The influence among the groups varies depending on which functions have knowledge or certainty of information about particular environmental conditions (Lawrence and Lorsch 1967). This leads to the concept of functional salience,

which varies as the environment changes because different functions (including logistics) within the organization change to best meet the needs of its members and the demands of the environment. Therefore, contingency theory suggests logistics becomes more salient within the firm as the environment changes in such a way that logistics capabilities become emphasized.

Resource Dependence Theory

Pfeffer and Salancik (1978) use resource dependence theory to suggest the relative influence of one subunit is a function of the resources the subunit contributes. Anderson (1982) also used resource dependence theory to suggest the changing influence of functions within the firm is based on adjusting to changes outside the firm. Much of this literature focuses on the power of one function over another. Firms or subunits that provide valued resources, with no close substitutes, on which others are dependent have more power and influence than other subunits (Homburg, Workman, and Krohmer 1999). In the same way, functions that are influential/important within the firm are those that provide valued information or which other functions in the firm depend upon.

If the influence/importance of a function is contingent on environmental demands, then logistics will be most salient in situations in which its contributions are critical to the firm's success. Novack, Rinehart, and Langley (1994) noted that as logistics becomes more important within the firm, it encompasses more functional areas for better coordination and integration. Logistics has been shown to play an important role in many contexts, such as customer service (Langley and Holcomb 1992), product availability, time advantages, low cost distribution (Stalk, Evans, and Shulman 1992), and global manufacturing (Fawcett and Closs 1993).

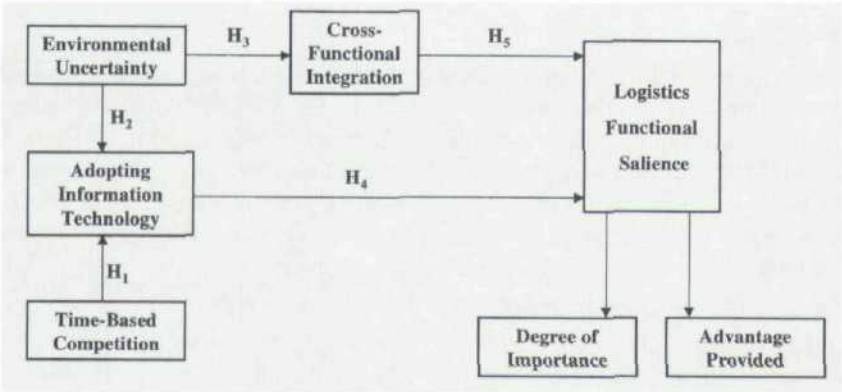
Factors in the external environment that could lead to the firm emphasizing logistics capabilities are environmental uncertainty, time-based competition, and the adoption of information technology. Factors internal to the firm that could affect logistics salience include cross-functional integration and the advantage provided by logistics. While the relationships between these external and internal factors may seem intuitive, there has been very little empirical research to test these relationships.

This led to the development of a conceptual framework of logistics salience contingent on both the external and internal environment (Figure 1). In the model, there are four first-order constructs or observed variables: time-based competition, environmental uncertainty, adopting information technology, and cross-functional integration. There is one second-order construct or latent variable – logistics salience – which is not measured directly but instead is measured through indicator constructs. In this model, the indicator constructs are degree of importance and advantage provided.

The next section reviews the literature associated with the constructs external to the firm (time-based competition, environmental uncertainty, adopting information technology), the constructs internal to the firm (cross-functional integration and logistics salience), and their associated hypotheses found in Figure 1.

FIGURE 1

LOGISTICS SALIENCE MODEL



HYPOTHESIS DEVELOPMENT

Time-Based Competition

Time-based competition (TBC) is a source of competitive advantage (Stalk 1988). Time responsiveness is an important factor for logistics managers to emphasize (Kohn and McGinnis 1997). Product life cycles are shortening and product proliferation is expanding (Fliedner and Vokurka 1997). In this rapidly changing environment, firms are forced to compete based on consistent product availability and faster product delivery to meet customer demand. Logistics as a function plays an important role in time-based competition in cases where consistent product availability and fast product delivery are more critical.

Mentzer (1999) identified four specific strategies that are used in time-based competition: just-in-time (JIT), quick response (QR), vendor managed inventory (VMI) and continuous replenishment programs (CRP). Efficient consumer response (ECR) is another time-based competition strategy found primarily in the grocery industry that focuses on inventory replenishment, store assortment, promotion and product introduction (Brown and Bukovinsky 2001). Continuous information exchange reduces uncertainty in the total supply chain and creates the opportunity for reduced inventory and improved availability. Collaborative, Planning, Forecasting, and Replenishment (CPFR) transfers end-customer information as far up the supply chain as possible to plan upstream supply chain activities such as distribution and production scheduling (Bowersox, Closs, and Stank 1999). Even though these strategies vary in assumptions and focus (See Table 1), they share the common trait of helping companies improve their competitive capabilities in industries in which there is an emphasis on time-based competition (TBC).

TABLE 1

TIME-BASED COMPETITION STRATEGIES

Time-Based Competition Strategies	Underlying Assumption	Focus
Just-in-time (JIT)	Independent Demand	Unfinished products using production schedule
Quick Response (QR)	Dependent Demand	Finished products using point of sale data
Vendor Managed Inventory (VMI)	Dependent Demand	Finished products using point of sale data
Automatic/Continuous Replenishment (AR)	Dependent Demand	Finished products using point of sale data
Efficient Consumer Response (ECR)	Dependent Demand	Finished products using point of sale data
Collaborative, Planning, Forecasting, and Replenishment (CPFR)	Dependent Demand	Finished products using collaborative forecast

Thus, there is greater likelihood that logistics is more salient in the firm when the industry emphasizes TBC. These strategies also share a common reliance on high quality information, which is facilitated by the adoption of information technology.

H1: Greater time-based competition leads to greater adoption of information technology.

Environmental Uncertainty

Environmental uncertainty (EU), defined as the extent to which outcomes are unpredictable (Chow, Henriksson, and Heaver 1995), has been a mainstay of contingency theory, which has long posited that environmental factors affect the firm both internally and externally. The business environment has become more dynamic and uncertainty has increased (Wind and Mahajan 1997). Environmental uncertainty and its effect on the firm are addressed by both contingency theory and resource dependency theory (Kim and Oh 2002). Environmental uncertainty is an important construct in organizational science (Lawrence and Lorsch 1967) and the logistics literature (Fawcett and Closs 1993). Lawrence and Lorsch found that environmental uncertainty affects the decision-making structures between functions in the firm. Thompson's (1967) theory of organizational structure noted that boundary spanning units help buffer the "technological core" from the sources of uncertainty. McCabe (1987) noted organizational structure changes with varying levels of environmental uncertainty.

Environmental uncertainty is important in a logistics context, especially to predict the behavior and expectations of logistics suppliers (Chow, Henriksson, and Heaver 1995). The greater the environmental uncertainty, the greater the amount of information that needs to be processed by decision

makers, and the organization changes in an effort to best process information (Galbraith 1973). As the environment increases in uncertainty, there is a need for more information and increased opportunity for different functions within the organization to work together. The LS model relates environmental uncertainty in the industry to an increase in the adoption of information technology and an increase in cross-functional integration.

H2: Increased environmental uncertainty results in increased adoption of information technology.

H3: Increased environmental uncertainty results in increased cross-functional integration.

Adopting Information Technology

Adopting information technology (AIT) is defined as the utilization of information technology in the industry. The business market determines the extent of capabilities that an organization develops (Day 1994) and the information processing needs determine the extent of information processing capability utilized (Day and Glazer 1994). The information technology capabilities of a firm enable it to manage a changing environment and reflect a firm's ability to exploit accumulated information (Grewal, Comer, and Mehta 2001). Investments in information technology to improve vertical coordination are most beneficial when high environmental uncertainty is present (Buvik and John 2000). Information technology has great potential to improve logistics capabilities (Drucker 1988; Porter 1990). Information technology offers structural alternatives that facilitate centralized strategic planning and day-to-day execution on a decentralized basis (Bowersox and Daugherty 1995).

The evolution of information technology and diminishing transaction costs led to a fundamental restructuring of industry practices for distributing and supporting products (Lewis and Talalayevsky 1997). Substituting information for inventory influences strategic decisions and enables significant cost reductions (Rogers, Dawe, and Guerra 1991). Information systems provide better visibility of physical goods as they move within the firm (Lewis and Talalayevsky 1997). The difference between mediocre and excellent logistics is often the firm's information technology capabilities (Rogers, Dawe, and Guerra 1991). Internet technology and information systems such as electronic data interchange enable value-adding partnerships in which the coordination of boundary-crossing logistical processes is the key to good logistical performance (Sheombar 1992). Improvements in information technology and transportation, coupled with decreasing tariffs, have led to the concept of worldwide markets for products and services (Fawcett and Closs 1993). Information technology is significantly related to the strategic integration of logistics into corporate strategy (Williams et al. 1997).

Advances in information technology and the tremendous increase in computing power at very low costs that provides increased information for the different functions within the firm are especially beneficial to logistics. Clearly, information systems are a vital and integral part of logistics and the adoption of better information systems leads to greater logistics efficiencies and salience.

Contingency theory suggests that as the environment/industry emphasizes adopting information technology, the organization places value on functions that can best utilize the new information. In

addition, resource dependence theory suggests that as information technology becomes more prevalent, a function such as logistics that can best provide the resources to compete and succeed in the new environment becomes more influential/important in the firm. Therefore, the LS model suggests that with greater utilization of information technologies within the industry, there is greater logistics salience.

H4: Greater adoption of information technology leads to greater logistics salience.

Cross-Functional Integration

In uncertain environments, functions adopt a more differentiated approach and use more sophisticated integration devices such as task forces and liaisons (Lawrence and Lorsch 1967). Higher environmental uncertainty with riskier technologies leads to a need for greater integration between marketing and R&D (Gupta, Raj, and Wilemon 1986). Ruekert and Walker (1987) used resource dependence theory to show that functions within the firm become more dependent on each other for expertise, information, and other resources as the environment becomes more uncertain. Environmental uncertainty leads to increasing integration among purchasing, engineering, production, materials management, marketing, and distribution (Germain, Dröge, and Daugherty 1994). Olson, Walker, and Ruekert (1995) suggested the level of cross-functional coordination is dependent on the level of environmental uncertainty. Practitioners and researchers have noted the benefits that result if firms improve cross-functional integration (CFI) among key functions (Clark and Fujimoto 1991; Hutt, Walker, and Frankwick 1995; Kahn and Mentzer 1996; Szakonyi 1994). Companies need to stress collaboration between departments to achieve goals collectively and work together as a team (Kahn and McDonough 1997).

Companies that already use a CFI approach, especially in new product development, are more likely to place value on different functions within the firm. This also suggests that as functions increase in importance within the firm, there is a greater likelihood they will be involved in CFI. Changing economic conditions have led logistics to a more horizontal cross-functional structure that emphasizes process management (Closs and Stank 1999). When marketing and logistics work together through collaborative integration, there are benefits for both the customer (unified service systems) and the firm (improved customer satisfaction and profitability) (Ellinger, Daugherty, and Keller 2000). Kohn and McGinnis (1997) note the need for logistics to have an integrated orientation to manage logistics flows and coordination within the firm.

Contingency theory and resource dependence theory suggest that as the environment/industry becomes more uncertain, there is a greater emphasis on different functions working together and that placing greater value on those functions provides better capabilities to handle the uncertainty. Logistics as a function increases in influence/importance in companies that stress collaboration and integration among the functions. Thus, logistics should be more salient in companies that emphasize CFI.

H5: Companies with higher levels of cross-functional integration have greater logistics salience.

Logistics Salience

Logistics salience is the influence/importance of logistics relative to other functions within the firm. Several researchers have examined the issue of the greater influence/importance of logistics within the firm. Logistics as a function is increasingly viewed as strategically important within the firm (Bienstock, Mentzer, and Bird 1997; Mentzer, Flint, and Hult 2001). Srivastava, Shervani, and Fahey (1999) identified supply chain management as a core business process and noted the importance of inbound, internal, and outbound logistics.

Logistics excellence has a significant impact on corporate profitability (Mentzer and Williams 2001) and firms can use logistics to create a competitive advantage (Bowersox, Mentzer, and Speh 1995; Morash, Dröge, and Vickery 1996b). Logistics performance is a key marketing component in the context of customer satisfaction (Bienstock, Mentzer, and Bird 1997; Mentzer, Flint, and Hult 2001). Several well-known companies such as Dell Computer Corporation and Wal-Mart rely on logistics excellence as their competitive advantage. Logistics within the firm has an important role in managing international suppliers and international customers (Fawcett and Closs 1993). An empirical study by Ellinger, Daugherty, and Keller (2000) found logistics is of strategic importance to the firm and affects corporate performance (customer satisfaction and overall profitability). Forker, Ruch, and Hershauer (1999) found the changing importance of quality management within the firm was dependent on access to top management, decision-making influence, and visibility within the firm. McGinnis and Vallopra (1999) found the changing importance of suppliers during new product development was dependent on the competitive advantage, cost advantage, service quality advantage, and profitability advantage provided by suppliers.

LS is conceptualized as a second-order construct (or a latent construct) made up of two indicator constructs: Degree of Importance (DI) and Advantage Provided (AP). It was felt a surrogate measure of LS – i.e., testing the degree of importance of logistics and the advantage provided by logistics – would have less opportunity for bias and be a more accurate measure of logistics salience.

To summarize, the specific constructs in the logistics salience model found in Figure 1 have theoretical support, but have not been tested as a model. It was this empirical test that was the focus of this study, and is discussed in the next section.

RESEARCH METHODOLOGY

A survey research design, following the total design method approach (Dillman 1978), was used to collect the data. Multi-item measures were developed or adapted to evaluate the constructs (Churchill 1979; Gerbing and Anderson 1988). The majority of the measures used to test the model were found in the literature review as discussed earlier. In addition, 21 half hour, in-depth interviews were conducted with company logistics executives in the automotive, rail transportation, retail manufacturer, logistics, truck transportation, Internet, telecommunications, returnable packaging, and chemical industries to discuss the concepts associated with the changing role and influence/importance of logistics within the company. The data collected during this phase were used to test the

external validity of the theoretical framework, develop hypotheses and scale items, and pre-test the survey instrument (Sarin and Mahajan 2001).

The 21 interview respondents then reviewed the survey to determine if the questions captured the important concepts associated with LS model, to identify any ambiguity or other difficulties in responding to the items, and to offer suggestions to improve the questionnaire. Six academic experts also evaluated measurement items and drafts of the survey from the standpoint of representativeness, item specificity, clarity of construction, readability, content validity, and face validity. Based upon the feedback, some items were rewritten or eliminated, and others were added. The constructs, and their associated items, used in the final survey are in Table 2.

TABLE 2

RESEARCH CONSTRUCTS

Environmental Uncertainty (1 = Strongly Disagree, 7 = Strongly Agree)

1) In your industry…
   a) Firms rarely change their marketing practices
   b) The rate of product obsolescence is slow
   c) The rate of technology obsolescence is slow
   d) Actions of competitors are easy to predict
   e) Demand is easy to forecast

Adopting Information Technology (1 = Not Used, 7 = Greatly Used)

2) How extensively are the following technologies used in your industry:
   a) Electronic Data Interchange [1]
   b) Internet [2]
   c) E-Commerce [2]
   d) Real-Time Product Tracking
   e) Supply Chain Information Systems
   f) Enterprise Resource Planning (ERP)|
   g) Advance Planning and Scheduling Systems

Time-Based Competition (1 = Not Used, 7 = Greatly Used)

3) How extensively are the following used in your industry:
   a) Just-In-Time
   b) Vendor Managed Inventory
   c) Automatic/Continuous Replenishment
   d) Quick Response
   e) Efficient Consumer Response
   f) CPFR

TABLE 2 (CONT.)

RESEARCH CONSTRUCTS

Cross-Functional Integration (1 = Strongly Disagree, 7 = Strongly Agree)

4) During new product development, departments within the firm...
   a) Are encouraged to work together
   b) Share information and provide input
   c) Share resources
   d) Achieve goals collectively
   e) Informally work together as a team

Degree of Importance (1 = Strongly Disagree, 7 = Strongly Agree)

5) The logistics/distribution department is an important department in your firm.

6) The logistics department has become important in the firm in terms of...
   a) Visibility within the firm
   c) Degree of access to top management
   d) Degree of decision-making influence[2]

Advantage Provided (1 = Strongly Disagree, 7 = Strongly Agree)

7) The logistics department has become important in the firm in terms of...
   a) A cost advantage
   b) A service quality advantage
   c) A competitive advantage
   d) A profitability advantage

Notes:

Items changed for the final model:

1. Did not load on construct as other items and was deleted.
2. Items were combined as they were highly correlated in measurement model, but measured slightly different concepts.
3. Logistics respondents and non-logistics respondents had a significant difference in response to this item, so item was deleted.

All of the variables of interest were estimated through managers' perceptions. The survey, in addition to questions about logistics, also contained control variables such as the size of the firm, annual sales, and the competitive nature of the industry. With one exception discussed later in this section, statistical analysis revealed these control variables did not significantly affect the results.

As discussed previously, the focus of this research was not to test if logistics salience existed, but rather to use the literature to identify reasons that logistics has been perceived as influential/important within the firm. Since the focus of this research was on identifying why logistics is salient, there was a need to survey companies that have logistics departments or executives who are at least familiar with logistics. The target firms were not limited to those in any single industry, but open to

U.S. firms in various industries in hopes of obtaining study results more applicable across industries in the U.S. Therefore, the Council of Logistics Management (CLM) list of U.S. manufacturing companies was used.

Out of the original list, which contained 2,041 manufacturers, a random sample of 268 potential participants was used for the pre-test. Participants were solicited through mail, telephone, and e-mail. Sixty-five respondents indicated they were prohibited, or otherwise not willing, to complete the survey, which left a sample size of 203. Forty-eight usable surveys were returned, for an effective pre-test response rate of 23.6%. There was one major change as a result of the pre-test. Based upon response rates, e-mail was used as the primary method of soliciting participation from potential respondents for the final survey. The data for the final survey were collected in a two-month period from March – April 2001.

For the final survey, eliminating names of those who indicated they were unable to participate (413), had no e-mail addresses (327), had already participated in the pre-test (268), or had incorrect e-mail addresses (229), left a final sample of 804. Out of this group, using a four-wave mailing process, 304 surveys were returned. Eight surveys were deleted for not answering 11 or more questions out of 67 (missed 16% of the survey). This left a final response of 296 usable surveys, for an effective response rate of 36.8%.

The survey contained six questions to determine the demographics of the sample population (Table 3). The majority of the respondents were in management (84%) and logistics (67%). To assure the logistics function did not bias the sample, T-tests were conducted on all of the constructs and the specific items and only one item was found to be different between logistics and non-logistics respondents at ($p < 0.01$). This item, the degree of decision-making influence of logistics, was different depending on whether the respondent was in the logistics department. Therefore, this item was deleted for the remaining analyses. The respondents were from a wide range of industries, with the largest (18%) from the electronics/computer industry. The respondents came from well-established companies (94% over 11 years old) and large companies (65% over 5,000 employees and 43% over $ 5 Billion in sales).

TABLE 3

DEMOGRAPHIC DATA

Title	Managers 84 %	Executive 12 %	Analyst 4%	
Department	Logistics 67%	Other 21%	Manufacturing 7%	Marketing 3.4%
Industries	Other 25%	Electronics 18%	Food/tobacco 18%	Pharmaceuticals 12%
Company Age	≤5 yrs 1.7%	6 - 10 yrs 3.4%	11-15 yrs 5.1%	>15 yrs 89.1%
Company Size (Employees)	<500 4.4%	501 - 5000 30.4%	5001 - 50,000 43.2%	>50,000 22.3%
Company Annual Sales (Billions)	<.099 4.4%	.100 - .999 27.3%	1 - 5 28.0%	>5 43.6%

Non-response error was tested by comparing early and late respondents for all of the constructs included in the study using ANOVA (Armstrong and Overton 1977). There were no statistical differences between the waves at $p < 0.05$. Thus, non-response bias was not considered a problem in the final sample.

A basic analysis of the returned surveys, including examination for incorrect coding, item normality, skewness, kurtosis, means, standard deviations, and outliers (Mentzer, Flint, and Kent 1999), was found to be acceptable. Using Cronbach's coefficient alpha (Cronbach 1951), reliability was assessed for the four first-order constructs and two indicator constructs (Table 4). The lowest Cronbach's coefficient alpha value was .75 (Cronbach 1951) – greater than the 0.7 that is suitable for exploratory research (Nunnally 1978) – so all scales were considered reliable.

TABLE 4

SUMMARY OF RELIABILITY ANALYSIS

Construct	No. Questions	Cronbach Alpha
Environmental Uncertainty	5	.7516
Adopting Information Technology	7	.8232
Time-Based Competition	6	.8238
Cross-Functional Integration	5	.9334
Degree of Importance	4	.9273
Advantage Provided	4	.8935

Principal factor analysis was conducted on the first-order constructs to ensure the scales were unidimensional and loaded on the constructs as theorized (Gerbing and Anderson 1988). There was a change in only one construct as adopting information technology had one item (the question about EDI) deleted. All other constructs were found to be unidimensional.

Structural Equation Modeling (SEM) using AMOS 4.0 was the main statistical analysis tool (Aaker and Bagozzi 1979; Garver and Mentzer 1999). A two-step model building approach was used in which the measurement model was tested before testing the structural model (Wisner 2003). The measurement models for the constructs EU, CFI, DI, AP and LS met the requirements of fitting the data, and these constructs were used without any changes in the final model. Two constructs (AIT and TBC) had items that were correlated, suggesting the respondents felt the items were asking similar questions. For AIT, the items for the Internet and electronic commerce were combined to create a new variable. For TBC, the items for vendor managed inventory and automatic/continuous replenishment were combined (it was felt each of these items was measuring slightly different concepts).

The three SEM indices of model adequacy and their values for the final model were the chi-square, goodness-of-fit test, ($\chi^2 = 753.983$), DF = 323, the Bentler comparison fit index (CFI = .9025), and Root Mean Square Error of Approximation (RMSEA = 0.0673), all suggesting the model fit the sample data well. All regression weights were significant at the 0.001 level. The final model, with the items and standardized values for the regression weights, is presented in Figure 2 – the LS Model with Standardized Values. Table 5 summarizes the hypotheses, regression weights, and P values for first-order constructs, and Table 6 summarizes the regression weights and P values for logistics salience.

FIGURE 2

LOGISTICS SALIENCE MODEL WITH STANDARDIZED VALUES

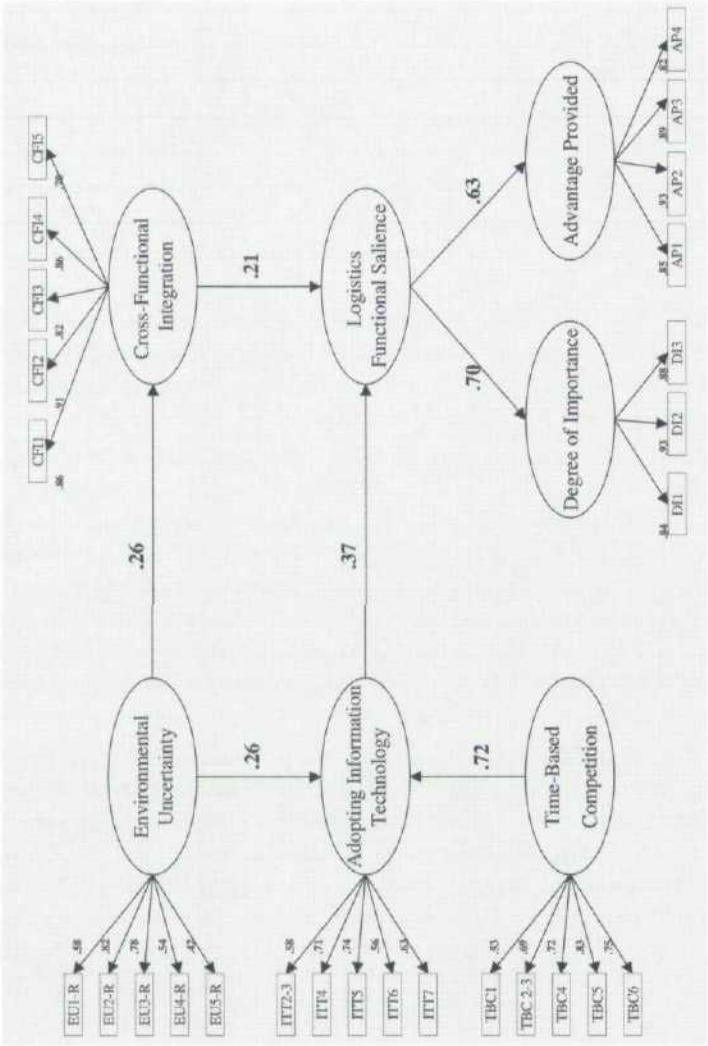


TABLE 5

FIRST-ORDER REGRESSION WEIGHTS

Hyp.	Construct	Construct	Regr.	P-Value
H1	Time-Based Competition	Adopting Info. Technology	0.2789	0.0000
H2	Environmental Uncertainty	Cross-Functional Integration	0.4176	0.0000
H3	Environmental Uncertainty	Adopting Info. Technology	0.4843	0.0000
H4	Adopting Info. Technology	Logistics Functional Salience	0.4219	0.0000
H5	Cross-Functional Integration	Logistics Functional Salience	0.2581	0.0014

TABLE 6

SECOND-ORDER REGRESSION WEIGHTS

Indicator Construct	2nd Order Construct	Regr.	P-Value
Degree of Importance	Logistics Functional Salience	0.7055	0.0000
Advantage Provided	Logistics Functional Salience	0.6405	0.0000

FINDINGS

Hypothesis 1, time-based competition leads to a greater adoption of information technology (.72), was supported as a positive relationship. This fits with much of the literature that suggests a positive relationship between time-based competition and information technology. The magnitude of the regression coefficient is very large, which suggests the relationship between the need to compete based on time and information technology is very strong. Therefore, companies that are in industries where time-based competition is prevalent invest in information technology.

Hypothesis 2, environmental uncertainty leads to a greater adoption of information technology (.26), was supported as a positive relationship. The theoretical implication is significant in that it suggests companies invest in information technologies, such as supply chain information systems, real-time product tracking, and the Internet/e-commerce, as the environment gets more uncertain. This supports the concept that having these information technologies allows logistics to make better and more informed decisions, which can lead to competitive advantage.

Hypothesis 3, environmental uncertainty leads to greater cross-functional integration (.26), was supported as a positive relationship. With 26% of the variance in cross-functional integration explained by environmental uncertainty, the findings of this study support the idea that greater

environmental uncertainty leads to greater CFI. As the environment becomes more uncertain, more functions will be involved in integrated processes within the firm.

Hypothesis 4, adopting information technology leads to greater LS (0.37), was supported as a positive relationship. The salience of logistics within the company changes as the need for quality information related to logistics increases within the industry. This is a very important construct in this paper, and the data support the concept of logistics salience. The two indicator constructs that make up logistics salience, degree of importance (.70) and advantage provided (.63), were also supported by the data. This research adds to the existing body of knowledge by demonstrating that logistics within the study firms changed in influence/importance, or became more salient, as the adoption of information technology increased in the industry.

Hypothesis 5, cross-functional integration leads to greater logistics salience (0.21), was supported as a positive relationship. This suggests that in companies that already use CFI, logistics will have greater salience. This supports the concept that logistics as a function is becoming more important in firms. In the past, CFI research primarily involved R&D, marketing, and manufacturing. An important consequence of changing logistics salience is to include logistics as a function that can improve the CFI process.

MANAGERIAL IMPLICATIONS

This research suggests logistics has become more salient within the firm, especially in the context of external factors such as time-based competition, environmental uncertainty, adopting information technology, and internal factors such as cross-functional integration. Managers should consider the performance implications and potential benefits of involving logistics in firm-wide activities where logistics currently does not play a prominent role, such as new product development, forecasting, or product promotion. This is especially true in uncertain environments characterized by competition based on time and where information technology rapidly changes.

The second managerial implication is the benefit of investing in information technologies, such as electronic data interchange, Internet/e-commerce, advance planning and scheduling, real-time product tracking, supply chain information systems, and enterprise resource planning systems. When managers invest in information technology, they have a greater capability to manage the logistics process, reflected in the significance and benefits associated with information technology, and consequently can contribute a more important role in overall strategy. The advent of information technology, and the logistics capabilities to utilize this technology for firm competitive advantage, is inextricably intertwined and should not be ignored by managers.

The third managerial implication is to consider investing in information technologies if environmental uncertainty increases. The popular business literature suggests the business environment is increasing in uncertainty and information technology is constantly improving. This research provides empirical support for the concept that environmental uncertainty and adopting information technology are related and that increasing environmental uncertainty leads to increasing investment

in information technology. This, in turn, leads to increased logistics salience to take advantage of this new information technology. As uncertainty increases, information helps managers better understand the environment, and logistics helps managers adapt to this changing environment.

The fourth managerial implication is the link between information technologies and time-based competition. This research provides empirical support for the value and need for investing in information technology, especially in a highly time-based competitive environment. As managers face increasing pressure from customers, suppliers, and competitors to provide faster, more reliable delivery, the need to invest in information technology to provide the critical time-based competitive aspect of supply chain visibility increases. Managers need to continually look to information-based solutions to logistics problems.

FUTURE RESEARCH IMPLICATIONS

This research identified a number of factors, external to the firm such as environmental uncertainty, adoption of information technology, and time-based competition and internal to the firm such as cross-functional integration, that affect the salience of logistics. There are several additional factors that were not considered that might have an effect on the salience of logistics – such as characteristics of the product or service provided by the company, size of the firm, or specific industry characteristics. This research had a broad multi-industry focus and, even though company demographics were not found in this study to affect the results, logistics may have greater salience in companies with particular products or in particular industries. Future research should more fully explore the impact of particular industries and products on the salience of logistics.

Future research should also consider different contexts where logistics might play a new and active role – such as new product development, forecasting/demand management, or promotion management. Another outcome of this research is to expand beyond the firm and consider the supply chain. Is logistics more salient across the supply chain than in a particular firm? Is there a similar relationship between logistics salience within the supply chain as within the firm?

In this study, we developed a new scale for LS, which has broad implications for future research. Researchers can substitute other input factors found in the external environment – such as government regulation/deregulation and global competition – and determine their effect on logistics salience. It should also be possible to consider input factors internal to the firm that affect the salience of logistics – such as centralization of the organization or an increased focus on supply chain management. Researchers can also adapt this scale to many situations in which performance outcome is contingent on external and internal environmental factors. Clearly, future research has much to explore with respect to the nature of the antecedents and consequences of LS.

The LS scale should also be useful for researchers who are interested in the salience of other functions within the firm. It is possible to adapt this scale for other functions within the firm (such as marketing or manufacturing) or external to the firm (such as supply chain variables). Researchers might use variations of the LS scale to determine the importance of a particular function – such as purchasing,

marketing, or R&D – or a particular initiative – such as quality – in other contexts. For instance, in a supply chain context, does the salience of the retailer or manufacturer change within a supply chain as the environment changes?

Another area to research is to use a much more diverse population sample to test the validity of the concepts presented. The sample was diverse in terms of industries but could have a more diverse representation of departmental functions. This survey could be administered to managers who are not affiliated with logistics to confirm that the role of logistics is gaining greater salience within the firm and further identify the benefits or problems associated with that change. Logistics might play a different role in companies that are small, in terms of sales and employees, compared to large multinational companies. Would logistics play a different role in companies that are less than five years old? Since logistics plays different roles in different industries, it would be interesting to research the effect these differences have on LS.

Finally, replicating this study with international firms would be a fruitful area of research. International respondents may have a different perspective on many of the constructs used in this research and incorporating their responses would increase the robustness of the constructs and the findings.

It is hoped this research will encourage both practitioners and researchers to consider the concept of logistics salience. It is further hoped that this research will generate additional research to investigate the salience of logistics in various specific strategic contexts.

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ABOUT THE AUTHORS

Zach G. Zacharia (Ph.D., University of Tennessee) is an Assistant Professor in the Department of Information Systems and Supply Chain Management at Texas Christian University. He has published in the *Journal of Business Logistics*, *Journal of Retailing*, *Journal of Vehicle Design*, *Logistique and Management*, *Transportation Research Record*, *Materials Performance*, and written several chapters in the book, *Supply Chain Management*.

John T. (Tom) Mentzer (Ph.D., Michigan State University) is the Harry J. and Vivienne R. Bruce Excellence Chair of Business in the Department of Marketing and Logistics at the University of Tennessee. He has written six books and published more than 170 articles and papers in the *Journal of Business Logistics*, *Journal of Marketing*, *Journal of Business Research*, *International Journal of Physical Distribution and Logistics Management*, *Transportation and Logistics Review*, *Transportation Journal*, *Journal of the Academy of Marketing Science*, *Columbia Journal of World Business*, *Industrial Marketing Management*, *Research in Marketing*, *Business Horizons*, and other journals.