TRUST AND GOVERNANCE IN HYBRID RELATIONSHIPS:
AN INVESTIGATION OF LOGISTICS ALLIANCES

DISSERTATION

Presented to the Graduate Council of the
University of North Texas in Partial
Fulfillment of the Requirements

For the Degree of
DOCTOR OF PHILOSOPHY

By

John Patrick Orr, B.A., B.J., M.B.A.

Denton, Texas

December 1998

Transaction cost economics (TCE) theorists traditionally have classified transactions between firms as governed by either market or hierarchy. By assessing characteristics of the transaction - asset specificity, uncertainty, and frequency - firms choose the governance form which minimizes transaction costs, the costs of administering the business deal.

During the 1980s, however, TCE has found itself unable to explain the proliferation of strategic alliances. These hybrid relationships seek the benefits of both markets and hierarchies, including quasi-integration, the control of assets without actual ownership. Further, hybrids tend to prefer trust-based relational contracting.

TCE’s acknowledgment of hybrids, however, raises other questions surrounding the behavioral assumptions which supposedly influence the transaction characteristic-governance linkage. Various dissenting researchers have theorized that (1) trust is more dominant in business than opportunism (2) the behavioral assumptions actually function as variables in different contexts, and (3) trust offers an integration mechanism for behavioral variables.
Logistics alliances (LAs) offer an interesting hybrid in which to study these questions of trust and governance dynamics. A field study used a mail survey of shipper and motor-carrier managers involved in LAs.

The moderated hierarchical regression model contained the governance dimensions of Structure and Process as the dependent variable, characteristics of transaction as independent variables, and trust and risk propensity as moderators. Hypotheses related to asset specificity and uncertainty received support. Although moderator interactions were not significant, risk propensity was a significant as a main effect when Structure was the dependent variable, and trust was a significant as a main effect when Process was the dependent variable.

Based on these results, the TCE model was revised to reflect possible temporal differences in the influence of Structure and Process. Further implications of these findings for theory and practice in logistics alliances are discussed.
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF TABLES</th>
<th>ix</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF FIGURES</td>
<td>xii</td>
</tr>
</tbody>
</table>

## Chapter

### I. INTRODUCTION

1. Statement of Problem ................................................................. 1
2. Logistics Alliances as a Research Arena ................. 5
3. Logistics Alliances and the Strategic Alliance Framework .... 7
4. Significance of the Research ...................................................... 11
5. Report Structure ................................................................. 13

### II. REVIEW OF LITERATURE

1. Part I. Theoretical Underpinnings ............................ 16
2. Transaction Cost Economics ...................................................... 16
3. Transaction Attributes and Assumptions
4. The TCE Model and Hybrid Relationships
5. Governance Mechanisms ......................................................... 22
6. Basic Concepts of Contracting
7. A Brief History of Contracting
8. Trust .................................................................................. 29
9. Development of the Trust Construct
10. Dimensions of Trust
11. Summary ........................................................................... 37
Part II. Development of a TCE-Based Logistics Alliance Model .............. 39

Logistics Alliances as Hybrid Relationships .................. 41
Origin of Logistics Alliances
LA Structure and Process as Relational Governance

Trust's Integrating Role in the Logistics Alliance Model ........ 52
Trust in Logistics Alliances
Trust as an Integrating Mechanism for Behavioral Variables
Influences on Choice of Governance Mechanisms in LAs

Summary of Model Development and Hypothesis Generation ........ 72

III. METHODOLOGY ......................................................... 74

Research Design ......................................................... 74

Sampling Set ........................................................... 77
Setting
Sampling Method
Power Analysis and Sample Size
Size of Initial Survey Mailing

Operationalization of Constructs ........................................ 86
Classification of Shipper-Carrier Relationships
Transaction Characteristics in Logistics Alliances
Behavioral Variables
Relational Governance
Control Variables for Logistics Alliance Model

Development of Survey Questionnaire ................................. 97
Contextual Refinement of Measurement Scales and Items
Questionnaire Design

Initial Tests of Data-Gathering System ...................... 103
Pre-Pilot Study
Pilot Study

Main Survey .......................................................... 107
Survey Mailing Schedule
Minimizing Non-Response
Data Analysis ............................................................... 109
  Justification of Use of Regression Analysis
  Structure of Initial Regression Model

Summary ................................................................. 111

IV. DATA ANALYSIS & RESULTS ........................................ 115

Main Survey Response Rate ........................................ 115
  Nonusable Replies
  Respondents vs. Non-Respondents
  Data Protocols and Missing Data

Characteristics of the Survey Sample .............................. 119
  Key Informants
  Firm-Level Demographics
  Characteristics of the Alliances
  Trends Within the Sample

Preliminary Data Analysis ........................................... 124
  Dependent Variable: Relational Governance
  Independent Variables:
    Asset Specificity, Uncertainty, and Frequency
  Moderators: Risk Propensity and Trust
  Control Variables

Tests of Hypotheses ................................................ 136
  Correlation Matrix
  Sequence of Hypothesis Tests
  Structure
  Process
  Overall Remarks on Hypotheses
  Multicollinearity Diagnostic: Variance Inflation Factor

Post-Hoc Tests ..................................................... 143
  Placement of Behavioral Variables
  Industry as a Covariate

Summary ................................................................. 146
V. DISCUSSION

Implications of the Findings ........................................ 147
  Main Effects: Characteristics of the Transaction
  Behavioral Moderators / Interactions
  Adjustments to the Model

Limitations and Validity Issues ..................................... 155
  Generalizability
  Statistical Conclusion Validity: Survey Response Bias
  Statistical Conclusion Validity: Power
  Causality, Field Studies, and Regression
  Construct Validity: Refinement of Scales
  Summary

Future Research ....................................................... 163
  TCE Theory
  Psychometrics
  Populations and Subgroups

Conclusions ............................................................. 166
  Benefits to Theory
  Benefits to Practice

APPENDICES

A. Approval Letter, Institutional Review Board
   on Human Subjects Research .................................... 169
B. Correspondence with Council of Logistics Management ........ 171
C. Development of Original Risk Propensity Scale ................ 174
D. Post Cards and Cover Letters for Survey Mailings ............. 192
E. 1998 Logistics Alliance Survey: Carrier and Shipper Versions ... 199

REFERENCES ............................................................. 208
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alignment of Contracting Types &amp; TCE Governance Mechanisms</td>
<td>27</td>
</tr>
<tr>
<td>2. Definitions of Trust</td>
<td>31</td>
</tr>
<tr>
<td>3. Multidimensional Modeling of Trust Relating to Economic Exchange</td>
<td>36</td>
</tr>
<tr>
<td>4. Characteristics of Three Types of Logistics Alliance Agreements</td>
<td>44</td>
</tr>
<tr>
<td>5. Field Research Methods and Theory Development in Strategic Management</td>
<td>75</td>
</tr>
<tr>
<td>6. Power Analysis for Logistics Alliance Model Equation: F-Test in Multiple Regression, A Priori Analysis, Accuracy Mode</td>
<td>83</td>
</tr>
<tr>
<td>7. Response Rates for Mail Surveys of Buyer-Supplier and Logistics Alliance Relationships</td>
<td>85</td>
</tr>
<tr>
<td>8. Multi-Item Scales Undergoing Contextual Refinement</td>
<td>99</td>
</tr>
<tr>
<td>9. Questionnaire: Measurement Scales for Variables Within the Logistics Alliance Model</td>
<td>101, 102</td>
</tr>
<tr>
<td>10. Pilot Study: Shapiro-Wilk Test of Normality</td>
<td>107</td>
</tr>
<tr>
<td>11. 1998 Logistics Alliance Survey - Schedule for Main Mailing</td>
<td>108</td>
</tr>
<tr>
<td>12. Logistics Alliance Model: Hierarchical Sequence of Variable Entry</td>
<td>112</td>
</tr>
<tr>
<td>13. 1998 Logistics Alliance Survey Response Results</td>
<td>116</td>
</tr>
<tr>
<td>14. Survey Respondents (R) vs. Non-Respondents (NR): t-tests on Key Factors</td>
<td>117</td>
</tr>
<tr>
<td>15. Characteristics of the Key Informants</td>
<td>119</td>
</tr>
<tr>
<td>16. ANOVA: Selected Variables of Interest x Job Category</td>
<td>121</td>
</tr>
</tbody>
</table>
37. ANOVA: Relational Governance Dimensions x Carrier-Shipper, SIC ......... 145
38. Post-Hoc Power Analysis of Models and Significant Variables ............... 160
   C-1. Standard Approaches to Measurement of Risk Behavior .................. 177
   C-2. Dichotomy of Risky Decision Behaviors Under REACT ..................... 179
### LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Classical Transaction Cost Economics (TCE) Model</td>
<td>3</td>
</tr>
<tr>
<td>2. Components of a Theory</td>
<td>15</td>
</tr>
<tr>
<td>3. Expanded TCE Model</td>
<td>18</td>
</tr>
<tr>
<td>4. Logistics Alliance Model</td>
<td>63</td>
</tr>
<tr>
<td>5. Hypothesis Summary for Logistics Alliance Model</td>
<td>72</td>
</tr>
<tr>
<td>6. Buyer-Seller Relationship Classifications</td>
<td>87</td>
</tr>
<tr>
<td>7. Revised Logistics Alliance Model</td>
<td>153</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

This research investigates the relationship between behavioral factors and selection and function of governance mechanisms within hybrid relationships under the transaction cost economics (TCE) framework. Specifically, this study examines the role of trust as an integrator of the behavioral influences on governance mechanisms. The hypotheses are tested within the motor carrier-shipper dyad of logistics alliances.

Statement of Problem

Transaction cost economics (TCE) had its roots in a classical economics debate in the 1930s over the proper role of the firm. Free-market economics assumed that, because the price mechanism coordinated economic allocation of resources, vertically integrated firms should be unnecessary. Thus, resource allocation should be most efficient through a series of open-market transactions (Coase, 1937). As environmental complexity increases, however, market transactions become extremely costly because of factors such as information asymmetry (Williamson, 1975, 1991). Information asymmetry conflicts with one critical assumption of price mechanism governance: that economic players possess complete information on market conditions. Thus, vertical integration allows the firm to bring certain parts of the production process under control of the firm's internal hierarchy. The market vs. hierarchy differentiation forms the basis of TCE, which seeks to align
interorganizational transactions with the least costly governance structure. Governance has been generally defined as a method for organizing transactions (Williamson & Ouchi, 1981; Heide, 1994), or administering contracts (Palay, 1984). More specifically, it has been defined as "a multidimensional phenomenon, encompassing the initiation, termination and ongoing relationship maintenance between a set of parties" (Heide, 1994, p. 72).

Choice of governance structure is contingent on the unique characteristics of the transaction (Coase, 1937; Williamson, 1975, 1991).

Characteristics of the transaction include asset specificity, the degree to which the parties must make non-recoverable investments in the transaction; uncertainty, the ability of the parties to monitor the other's adherence to the contractual agreements; and frequency of transaction, the degree to which the transaction recurs (Williamson, 1985). TCE posits that this transaction characteristics-governance linkage takes place under three behavioral assumptions (see Figure 1). These assumptions are opportunism, bounded rationality, and risk neutrality. Through opportunism, "self-interest seeking with guile," (Williamson, 1985, p. 30), economic players attempt to circumvent the rules of the contract, or otherwise manipulate information asymmetry and uncertainty to force the other firm to make unwise decisions. Bounded rationality addresses both the cultural and physical limits of humans for processing information before making decisions (Williamson, 1975; 1985). And finally, risk neutrality assumes that all decision-makers are indifferent as to whether profits from a business undertaking are guaranteed or fluctuating, as long as the average of the fluctuating profits equals the certain profit (Chiles & McMackin, 1996; Townsend, 1982).
Characteristics of Transaction Governance Mechanisms

Behavioral Assumptions

FIGURE 1. Classical Transaction Cost Economics (TCE) Model

Classical TCE (Coase, 1937; Williamson, 1975), however, found itself unable to account for a rising incidence of transactions which are neither market nor hierarchy in form. These hybrid forms, often called strategic alliances, attempt to harness the best aspects of both market and hierarchy. Strategic alliances and other interorganizational relationships emerged as a worldwide response to the challenge of achieving competitiveness in a fast-paced global economy of the 1980s. These partnerships have allowed member firms to pool assets for projects neither one would be able to undertake alone, with the option to break the relationship if it no longer serves the needs of one of the parties. Some of the strategic alliance forms include joint ventures, licensing arrangements, research and development arrangements, buyer-supplier partnerships, and logistics alliances (Borys & Jemison, 1989; Ellram, 1992; and Harrigan, 1987). Of these,
logistics alliances are the newest, and early research has tended to be exploratory in nature (e.g., Bowersox, et al., 1989; Frankel, 1995; Gentry, 1994).

The recognition of both the existence and prevalence of hybrid forms, however, spawns new questions for TCE. These new questions center around the static behavioral assumptions which purportedly influence the transaction characteristic-governance linkage. For example, some researchers argue that trust, not opportunism, is more salient in business transactions. Arguments which support the preeminence of trust note variously that a firm with a reputation for opportunism would be shunned economically by other firms (Hill, 1990), and that transactions are embedded in larger social systems with their ethical norms (Granovetter, 1985). A blanket assumption of risk neutrality has likewise been questioned. Researchers have argued that risk propensity will vary across managers and transaction contexts (Chiles & McMackin, 1996; Noorderhaven, 1994, 1995). Finally, bounded rationality proves to be troubling as a blanket assumption. Even Williamson (1985), in his chronicle of mainstream TCE, describes activities between regularly interacting firms which attenuate bounded rationality. These activities, such as emergent informal standard procedures or formal professional training, have been termed joint action by researchers such as Heide and John (1990) and Zaheer and Venkatraman (1995).

Thus, researchers face the challenge of how to conduct a coordinated study of the role of behavioral factors which influence the linkage between transaction characteristics and governance. One approach to this challenge comes from Chiles and McMackin (1996), who suggest that trust be used as an integrating mechanism for the behavioral
variables. Citing the literature of the various organizational disciplines, they point out links between trust and opportunism (e.g., Bradach & Eccles, 1989), between trust and bounded rationality (e.g., Powell, 1990), and trust and risk (e.g., Mayer, Davis, & Schoorman, 1995). Thus, this leads to an overall research question:

*What is the role of trust in influencing governance mechanisms in hybrid relationships?*

**Logistics Alliances as a Research Arena**

A particularly interesting type of hybrid relationship for exploring the trust and governance question is the logistics alliance (LA). LAs arose during the 1980s in the United States as a response to both deregulation of transportation under the Carter and Reagan administrations (Bowersox, 1990), and the move toward the "lean organization." These two factors caused organizations to rethink the traditional buyer-supplier relationship when it came to transporting goods. Commencing with all-cargo aircraft operations in 1977, deregulation soon spread to the airlines, motor carriers and railroads (Johnson & Wood, 1993). Deregulation offered manufacturers new options in moving goods because it removed the mandate that carriers offer uniform rates to all customers; custom contracts were now permitted (Johnson & Wood, 1993). Also, the lean organization concept caused many firms to outsource value-chain functions that were not part of the firm's core capabilities (Bruton, Keels & Shook, 1996). Logistics, broadly defined as "business operations concerned with the strategic positioning of inventory" (Bowersox, et al., 1989, p. 7), was one such area. Some third-party logistics operations
were handled as arms-length outsourcing, or subcontracting transactions, while others developed into alliances.

Logistics activities include inventory management, transportation of raw materials, components and finished goods, and warehousing. The following interfirm relationships illustrate logistics alliances common in industry:

Ford Motor Co. contracted with American Presidents Co. to coordinate shipments of automotive components in sealed containers from Michigan to maquiladora auto assembly plants in Mexico (Bowersox, 1990). Once the containers were emptied at Ford’s Mexican assembly plants, American Presidents filled them with finished goods from other maquiladora plants for shipment back to the United States. Ford, whose core competencies involve auto manufacturing, handed over logistics to an outside expert. American, through contacts with noncompeting manufacturers, was able to fill the containers for a productive return trip, rather than returning empty containers. Ford received greater cost savings on logistics, and American realized greater profits.

J.B. Hunt Trucking Co. has formed a logistics alliance with railroads based around use of a standardized container (Solo, 1994). The sealed container, in a system called intermodal transportation, readily transfers from truck flatbed to rail car as the sealed shipment advances from source to target location. Customers benefit from both cost savings in handling - containerized goods are packed and unpacked only once - and less transit damage because of the protection of the sealed container. Also, customers can cut usual transit time by entering goods into a precoordinated intermodal network.
In the hospital supply industry, 3M Company and Abbott Laboratories formed a horizontal linkage with four other manufacturing firms to provide joint delivery of alliance-member goods to client hospitals (Bowersox, 1990). Use of electronic data interchange (EDI) enabled more frequent delivery of needed product mix. This lessened inventory costs and added the convenience of consolidated delivery for inbound logistics at the hospital.

Logistics Alliances and the Strategic Alliance Framework

A starting point for study of logistics alliances is the overall strategic alliance framework. Although some strategic alliances are quite successful, others have faced serious challenges to relationship survival (Stafford, 1994). Researchers at Harvard University analyzed studies of strategic alliances and found failure rates for alliances in the 50- to 80-percent range (Khanna, Gulati & Nohria, 1994). Industry provides numerous examples of the problems which can harm the productivity of strategic alliances. Problem areas include performance standards, alliance-parent firm goal conflict, contracts, and unrealistic appraisals of payout. The next four paragraphs will describe these broad strategic alliance problem areas, and relate them specifically to LAs.

*Inappropriate Performance Standards.* Managers involved in strategic alliances indicate that ill-chosen performance standards often draw unfavorable attention to newly-formed strategic alliances. Start-up alliances do not compare favorably to wholly owned divisions in standardized performance measures (Anderson, 1990; Gulati, Khanna, & Nohria, 1994). Furthermore, these standardized measures do not adequately assess the
alliance, especially when an alliance has mutual learning rather than quick profit as its short-term goal. LAs, which involve joint reengineering of a custom logistics system, also have the elements of a start-up. Some have described the formation period of an alliance as an iterative option process, with each side having the opportunity to exit if the emerging arrangement fails to serve its needs (Anderson, 1990).

**Goal Conflicts.** Personnel who work within alliances may experience conflict between the goals of the alliance and those of the parent companies (Ohmae, in Bleeke & Ernst, 1993). As logistics alliances develop, the shipper’s in-house logistics personnel often fear that their parent company will eliminate their jobs by using a third-party logistics provider (Bowersox, 1990). Thus, the shipper’s in-house logistics workers feel that their support of the LA’s goals and programs will hurt them individually.

**Degree of Emphasis on Formal Contracts.** Third, problems can arise involving contracts. Firms which want to write strict contracts may find the process extremely time-consuming. Also, one survey shows that U.S. business managers spend much more time drafting contracts than monitoring relations after the contract is enacted (Gulati, et al., 1994). Once these explicit contracts are enacted, line managers rely on contracts to a much lesser degree than lawyers and accountants. As one purchasing agent said, "If something comes up, you get the other man on the phone and deal with the problem. You don't read legalistic contract clauses at each other if you ever want to do business again" (Macaulay, 1963, p. 61). Thus, interorganizational trust emerges among line managers as the preferred way to monitor relationships, while staff personnel tend to favor formal governance structures. In LAs, because of the fluid nature of operations, some have
postulated that quality interpersonal relations, including trust, are a necessary component of a successful alliance (Bowersox, 1990).

**Unrealistic Expectations.** Firms sometimes lack realistic appraisals of what payout they should receive from the strategic alliance. Firms often fail to realize that alliances begin as a "three-legged race" (Khanna, et al., 1994), and that it takes the two firms awhile to coordinate their activities. Formal contracts aside, the unilateral commitment of resources to the relationship has been shown to increase trust and commitment within the alliance dyad, as each side sequentially works to improve the relationship. The commitment is necessary because of the risk incurred by both parties: The shipper replaces in-house transportation with the services of an outside firm, and shares proprietary information through the EDI link (Bowersox, 1990). Likewise, the carrier must often make investments in systems which will support this particular shipper (Walton, 1994). In LAs, some potential partners have called in third-party negotiators during the formation stage to aid in the structuring of mutually supportable goals (Bowersox, 1990).

Several themes emerge from this discussion of LAs. The overall theme is the increasing trend away from emphasis on the discrete transaction and a move toward focusing on the overall relationship within which the transaction occurs. Within the LA, this has been facilitated in part by the possibility of long-term custom transportation contracts available in the era of deregulation. These relationships, however, appear to work best when the initial groundwork, often shepherded by outside consultants, has produced common LA goals. This alliance decision involves risk for both parties: The
shipper shifts transportation capacity to an outsider, with whom it shares proprietary information through EDI, and the carrier must invest in systems to support this shipper, despite possibility of the demise of the LA.

The groundwork, however, is only the start. Whereas the common goals serve as a starting point, building a mutually beneficial system comes only from repeated interaction within the shipper-carrier dyad. It often becomes a matter of "getting the other man on the phone" to fine tune the system. Because of the fluid nature of logistics operations, problems arise which must often be solved by one party without consultation with the other. Thus, both system development activities, such as the EDI linkages, and acute problem solving rely heavily on trust (Bowersox, 1990).

The LA situation has numerous similarities to the hybrid relationship phenomenon within TCE. Anecdotal evidence of the emphasis on trust within LAs parallels the trust-opportunism debate within TCE. Likewise, the value afforded high-quality interpersonal relationships by LA practitioners parallels TCE's interest in how joint action between parties of a hybrid relationship diminishes bounded rationality. Finally, researchers of both the LA and TCE areas have found risk to be an interesting topic; as LA parties must consider the risk levels in determining whether to continue the alliance, TCE researchers have begun to consider variability in risk assessment as opposed to making a blanket assumption of risk neutrality. Although LAs and TCE studies use differing terminology, the two areas share many common themes. These common themes lend themselves to exploration under Chiles and McMackin's (1996) recommendation that trust be used as an integrating mechanism for study of the behavioral variables influencing the transaction
characteristic and governance linkages in TCE. Capitalizing on these common themes, this study uses LAs as a vehicle to study the function of trust and governance in TCE's hybrid relationships.

**Significance of the Research**

This study of TCE hybrid relationships within a logistics alliance context addresses needs of both the academic and business communities. General contributions to academic research include enhancement of TCE theory regarding the influence of behavioral variables, and inquiry in mid-range theory. Likewise, general contributions to business and industry include a clearer understanding of the role of trust in LAs, and its viability as opposed to formal contracts as a control method. Specific benefits to both communities follow.

**Benefits for Academic Research**

TCE researchers in the area of hybrid relationships have suggested that the classical TCE model, which views the behavioral factors as blanket assumptions, may be underspecified (Chiles & McMackin, 1996; Noorderhaven, 1994, 1995). These researchers have called for inquiry to determine if the assumptions will have more explanatory power for TCE if they are reframed as variables. Further, Chiles and McMackin (1996) have called for research on the use of trust as a coordinating concept for the behavioral variables in TCE. This study addresses both these recommendations.

Development of mid-range theory also benefitted from this study. Mid-range theory attempts to bridge the gap between the poles of the organizational studies: all-
inclusive grand theories of organization, and the opposing viewpoint that each organization is too unique to be explained by generalities (Steiner, 1979). In strategy, a dominant mid-range theory is contingency theory, which posits that organizations succeed by aligning themselves to the contingencies which they face in their environment (Galbraith & Nathanson, 1979; Hambrick, 1983). TCE, which seeks to align firm governance mechanisms with (environmental) characteristics of the transaction, is a subset of contingency theory. With a look at specific constructs within this study, recommendations for mid-range theory research abound. Cummings and Bromiley (1996) have called for testing their generalizable interunit trust model in multiple contingencies, and Sitkin and Weingart (1995) call for similar activity in the area of risk propensity and decision-making under risk. Both recommendations have been addressed in this study.

**Benefits for Business and Industry**

The study provides empirical evidence to help refine the framework for assessment of trust relationships in logistics alliances. Anecdotal evidence (Bowersox, 1990) and case studies (Gentry, 1994; Frankel, 1995) indicate that LAs operate with higher levels of trust than outsourcing arrangements; this study addresses the question on a cross-sectional, multi-industry basis. Further confirmation of the role of trust within LAs could lead to greater emphasis upon trust within such partnerships as an alternative to costly legal contracting.

Also, this study yields information on the dynamics of alliances between third-party motor carriers and the shippers of goods. Investigation of both the trust elements and overall dynamics of LAs should yield valuable information for business and industry.
Report Structure

The remainder of the report includes the review of literature, the methodology, the results, and conclusions and recommendations for future research. Chapter 2, the review of literature, provides an overview of transaction-cost economics, explains the nature of hybrid relationships between autonomous firms, and develops a TCE-based Logistics Alliance model. Also, the chapter discusses specific theoretical issues relating to governance and trust in logistics alliances, culminating in testable hypotheses. Chapter 3, Methodology, explains research design, sampling plan, operationalization of variables and questionnaire design, and data analysis. Chapter 4 shows statistical and qualitative results of the study, and Chapter 5 addresses conclusions and recommendations for future research.
CHAPTER II

REVIEW OF LITERATURE

This study of trust and governance in hybrid relationships (in logistics alliances) integrates literature from a number of disciplines, including strategy, organizational theory, marketing channels, economics, contract law, and logistics. To organize the effort, this review of literature contains two parts. The first, Theoretical Underpinnings, reviews the attempts of transaction cost economics (TCE) to deal with the phenomenon of hybrid relationships between autonomous firms. Important related topics include governance mechanisms and trust. The second, development of a TCE-based Logistics Alliance Model, explains why the logistics alliance stands as an interesting vehicle for studying hybrid relationships, especially for questions related to the interplay of trust and efficient governance. Topics include the origins, structure and processes of logistics alliance, the increasing prevalence of TCE in logistics research, and the integration of recent TCE theory-building efforts into the resultant model. Further discussion of the model yields a set of testable hypotheses.

Before addressing these topics, this study's activities will be explained in terms of the theory development cycle (Bacharach, 1989). First, a theory serves as a framework to facilitate the scientific examination of phenomena. According to Brief and Duderich (1991, p. 328): "By theory, we mean a set of logically related propositions that describe and explain a range of observations." One of the criteria of a good theory is its usefulness
(Lewin, 1945; Platt, 1964; Bacharach, 1989). This usefulness is the degree to which a theory clarifies constructs and variables, and facilitates the attempts to predict and explain the relationships between these factors (Bacharach, 1989).

FIGURE 2. Components of a Theory

The theory development cycle, as summarized in Figure 2, includes the interrelated activities of theory building and theory testing (Bacharach, 1989). Theory building, which is the focus of Chapter II, involves an analysis of what is known about a phenomenon, comparing past studies to determine fruitful venues for future research. Theory building refines constructs, which are generalized, conceptual descriptions of a phenomenon, and
links constructs together with propositions, which are generalized statements of relationships between constructs. Once the propositions have been formed, the researcher seeks either a laboratory or real-world situation under which the propositions can be converted into specific, testable hypotheses. These two activities, construct refinement and hypothesis development, form the basis of Chapter II. This study, as will be shown, will test hybrid relationships in the specific setting of logistics alliances. Chapter III, along with fully operationalizing the variables of the hypotheses, will establish a full plan for hypothesis testing, which is theory testing.

This concludes the discussion of the theory development process, which involves the theory building, theory testing cycle (Bacharach, 1989). Now the discussion will turn to the theoretical underpinnings of TCE.

**Part I. Theoretical Underpinnings**

**Transaction Cost Economics**

Transaction cost economics (TCE) seeks to explain and understand the governance structure used by firms to control business transactions (Williamson, 1975, 1985). TCE marks a departure from classical microeconomics in two areas. It uses the business transaction - not the firm - as the unit of analysis (Commons, 1934; Williamson, 1975), and describes the firm as a governance mechanism for the transaction, not a production mechanism (Coase, 1937/1991; Williamson, 1975). The transaction in question represents a make-or-buy decision for the firm (Walker & Weber, 1984). The basic TCE model theorizes that two generic governance mechanisms are available to
firms: *market-driven* (external) governance mechanisms, which control a discrete
transaction between two or more autonomous firms, and internal governance mechanisms,
termed *hierarchy*, which control vertical integration of the capabilities into a single firm
(Coase, 1937; Williamson, 1975).

According to TCE theory, the choice of governance mechanism results from the
attributes of the transactions, and is influenced by certain behavioral assumptions
(Williamson, 1975, 1985). This part of Chapter II contains a review of the literature
which will: (1) explain these attributes and assumptions; (2) show how adjustments to the
basic TCE model have helped it explain hybrid relationships; and, (3) determine what TCE
can contribute to the study of logistics alliances. TCE increasingly appears as a tool in LA
literature, both in theory development and in empirical testing. Now, the basic TCE
model will be addressed.

Transaction Attributes and Assumptions

*Transaction costs* are the costs incurred to administer a business exchange.

According to TCE, alignment of transaction characteristics with the governance
mechanism will minimize transaction costs (Williamson, 1975). Failure to select the
optimum governance structure will lead to waste, bureaucratic inefficiencies, and slack
(Williamson, 1991). *Slack* represents resources in excess of those needed for an efficient
production process. TCE assumes that each transaction can be analyzed based upon three
characteristics of the transaction (see Figure 3) to determine the most appropriate
governance structure (Williamson, 1985, 1991). These transaction characteristics are:
Asset Specificity. This represents the flexibility with which assets involved in the transaction can be shifted to an alternate use without loss of value. Highly specific assets cannot readily be used for other projects if the original production system is discontinued. An example of highly specific assets would be specially designed auto hauling trailers, purchased by a trucking company for a contract to haul new autos from assembly plant to dealers. If the trucking company loses its account to haul autos, the trailers would be of little or no use for other types of hauling.

Uncertainty. Degree of uncertainty measures the likelihood of disturbances interfering with the transaction. According to Williamson (1985), this uncertainty is
behavioral in nature, and arises from the activities of parties internal to the transaction. Governance structures vary in their ability to adapt to disruptions in the transaction.

**Frequency.** This characteristic gauges how often the transaction will occur. Frequency of transaction becomes especially critical when the transaction involves costly specific assets. If these assets will be used infrequently, it may be difficult to justify the financial expenditure.

As previously mentioned, the transaction characteristics are influenced by three behavioral assumptions (Williamson, 1985). These are:

**Opportunism.** Defined as "self-interest seeking with guile" (Williamson, 1975, p. 26), opportunism is behavior which seeks to evade the spirit and sometimes the letter of governance agreements.

**Bounded Rationality.** This assumption addresses managerial behavior which is "intendedly rational, but only limitedly so" (Simon, 1961, p. xxiv). These bounds, or limits, can be either neurophysiological or language-based in nature. Neurophysiological limits include quality of the brain's information-processing capability and the inefficiencies emerging from perceptual flaws. Language-based bounds involve the ability to interpret information regarding the transaction (Williamson, 1975).

**Risk Neutrality.** Risk neutrality assumes that for TCE analysis, firms neither seek nor go out of their way to avoid risk. Williamson (1985) argues that the assumption of risk neutrality supports TCE's focus on efficiency. Assuming risk neutrality "helps to disclose core efficiency features that go unnoticed or are misconstrued when risk aversion assumptions are employed" (Williamson, 1985, p. 389).
As the use of TCE has expanded, several problems have emerged with the basic model. These problems center around the types of governance structures and the behavioral assumptions under which TCE theory operates. The discussion will now shift to these problems and their implications for this study when TCE is used to model interfirm cooperative agreements.

The TCE Model and Hybrid Relationships

Early TCE theorists suggested that markets and hierarchies comprise two theoretically distinct types of governance mechanisms (Coase, 1937/1991; Williamson, 1975). In reality, however, there exists a range of governance mechanisms which fall between the theorized absolutes of market and hierarchy. Organizational researchers have used various terminologies to define these types of relationships under which unique governance mechanisms are chosen. For example, they have been called networks (Miles & Snow, 1986; Thorelli, 1986), hybrids (Borys & Jemison, 1989), strategic alliances (Harrigan, 1987), buyer-supplier partnerships (Heide & Miner, 1992), and logistics alliances (Bowersox, 1990; Ellram, 1992; Heide, 1994). This range of relationships, generally termed hybrids within TCE, involves long-term contracting between firms (Williamson, 1991). Hybrids theoretically deliver the benefits of vertical integration without the inherent transaction costs of internal coordination (Chiles & McMackin, 1996).

Integration of hybrid relationships into TCE has accounted for the real-world existence of governance mechanisms which the market-hierarchy polar opposites failed to explain. Along with the designation of hybrids has come questions about the role of the
behavioral assumptions which influence TCE. This section next will address one of these, the trust-opportunism debate.

The debate concerning the behavioral influences on the choice of governance mechanisms centers around whether opportunism or trust is the more dominant influence; it features arguments from across the organizational studies spectrum. Early TCE literature acknowledged the effect of trust in many business relationships (Williamson, 1975). It was argued, however, that difficult-to-identify opportunistic parties existed, and that the best way to minimize transaction costs was to assume that all parties were opportunistic (Williamson, 1985). On the other hand, other theorists argue that TCE theory overemphasizes opportunism. For example, Hill (1990) argues from a strategy perspective that trustworthy players are much more likely than opportunistic ones to survive in the marketplace. Also, sociologist Granovetter (1985) argues that economic transactions are embedded in larger social systems, which are based on trust. An interfirm cooperation model which emphasizes trust over opportunism has received support elsewhere in recent literature (Chiles & McMackin, 1996; Parkhe, 1993; Ring & Van de Ven, 1992; Ring, 1996).

This trust-opportunism debate rests, ultimately, on the nature of contracting. The historical development of contracting norms, as a central theme, has addressed the degree to which individuals must be protected from dishonest (or opportunistic) members of the community in the course of economic transactions (Gilmore, 1977; Macneil, 1980). Governance has been defined broadly as a method for organizing transactions (Williamson & Ouchi, 1981; Heide, 1994), and narrowly as the administration of contracts (Palay,
1984). This suggests significant overlap between the topics of governance and
contracting. The next section, therefore, deals with the influence of the evolution of
contracting on the shaping of available governance mechanisms.

**Governance Mechanisms**

Governance and contracting, two concepts previewed in Chapter I, form the basis
of attempts to explain controls surrounding economic transactions. Governance, as
defined by Palay (1984), is a framework for administering contracts. Thus, governance
options available for overall transaction relationships can best be explained in terms of the
evolution of contract law. The first subsection contains discussion of the basic definitions
dealing with contracting and governance. The second subsection offers conceptual and
historical reviews of contract law and how it shapes the content of TCE governance
mechanisms.

**Basic Concepts of Contracting**

The American Law Institute (1973) defines a contract as "a promise or set of
promises for the breach of which the law gives remedy, or the performance of which the
law in some way recognizes as duty." However, Macneil (1980) notes that "... law is
not what contracts are all about. Contracts are about getting things done in the real
world" (p. 5). Contracts are rooted in socioeconomic exchange, labor specialization,
freedom of choice among parties, and an attempt to "project exchange into the future"
(Macneil, 1980, p. 6). Contracts are structured as a "promise in exchange" (Macneil,
1980, p. 7) which specifies four elements relating to the exchange: (1) the desires of the
promisor and promisee; (2) present activity which will constrain future options; (3) communication of intention; and, (4) measurable reciprocal exchange.

The American Law Institute's definition of a contract refers to the legal structure of the exchange relationship, whereas Macneil's definition refers to how contracts function in the everyday world (Macneil, 1980). Attempts to balance these two aspects of contracting, contract in law and contract in action, form the basis of modern relational contracting (Macneil, 1978, 1980). Norms, which are dominant patterns of thought and behavior attributable to a specific group, govern the configuration of a contract (Macneil, 1980). The source of appropriate norms has been a primary concern throughout the historical evolution of contracting.

A Brief History of Contracting

Modern contract law has undergone three developmental stages: classical, neo-classical, and relational (Macneil, 1978). Each of these stages has its own specific views of how transactions between firms should be governed. Prior to addressing modern contracting, a discussion is warranted of its roots, namely the concepts of "primitive" relational contracting.

"Primitive" relational contracting originated in ancient times when the village and its community was the universe of economic exchange for the villager (Macneil, 1980). Such contracting generally involved "primary" and "whole person" relationships. Primary relationships involved the face-to-face meeting of the ultimate decision-makers on the transaction; no intermediaries or agents intervened. Whole-person relationships were termed as such because consummation of the transaction had long-term implications
for each participant both individually and as a member of the community (Macneil, 1980). Primitive exchanges were deeply embedded in their social surroundings (Granovetter, 1985) and the external (non-transaction specific) norms weighed heavily on the choices the two parties could make during the transaction (Macneil, 1980). In general, protection of the community from exploitation was a central goal in primitive contracting (Macneil, 1980). This primitive relational view of contracting proved especially salient in medieval times. For example, the three religions of Europe and the Mediterranean basin - Judaism, Christianity, and Islam - all restricted usury, the charging of interest on loans (Levine, 1980; Saleh, 1986; Schreiber, 1979). Such activities were viewed by religious authorities as violations against the spirit of charity and community cohesion.

Primitive relational contracting served as an antecedent to modern contracting and its three phases: classical, neo-classical, and modern relational (Macneil, 1978). Classical contracting represented the laissez-faire attitudes of the Industrial Revolution, which emphasized minimal government interference in commerce (Wren, 1987). Next, neo-classical contracting coincided with the introduction of fairly strict government regulation of certain aspects of commerce (Macneil, 1978), including transportation and logistics (Johnson & Woods, 1993). Finally, relational contracting has emerged, which attempts to base contract governance on long-term relationships, and development of behavioral norms among parties to the transaction (Macneil, 1978, 1980).

**Classical Contracting.** Development of classical contracting parallels the emergence at the dawn of the Industrial Revolution of the works of classical economists such as Adam Smith and David Ricardo. In 1776, Smith in *The Wealth of Nations* calls
for minimal government interference in commerce. Smith argued that the "invisible hand" of price-driven free market forces would guide the economy for the benefit of all - if government regulations were minimized. This ushered in the era of laissez-faire capitalism (Wren, 1987). Classical contracting therefore focuses on discreteness and presentation (Macneil, 1978, 1980). Discreteness deals with the idea of "sharp in, sharp out" transactions which involve no past or assumed future relationships. Presentation attempts to bring all future contingencies relating to the contract into the present and to make a decision on these contingencies at the time of the transaction. Also, discrete transaction contracting leaves the transaction "free of all sorts of extraneous social baggage" which might detract from economic efficiency (Macneil, 1978, p. 858). Thus, discrete and market contracting are synonymous.

**Neoclassical Contracting.** Neoclassical contracting emerges with neo-classical economics, which advocates government arbitration of business dealings. Laissez-faire capitalism, although it developed the U.S. economy into a strong engine, caused a backlash among citizens over the social costs of the development (Wren, 1987). Reports of railroad stock fraud and excessive rail rates, widespread bribery of government officials, and violence over labor contracts created a call for regulation of industry. This brought in an era of government regulation of commerce, with protection of the basic transportation system as one goal (Johnson & Wood, 1993; Wren, 1987). In the transportation area, federal regulation was imposed on oil pipelines in 1906, trucking in 1935, airlines in 1938, inland waterway shipping companies in 1940, and freight forwarders in 1942. Also, the federal government passed the Uniform Commercial Code in 1952, which specified
standard rules for the sale of goods in the United States (Johnson & Wood, 1993). Likewise, professional associations such as the American Institute of Architects (AIA) developed standards governing contracts in their industry (Macneil, 1978). Thus, contracts of any complexity could be carried out under a tri-lateral governance mechanism (Williamson, 1985), with the government or quasi-government professional associations acting as arbitrator between parties when disputes occurred (Macneil, 1978). Thus, the “social baggage” which classical contracting had tried to avoid intruded upon neo-classical contracting transactions in the form of government regulation.

**Relational Contracting.** Relational contracting looks at business dealings not as a single economic transaction, but as a relationship within which a series of transactions occur. One of the key aspects of relational contracting is the idea of private ordering (Galanter, 1981; Williamson, 1985). In *private ordering*, the written "contract of law" serves as a framework for the transactions, with the assumption that periodic adjustments will have to be made during the course of the relationship to resolve any conflicts that arise. Relational contracting takes either a unitary or a bilateral configuration (Williamson, 1985). *Unitary* mechanisms are typically “internal” governance mechanisms used within firms; employment contracts are an example of such mechanisms. *Bilateral* mechanisms govern relationships between two firms, and include the governance of hybrid relationships such as logistics alliances. The information age has brought an increased emphasis on modern, bilateral relational contracting. This modern relational approach seeks both the flexibility of focus on the specific transaction, with the equivalent goal of developing a long-term relationship between partners (Macneil, 1980; Nooteboom, 1996).
Table 1 links the three types of modern contracting with parallel TCE governance mechanisms.

**TABLE 1**

**Alignment of Contracting Types & TCE Governance Mechanisms**

<table>
<thead>
<tr>
<th>Type of Contract</th>
<th>Characteristics of Contract</th>
<th>Governance Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical</td>
<td>“Sharp in, sharp out”; focus on discreteness, presentation; no past or future contact assumed.</td>
<td>Market</td>
</tr>
<tr>
<td>Neoclassical</td>
<td>Contracts arbitrated by third parties; government regulations, standard contracting procedures.</td>
<td>Tri-Lateral</td>
</tr>
<tr>
<td>Relational</td>
<td>Private ordering; uses “contract in law” as starting point, with presumption of adjustments as relationship grows.</td>
<td>Unitary</td>
</tr>
</tbody>
</table>


To summarize, classical contracting focuses on a discrete transaction, involving minimal social interference; neo-classical contracting makes the case for government and quasi-government regulation of commerce; and (modern) relational contracting approaches business dealings from a relationships perspective, with the idea of governing a series of transactions through jointly developed behavioral norms (Macneil, 1978, 1980; Williamson, 1985). These three forms of modern contracting differ, in one respect, on
their view of the degree to which society should monitor both specific contracts and the nature of contracts in general.

A central theme of the governance and contracting discussion deals with balancing protection of the community/firm from exploitation with the need for efficient economic transactions. Focusing on the firm, a common goal of both hybrid relationships and relational contracting is to minimize the transaction costs of administering the transaction. These two views focus on developing a relationship within which to administer transactions, not just the conduct of an isolated transaction. The relationship begins with a basic contract, with the terms of the relationship mutually adjusted during the course of its development; theoretically, flexibility emerges as one of the deliverables of this strategy (Macneil, 1980; Nooteboom, 1996). This pursuit of minimal transaction costs and operational flexibility, however, links back to the question of trust and opportunism in the expanded discussion of TCE. Do people in the marketplace tend to rely on exploitation and opportunism (Williamson, 1985), or do they tend to rely on fair play (Granovetter, 1985; Hill, 1990)? The ensuing discussion of trust focuses on the latter argument, that fair play and resultant trust is more salient.
Trust

"There is an element of trust in every transaction."


Can I trust Acme Co.? Can I trust Kim at Acme Co.? Such questions are often asked in the business world, by both executives and basic workers. These questions frame trust within a transaction context, and can spawn several other questions about interorganizational trust. Some of these include how trust is defined, the relationships surrounding trust, and the development of trust as a component of governance mechanisms in interfirm relationships.

The “can I trust...” elements of these questions reflect back to the trust vs. opportunism debate. Game theory offers a frequently used way to approach this trust-opportunism question. Research observations from game theory describe the behavior of Agent A, who must decide whether to cooperate with Agent B for the benefits of the game interaction. Shadow of the future, an assessment of whether or not the game will be repeated with the focal agent at a later time, emerges as a key factor in determining patterns of cooperation between the gaming agents (Axelrod, 1984; Heide & Miner, 1992; Parkhe, 1993). Cooperation and the perceived likelihood of future interaction are positively correlated. Trust and cooperation, however, have frequently been treated as separate constructs (Mayer, et al., 1995). Thus, to accurately gauge trust within relationships, it is necessary to clearly define what constitutes trust. Segments of this section will include development of and dimensions of the trust framework, and selection of a trust framework appropriate to TCE modeling.
Development of the Trust Construct

Researchers originally viewed trust as a global personality trait that tended to be stable across situations. With the advent of attitude measurement, however, the scope of trust was expanded to include attitudes toward other persons or organizations based on learned interactions (Rotter, 1967). Current integrative modeling of trust includes both individual propensity to trust and the effects upon trust of interaction with other persons or groups (Mayer, et al., 1995).

Definitions of trust (Table 2) often include two central characteristics: (1) the willing exposure to risk within a relationship, and (2) the ethical acceptability of behavior. Exposure to risk includes themes such as belief that the other party will refrain from opportunism (Cummings & Bromiley, 1996); willingness for unguarded interaction (Tway, 1994); belief in another's good will (Ring & Van de Ven, 1992); authorization for an associate to act as one's agent in uncertain circumstances (Shapiro, 1987); and a willingness to forego behavioral guarantees (Nootbol, Berger, & Noorderhaven, 1997). The criteria for ethical acceptability of behavior include the assumption of honest negotiations (Cummings & Bromiley, 1996) and the belief that an associate will make ethically justifiable decisions when acting on the trustor's behalf (Hosmer, 1995).

Trust has sometimes been compared to and used interchangeably with cooperation, confidence, and predictability. However, there is sufficient evidence in the literature to suggest that trust should be viewed as a construct distinct from these three competing constructs (Mayer, et al., 1995). For example, cooperation can exist without trust, if the trustor believes societal sanctions will prevent the other party from behaving
TABLE 2
Definitions of Trust

<table>
<thead>
<tr>
<th>Authors</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotter, 1967</td>
<td>Expectancy held by person or group that another person or group can be relied upon.</td>
</tr>
<tr>
<td>Granovetter, 1973</td>
<td>Leaders are trusted if they are predictable; weak ties allow cohesiveness with outsiders.</td>
</tr>
<tr>
<td>Shapiro, 1987</td>
<td>“Social relationship in which principals - for whatever reason or state of mind - invest resources, authority, or responsibility in another to act on their own behalf for some uncertain future return.”</td>
</tr>
<tr>
<td>Atwater, 1988</td>
<td>“An integrative mechanism that creates and sustains solidarity in social relationships and systems.”</td>
</tr>
<tr>
<td>Hart, 1988</td>
<td>Personal: Emotional bond between individuals which is maintained because the cost of breaking bond is deemed greater than gain from doing so. System: Social mechanism activated by collective sense of internal order.</td>
</tr>
<tr>
<td>Bradach &amp; Eccles, 1989</td>
<td>“Trust is characterized by a cognitive ‘leap’ beyond the expectations that reason and experience would warrant: where opportunism might rationally be expected, trust prevails.”</td>
</tr>
<tr>
<td>Korsgaard, Schweiger, &amp; Sapienza, 1994</td>
<td>Belief by organizational members - especially subordinates - that procedural justice will be fair.</td>
</tr>
<tr>
<td>Hesterly, Jones, &amp; Madhok, 1994</td>
<td>Relational: informal, dyadic</td>
</tr>
<tr>
<td>Tway, 1994</td>
<td>The state of readiness for unguarded interaction with someone or something. Three factors: perceptions of intentions and competence, and capacity for trusting.</td>
</tr>
<tr>
<td>Mayer, Davis, &amp; Schoormann, 1995</td>
<td>“The willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor irrespective of the ability to monitor or control that other party.”</td>
</tr>
<tr>
<td>Hosmer, 1995</td>
<td>“Trust is the expectation by one person, group or firm of ethically justifiable behavior - that is, morally correct decisions and actions based upon ethical principles of analysis - on the part of the other person group, or firm, in a joint endeavor or economic exchange.”</td>
</tr>
<tr>
<td>Cummings &amp; Bromiley, 1996</td>
<td>Belief that another group or individual: I. makes good faith efforts to honor commitments; II. is honest in negotiations; and III. does not act opportunistically.</td>
</tr>
<tr>
<td>Nooteboom, Berger, &amp; Noorderhaven, 1997</td>
<td>“An individual trusts someone when he or she is willing to forego guarantees based on coercion or self interest.” (Subjective probability).</td>
</tr>
</tbody>
</table>
badly. Trust implies a sense of calculated risk, whereas confidence need not (Luhmann, 1988). For predictability, a person who has a history of cheating others may be predictable, but not trusted.

Thus, despite comparison and contrast with other constructs, trust eludes simple definition. Mayer, et al. adopted a multifaceted definition:

"The willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor irrespective of the ability to monitor or control that other party" (1995, p. 712).

This definition mirrors the increasing tendency to deal with trust as a multidimensional construct (Butler, 1991). This next section deals with these dimensions of trust, with a focus on trust conceptualizations which encompass economic exchange.

**Dimensions of Trust**

Among multidimensional treatments of trust, those of most interest to this study have economic-exchange applications. This discussion will address five such exchange-related models - two from psychology (Johnson-George & Swap, 1982; Rempel, Holmes & Zanna, 1985), one from organizational theory (Mayer et al., 1995), and two from TCE (Cummings & Bromiley, 1996; Nooteboom, Berger, & Noorderhaven, 1997). Then, the dimensions of the models will be compared for their value in analyzing trust within hybrid relationships.

Johnson-George and Swap (1982), building on research in psychology, address *interpersonal bargaining relationships*. These relationships feature interactions framed in
risky circumstances, which require the parties involved to use joint action and interdependence to achieve mutual goals. Factor analysis of the results revealed two dimensions, *emotional trust* and *reliableness* [sic]. Analysis of scale data, however, showed non-universal additional factors attributable to gender differences. Males tended to generate two additional dimensions, *dependability* and *general trust*, while females tended to generate one additional dimension, *physical trust*. Further tests employing the scale proved it valuable for assessing trust across male-female dyads; specific business applications, however, were not tested.

Also from psychology, Rempel, Holmes & Zanna (1985) theorized three dimensions of trust which each reflect “a different perspective or basis from which to make subjective probability judgments for a partner’s future behavior” (p. 98). The dimensions are: (1) *predictability*, the ability to accurately forecast the partner’s behavior; (2) *dependability*, the assessment of partner on overall personal characteristics rather than specific acts; and, (3) *faith*, an element of trust derived neither from experience nor calculativeness. Rempel, et al. then developed and validated a scale to measure these dimensions. Although the model was developed around male-female dyads, or social couples, these dimensions match closely to those of more transaction-specific dimensions of the next two models.

Organizational theory research likewise offers a three-factor model of trust. In a survey of 23 multidisciplinary journal articles on trust, Mayer et al. (1995) derived three dimensions of trustworthiness upon which party A assesses its trust for party B. These are: (1) *ability*, perceived competence in a specific skill area; (2) *integrity*, the perception
that “the trustee adheres to a set of principles that the trustor finds acceptable” (p. 719); and, (3), *benevolence*, the perceived willingness of the trustee to do good things for the trustor. Mayer et al.’s discussion describes benevolence as behavior of fair play, which translates into TCE terms as the opposite of opportunism.

Finally, TCE offers two models. The first is Cummings & Bromiley’s (1996) interunit trust model with three dimensions: (1) trustworthiness to keep commitments; (2) honesty in negotiations; and (3) willingness to forego opportunism. These dimensions had their roots in a theoretical literature review of TCE as applied to interorganizational strategies (Bromiley & Cummings, 1993, 1995). According to the interunit trust model, reputation develops through the cumulative effect of past transactions between two groups, or units. Thus, the Cummings and Bromiley model deals with trust as a cumulative belief about a referent group’s reputation, not a case-by-case analysis of behavior for trustworthiness. Bromiley and Cummings (1993, 1995) have argued that their model can be applied to comparisons of work units both within and across corporations.

Nootboom, et al. (1997) offer a TCE model of relational risk with a three-dimensional trust construct. The model seeks the threshold at which “trust can economize on transaction costs” (p. 313). The three dimensions of trust are: (1) *institutionalization* “of values and norms which constitute an ethics of transaction relationships” (p. 314); (2) *habitualization*, the development of friendship or family-type bonds; and, (3) *competence*, the degree to which the other firm, as per Mayer et al. (1995), is judged to have the ability to meet its commitments. Citing Williamson (1993), Nootboom et al. (1997) cautioned
that presence of the competence dimension of trust is not sufficient to sustain a long-term relationship.

In their approach to relational risk, Nooteboom et al. (1997) use trust, along with governance, as indicators of perceived risk and actual losses within hybrid relationships. In doing so, they emphasize institutionalization and habitualization as their focal dimensions of trust. The value of discussing the Nooteboom, et al. (1997) model lies in the correspondence of their trust dimensions with those of Mayer et al. (1995) and Cummings and Bromiley (1996).

Among these five models, clusters of similar trust constructs appear. Table 3 compares the respective dimensions of the five models. Emotional trust and faith form a cluster, dealing in their respective models with more spiritual aspects of the relationship. The dimensions of ability, reliability, predictability, keeps commitments, and competency all deal with the calculative assessment of behavior. Integrity (viewing the other party’s values as acceptable), dependability (trust from overall character assessment), negotiates honestly, and institutionalization cluster around the ideas of ethical behavior or adherence to norms. And finally, benevolence, eschews opportunism, and habitualization, as mentioned during our discussion of Mayer et al., form a cluster. Cummings and Bromiley’s (1996) three dimensions of *keeps commitments, negotiates honestly, and eschews opportunism* have parallels within the other four models, with an almost identical match with Mayer et al. (1995) and Nooteboom, et al. (1997).
TABLE 3

Multidimensional Modeling of Trust Relating to Economic Exchange

<table>
<thead>
<tr>
<th>Authors</th>
<th>Dimensions of Trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johnson-George &amp; Swap, 1982</td>
<td>Emotional, Reliability</td>
</tr>
<tr>
<td>Rempel, et al., 1986</td>
<td>Predictability, Dependability, Faith</td>
</tr>
<tr>
<td>Mayer, et al., 1995</td>
<td>Ability, Integrity, Benevolence</td>
</tr>
<tr>
<td>Cummings &amp; Bromiley, 1996</td>
<td>Keeps Commitments, Negotiates Honestly, Eschews Opportunism</td>
</tr>
<tr>
<td>Nooteboom, et al., 1997</td>
<td>Competency, Institutionalization, Habitualization</td>
</tr>
</tbody>
</table>

Comparative Assessment

Now that these multidimensional models of trust have been discussed, the five will be assessed to determine which will best support this study involving hybrid relationships. The two models from psychology (Johnson-George & Swap, 1982; Rempel, et al., 1985), they lend themselves more to analysis of social relationships, especially male-female dyads, than economic transactions. Thus, the psychology-based models are dropped from consideration. This leaves the models from organizational theory and TCE.

Of the remaining three, the Cummings and Bromiley (1996) interunit trust model shows the most promise for this study. The model’s dimensions have an advantage over those of Mayer et al. (1995) because of direct theoretical linkages to TCE. Further, the Cummings and Bromiley model has an advantage over Nooteboom, et al. (1997) in the developing discussion for the following reason: the Cummings and Bromiley model better supports the discussion thus far of trust as a primary factor in sustaining economic transactions (e.g., Chiles & McMackin, 1996; Hill 1990; Granovetter, 1985). Nooteboom
and colleagues, rather, deal with relational risk as the key factor determining structure of an economic relationship. Trust is thus relegated to a supporting role as an influence upon risk (Nooteboom et al., 1997). Advantages of the Cummings and Bromiley interunit trust model (1996), including its capture of an opportunism dimension, will further be discussed in Part II of this chapter.

**Summary**

Part I of Chapter II has presented an overview of TCE and its components. Initial discussion dealt with transaction attributes and assumptions. Transaction costs are the costs incurred in administering a business deal; according to TCE, governance mechanisms are chosen with the goal of minimizing transaction costs. Selection of a governance mechanism is determined by the three characteristics of the transaction: asset specificity, uncertainty, and frequency. These transaction characteristics are moderated by the three behavioral assumptions of opportunism, bounded rationality, and risk neutrality.

The usefulness of TCE for the study of organizations has increased with the addition of hybrid relationships to the traditional governance poles of market and hierarchy. Hybrid governance mechanisms involve long-term contracts between firms, with the focus on relationship as opposed to discrete transaction (Williamson, 1991). The hybrid mechanism has also added fuel to the debate over whether opportunism or trust is more salient within economic exchanges.

Treatment of trust included a review of the development of the trust construct and the trend toward multidimensional models of trust. Finally, a TCE-based model of trust was selected for this study. The Cummings and Bromiley (1996) interunit trust model
theorizes three dimensions for analyzing the behavior of a specific, referent exchange partner: keeps commitments, negotiates honestly, and eschews opportunism. This concludes Part I of this literature review chapter. The next topic will be development of a TCE-based logistics alliance model.
Part II. Development of a TCE-Based Logistics Alliance Model

As mentioned in Part I, recent theory developments in transaction cost economics (TCE) have introduced the concept of hybrid transactions into its governance options (Williamson, 1985, 1991). Hybrid transactions are based on the notion of relational governance, in which the formal contract serves as a framework for development of a long-term relationship (Heide, 1994; Macneil, 1978, 1980; Williamson, 1985, 1991). Hybrid transactions add new perspectives to the debate over whether opportunism (Williamson, 1975, 1985) or trust and fair play (Granovetter, 1985; Hill, 1990) are more prevalent in business transactions. Likewise, recent theoretical developments on the role of trust in TCE also suggest a possible expanded role of behavioral factors in relationship governance mechanism linkage (Chiles & McMackin, 1996). A particularly interesting vehicle for investigating the role of trust and behavioral factors would be the realm of logistics alliances (LAs).

The primary form of LA consists of relational-governance-based linkage between a third-party logistics specialty firm and a shipper of goods (e.g., a manufacturer or a distributor) to jointly design and implement a system which expedites shipment of products to the customers (Bowersox, 1990). Secondary forms include networks among logistics providers or linkages for joint product marketing. This study will focus on the primary form of LA involving a shipper and a logistics provider; the focal logistics providers will be motor carrier firms.

Early research identified key characteristics of LAs as (1) high-quality, trust-based interpersonal relationships and, (2) the use of electronic data interchange (EDI)
(Bowersox, et al., 1989; Bowersox, 1990). Subsequent studies (e.g., LaLonde & Masters, 1994; Rogers & Daugherty, 1995) have also highlighted prominent roles for trust and EDI in LAs. Likewise, a qualitative analysis conducted by this author of trade-publication articles on LAs written in 1995 confirmed trust and EDI as two critical factors. In 15 such articles, trust was mentioned 10 times and EDI eight times. Further discussion will develop the idea of relational focus and the trust aspects of LAs. Although EDI falls under governance mechanisms, the presence of EDI links also reflects back upon trust. Since more sophisticated EDI linkages between shipper and carrier allow each access to the other's proprietary information, the existence of EDI linkages reflects an element of trust within the LA relationship.

This LA emphasis on trust relationships corresponds to the idea of hybrid governance forms within TCE. Indeed, the logistics and LA literature shows that several researchers have used the TCE model in their inquiries (Maltz, 1994; New & Payne, 1995; Schmitz, Frankel, & Frayer, 1995; Stank & Maltz, 1996). Thus, this study will use LAs as the unit of interest to investigate the relationship between trust and governance in hybrid relationships. Development of this Logistics Alliance Model of interfirm cooperation will integrate three recent research streams: (1) the role of trust and relational governance in economic exchange (Zaheer & Venkatraman, 1995); (2) the proposed use of trust as an integrating mechanism for the behavioral factors of TCE within hybrid relationships (Chiles & McMackin, 1996); and, (3) the recommendation of the TCE as the preferred framework for the study of logistics (New & Payne, 1995). Integration of these three
research efforts, when dovetailed with classical TCE concepts, will result in a Logistics Alliance framework and in a set of testable hypotheses.

**Logistics Alliances as Hybrid Relationships**

This next section will address LAs as a unique form of hybrid relationship, and also will touch upon the importance of trust within LAs. Specific subsections will discuss the origins of LAs, and LA structure and process as examples of relational governance.

**Origin of Logistics Alliances**

The relationship between manufacturer Ford and logistics provider American Presidents Co., addressed in Chapter I, was termed an LA, a type of strategic alliance (Bowersox, 1990). Strategic alliances grew exponentially during the 1980s as a worldwide response to the challenge of achieving competitiveness in the fast-paced global economy. Compared to other strategic alliance forms (e.g., Borys & Jemison, 1989), LAs are the newest, and much of the research is exploratory, using case studies or surveys tied to inductive inquiry (Bowersox, et al., 1989; Ellram, 1992; Frankel, 1995; Heide, 1994; Muller, 1988; Premeaux, Abshire, Mondy & Rader, 1995; Rogers & Daugherty, 1995).

LAs emerged as a result of two recent U.S. economic phenomena: A wave of deregulation of the U.S. transportation industry which began in the Carter and Reagan administrations (Bowersox, 1990), and a trend in the 1980s toward the "lean corporation" (Bruton, et al., 1996). Deregulation opened up a new variety of options to manufacturers who wanted to ship their products. In some cases, manufacturers decided that they could contract with outside logistics specialists to transport their goods, rather than maintain an internal fleet of trucks and drivers (Bowersox, 1990; Davisson, 1986). Thus, the post-
regulatory era created a new day for the common-carrier transportation providers. Gone were the days when common carriers could only offer government-mandated, one-price-fits-all shipping rates and services (Johnson & Wood, 1993). In 1986, the Council of Logistics Management's annual bibliography began maintaining a category of magazine and journal articles called "third-party distribution" (LaLonde, 1986, p. 58). With deregulation, third-party distribution had become a creative process.

When deregulation of the U.S. transportation industry began, trucking was one of the first segments deregulated. Shippers (firms wanting to ship goods) approached the outsourcing opportunity created by deregulation of the trucking industry by exerting pressure on carriers to achieve the lowest short-run cost (Muller, 1988). This hurt both shippers and truckers: Numerous carriers went bankrupt due to declining profit margins, and shippers incurred severe customer-service problems due to the low-quality performance of the surviving carriers. This caused customers to reassess their relationship with third-party logistics providers, such as truckers, and to view them as potential third parties in the traditional dyadic buyer-supplier partnership (BSP).

One of the first post-regulatory era empirical studies dealing with LAs was the joint research project involving the Council for Logistics Management (CLM) and Michigan State University (Bowersox, et al., 1989). Their database included 695 North American firms surveyed on leading-edge practices; 187 U.S. manufacturing firms surveyed on anticipated changes in logistics practices during the 1990s; and 27 Canadian manufacturers surveyed as a comparison group to U.S. manufacturers (Bowersox, et al., 1989). As previously mentioned, their analysis identified EDI and trust as critical
components of successful LAs. The study also yielded a base typology of five shipper-logistics provider relationships: a spot transaction, recurring transactions, and three alliance types; the alliance types are summarized in Table 4.

Third-party logistics is undergoing a period of rapid growth in the United States, despite the reluctance of many retailers to give up what they consider a core competency (Fernie, 1989; Leahy, Murphy & Poist, 1995; Retailers bullish, 1996). Third-party providers of contract logistics did an estimated $15 billion of business in 1994, with industry experts predicting a $50 billion industry by the year 2000 (Cozy up, 1994). LAs present in this accelerating field of third-party logistics reveal certain basic patterns of form and activity. Thus, the next section will explore the structure and process of LAs, with an emphasis on the function of relationships and trust within the field.

**LA Structure and Process as Relational Governance**

Relational governance has been conceptualized as having two components, structure and process (Zaheer & Venkatraman, 1995). *Structure* is the basic interfirm framework under which the transactions will occur, and *process* is the joint action undertaken between firms to carry out the transactions. Over time these activities produce norms for the procedures of this relational exchange (Macneil, 1980). Some have termed the resulting behaviors *procedural asset specificity* (Malone, Yeats & Benjamin, 1987; Zaheer & Venkatraman, 1995). This structure-process dichotomy fits with the model of modern relational contracting, with structure equivalent to the base contract and process equivalent to the activities which actually carry out the contract (Macneil, 1980; Williamson, 1985). LAs, as hybrid relationships, fit the relational governance model.
<table>
<thead>
<tr>
<th>FACTORS</th>
<th>Partnership</th>
<th>Third Party</th>
<th>Integrated Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formality</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Dependency</td>
<td>Synergy without dependency</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Expected Duration</td>
<td>Not specified</td>
<td>Expectation of longevity</td>
<td>Part of strategic plan</td>
</tr>
<tr>
<td>Exclusivity</td>
<td>No</td>
<td>Yes</td>
<td>Depends on service provider's size</td>
</tr>
<tr>
<td>Modification of Firm Practices</td>
<td>Minimal</td>
<td>Service provider(s) and shipper modify procedures/systems for mutual benefit</td>
<td>Shipper replaces internal capability with external expertise</td>
</tr>
<tr>
<td>Increased Financial Commitment</td>
<td>Minimal</td>
<td>Specific assets purchased</td>
<td>High; difficult to exit. Often covered by break-up agreements.</td>
</tr>
<tr>
<td>Service Provider Role</td>
<td>Standardized services</td>
<td>Some custom services</td>
<td>Full range; service provider operates as consultative problem-solver.</td>
</tr>
<tr>
<td>Risk Sharing</td>
<td>No</td>
<td>Some penalty/bonus structures; some shared infrastructure expenses.</td>
<td>Extremely high; this is why so few of this type of LA exists.</td>
</tr>
<tr>
<td>General Remarks</td>
<td>Emphasizes synergy between and joint maximization of both firms' existing systems.</td>
<td>Internal corporate logistics departments with excess capacity seek external service business.</td>
<td>Service provider functions as &quot;logistics utility&quot; under full integration.</td>
</tr>
</tbody>
</table>

Thus, a discussion of LA structure and process will show the unique aspects of this organizational form.

**LA Structure.** Structure can be approached initially in terms of the decision options of firms considering LAs as a business option. LAs result from a make-or-buy decision by the shippers to outsource at least part of their logistics functions (Rogers et al., 1995). This coincides with moves by firms to focus their activities on core products. Non-core functional areas, such as logistics, could be outsourced (Porter, 1990; Stank & Maltz, 1996). As mentioned in the section on governance mechanisms, the hybrid relationships employ the bi-lateral governance mechanism associated with alliances (Williamson, 1985; 1991). Alliances (e.g., LAs) provide "vertical integration without ownership" (Schmitz, et al., 1995); this is also termed *quasi-integration* (Blois, 1972; Zaheer & Venkatraman, 1995). In LAs, the shipper gets the benefits of internal control - namely the ability to acquire customized services - without the financial risks of ownership (Ellram, 1992; Gentry & Vallenga, 1996).

The shipper also receives improved customer service and cost savings from such an association with the carrier (Bowersox, 1990; Stank & Maltz, 1996). The third-party logistics provider (the carrier) is able to *leverage capital* employed, utilizing and efficiently coordinating its human and physical resources across multiple customers. The goal is both economies of scale and economies of scope (Whipple, Frankel, & Frayer, 1996). Thus, both parties realize financial advantages in such LAs.

LAs are similar to the Borys and Jemison (1989) type of buyer-supplier partnerships (BSPs). BSPs focus on the establishment of a continuing relationship
between the buyer and supplier with the goal of exchanging information to allow mutual product/service improvement and cost reductions (Ellram, 1990; Gentry 1994; Heide & Miner, 1992). BSPs involve varying combinations of firms along the value chain, but the most common pairings tend to be components suppliers and manufacturers (Burgers, Hill & Kim, 1993; Martin, Mitchell & Swaminathan, 1995), and finished-goods manufacturers and retailers/distributors (Anderson & Narus, 1990; Anderson & Weitz, 1992; Kumar, Scheer, & Steenkamp, 1993). BSPs focus on the buyer-supplier dyad, with any third-party logistorian considered a peripheral player (Gentry, 1994). The LA inserts the custom logistics provider between the supplier and buyer, and focuses on the relationship between the carrier and the party from the buyer-supplier dyad which coordinates the shipments (Bowersox, 1990). A study of U.S. buyer-supplier partnerships found that coordination of third-party logistics was a single-firm decision in 78 percent of cases: shipments were coordinated by buyers 38 percent of the time, by suppliers 40 percent of the time, and by multiple parties 22 percent of the time (Gentry, 1994). The presence of custom service and joint system development makes LAs unique from outsourcing, a procedure in which a firm purchases an existing logistics service plan (Bowersox, 1990).

LAs appear in three types (see Table 4), progressively increasing in complexity and degree of relational interlock as they shift from partnership through third-party agreements to integrated service agreements (Bowersox, et al., 1989). Partnership agreements emphasize joint maximization of the existing systems of both the shipper and the service provider (Bowersox, et al., 1989). Third-party agreements feature the modification of both shipper and service-provider procedures for mutual benefit. In integrated service
agreements, the rarest of the three, the service provider acts as a “logistics utility” for the shipper, replacing the majority of the shipper’s in-house logistics capability.

Logistics service providers classify themselves into two groups. Non-asset based organizations focus on planning and management of logistics systems. Alternately, asset-based organizations provide the equipment, personnel, and facilities used to deliver hands-on logistics tasks, along with varying degrees of planning and management (Leahy, et al., 1995). These asset-based firms can either own or lease equipment, such as trucks and trailers, or facilities, such as warehouses and air hubs.

As mentioned earlier, basic LAs consist of third-party firms providing logistics services for shippers, normally buyer-supplier dyads such as component suppliers and manufacturers or manufacturers and retailers/distributors. In most industries, the purchasing department is a primary point of contact for contracting and coordinating logistics (Gentry, 1993; Leenders & Fearon, 1993). In a study by the Center for Advanced Purchasing Studies, 91 percent of purchasing professionals who participated in the survey reported they were involved in in-bound logistics decisions (Gentry, 1993).

LA Process. Process within LAs, due to the high velocity of logistics activity, relies a great deal upon trust, which will be addressed in the context of LAs later in the discussion. It involves, among other things, a willingness to overlook minor shortcomings of the alliance partner because of belief in building the long-term relationship (Ring & Van de Ven, 1992; Ring, 1996). The increasing intensity of the alliance as the relationship swings from partnership towards integrated services also triggers investments in specific assets (Bowersox, et al., 1989; Rogers & Daugherty, 1995). Many of these assets are
procedural in nature (Malone, et al., 1987). Channels research shows that shippers often require carriers to adopt electronic data interchange (EDI) as a means to coordinate traffic flow; also, some proactive carriers initiate their own EDI programs to increase their competitiveness (Walton, 1994). Supplier certification for purchase of transportation services may consider not only EDI, but also whether the carrier has industry-compatible equipment and has invested in driver training for such activities as hazardous materials handling (Gibson, Mundy & Sink, 1995). Along with the investments comes increased risk-sharing. Activities beyond partnership often involve contractual clauses addressing both incentive and penalty contingencies for the carriers (Bowersox, et al., 1989). These investments serve to bind the shipper and carrier into long-term relationships.

The break-up of a long-term LA relationship can be costly for both sides. The carrier loses a client into which it had invested time and assets and relationship building; similarly, the shipper loses the provider which had taken over varying degrees of its logistics functions, certain functions which the shipper no longer performs in-house. Again, this coordination between the two firms represents the procedural asset specificity which arises from the relational governance processes (Malone, et al., 1987; Zaheer & Venkatraman, 1995).

Research on transportation contracting suggests that one of the major benefits of the long-term relationships such as LAs is experienced-based cost savings (Brier, 1989). The experience curve, in general terms, is used to determine cost savings based on both worker learning and systems improvements for a given process (Noori & Radford, 1995). Thus, contracting offers both shipper and carrier the chance to pursue cost controls
through the experience curve. The long-term benefits of the contract relationship include market share for the carriers and cost savings for the shippers (Brier, 1989). Also, long-term partnerships allow carriers and other third-party logistics the opportunity to leverage capital, which is the “firm’s ability to plan, coordinate, and implement the use of its physical and human resource base and/or skills over multiple consumers to achieve economies of scale and scope” (Whipple, et al., 1996, p. 32).

A survey of prominent third-party logistics providers, as identified by Traffic Management magazine's 1994 "who's who" list, provided current information on processes linking shippers and logisticians (Leahy, et al., 1995). Most commonly provided services included distribution system planning, provision of EDI service, performance tracking, freight consolidation, and carrier selection. Customer service, mutual trust, and long-term relationships were cited as factors necessary for creating successful partnerships.

Several special processes are providing challenges for third-party logisticians, especially carriers. These include cross-docking, intermodal transportation and just-in-time (JIT) manufacturing deliveries:

*Cross-Docking.* This involves coordination among shippers, carriers and warehouses to facilitate the joint movement of goods of multiple shippers; the shippers are often business competitors. At a central warehouse, in-bound shipments are sorted into full truckloads going to a common destination, with shippers sharing the cost savings (Andel, 1996b; Cooke, 1996). Cost savings arise for all parties: Products are not stored at the central warehouse; the carrier hauls a full truckload to one location; the distributor gains the efficiencies of handling a full truckload shipment of a single merchandise type.
Intermodal Transportation. Intermodal involves transporting goods from origin to terminal destination in standardized, sealed containers, using multiple transportation modes (Bowersox, 1990). The shippers receive lower rates because the carriers maximize the strengths of each mode, such as trucks for short-haul and rail for long-haul (Johnson & Wood, 1993), and also can route shipments into pathways with excess capacity. Specific routes were once specified by shipper in each transportation order (Johnson & Wood, 1993).

JIT Delivery. This technique allows manufacturers to greatly lessen inventory and materials handling costs by receiving parts often within hours of when an assembly run begins. Thus, JIT carriers incur extreme pressures to meet tight delivery and pickup schedules (Bowersox, 1990; Gentry & Vallenga, 1996; LaLonde & Cooper, 1989).

These three special activities highlight key aspects of process within LAs. All three involve initiating trust-based frameworks, planning and adjusting on the move, and sharing risks. Trust is critical in crossdocking, as the carrier is trusted to move the shipper’s goods often with competitor’s goods; in intermodal, because the carrier is trusted to select the best route; and in JIT, because the manufacturing process shuts down if the carrier misses deliveries. Planning and adjusting on the move is the very essence of intermodal and JIT; and in crossdocking, the outbound loading plan materializes as inbound shipments arrive at the sorting dock. Finally, sharing risks appears in the increasing number of penalty-bonus clauses appearing in carrier contracts with shippers.

Long-term carrier contracts, as noted, were not possible until after transportation deregulation (Brier, 1989; Crum & Allen, 1990). Thus, getting and maintaining contracts
offers a special challenge for post-regulation carriers. Increases in market share from
gaining big shippers may be more difficult in the future. Increases in long-term
contracting, coupled with the fact that shippers have been decreasing the number of
carriers with which they work, could mean that carriers who lose a big account may have
trouble replacing it in the future (Crum & Allen, 1990). Also, new carriers may
experience trouble getting on the preferred carrier list of major shippers.

In summary, LAs are a unique form of strategic alliance. Although sharing
similarities with the Borys and Jemison (1989) type of buyer-supplier partnership, LAs are
unique. Whereas BSPs view third-party logisticians as peripheral players, LAs focus on
the interface between the logisticians and the BSP member who coordinates logistics
(Bowersox, 1990; Gentry, 1994). Also, one critical element for success of LAs appears to
be quality, trust-based interpersonal relationships (Bowersox, 1990). Third-party logistics
is an expanding industry, with a need for processes which will increase coordination
between shipper and carrier. Examples of processes which provide special coordination
challenges and a reliance on trust are crossdocking, intermodal transportation, and JIT
manufacturing.

One of the primary benefits of the long-term interaction between carrier and
shipper is experience-based cost savings that allow the logistics specialists to leverage
their capital assets across a number of customers; this, in turn, provides cost savings for
shippers. The entire LA process, moreover, focuses not just on the transaction at hand,
but rather on building a relationship in which transactions can take place. This concludes
the overview of the origins, structure and process of LAs. As mentioned earlier, TCE has
become increasingly suggested as a framework for studying logistics transactions. The following discussion will explore this suggestion.

**Trust's Integrating Role in the Logistics Alliance Model**

The previous section discussed LAs as an example of hybrid relationships, and LA structure and process as an example of relational governance. This section addresses the topics of an expanded role for trust in TCE, the interlocked reframing of static behavioral assumptions as variables, and the impact of behavioral variables on the transaction characteristic-governance linkage. The final topic’s discussion will also generate the hypotheses for this study. Thus, the Logistics Alliance Model will be explained in detail in the ensuing pages. The trust-as-integrator topic begins with a return to the focus on LAs.

**Trust in Logistics Alliances**

Trust-driven LAs, as previously mentioned, are arguably the most newly identified form of hybrid relationship. Because trust readily arises as a topic in most analyses of hybrid relationships, the more mature area of buyer-supplier partnership (BSP) literature offers insights into the role of trust between firms which could be useful to the study of LAs. In recent years, the commitment of firms to *idiosyncratic investments* - assets useful only within a specific project - and the general acceptance of flexible contract terms has drawn buyers and suppliers closer to one another (Anderson & Weitz, 1992). This has increased the willingness of buyers to actively participate in the process of improving the performance of the BSP, and encourages mutual forgiveness of short-run errors in order to allow development of long-term relationships (Anderson, Lodish & Weitz, 1987). In a related study, Anderson and Narus (1990) found that trust was the core construct which
enabled manufacturers and distributors to develop such interdependencies. Similarly, Ganesan (1994) found that a strong presence of trust allows manufacturers and retailers to better focus on future activities. A study in relationship marketing found that both trust and commitment served as mediators between antecedents and outcomes of the partnership (Morgan & Hunt, 1994). Despite the fact that trust shows itself to be active in the above-mentioned partnership scenarios, the proper position for trust in the alliance models remains unresolved.

One possible position for trust involves the very creation of alliances. In the LA arena, the ability of shippers and carriers to trust one another influences whether the logistics interaction ever moves from outsourcing possibility to alliance. The process of trust generation can be explained by the contingency decision-making model, which measures problem uncertainty by the dimensions of goal consensus and technical understanding of the problem (Daft, 1992; Thompson, 1967). A combination of high goal consensus and high technical understanding tends to minimize uncertainty about both the nature of the problem and how to solve it. Thus, the joint development of an LA system can build trust between shipper and logistician that helps both sides identify both unilateral and mutual goals. This development process, if successful, would allow both shipper and carrier to trust each other's judgment in making quick adjustments to logistics flow, an activity that goes on all hours of the day, every day of the year (Bowersox, 1990). This parallels Williamson's (1985) discussion of the informal norms and operating systems that arise between firms which have long-term dealings with each other. This degree of trust and the accompanying integration can become highly developed, as is the case between
J.B. Hunt Logistics and automotive van customizer Glaval of Indiana (Adams, 1995). The Hunt on-site manager reports that on the joint transportation team, the teamwork is so good that outsiders can’t tell which firm a transport person actually works for. As mentioned earlier, trust is regarded as a critical ingredient for successful LAs.

Societal level relationships mark another suggested position for charting trust perceptions (Granovetter, 1985). One of the barometers of trust is an individual’s or firm’s reputation, which is the assessment that others have of it for likely behavior patterns (Greif, 1993; Williamson, 1985). Reputation represents the firm’s ratings for behavior by both current and potential partners. In the alliance arena, channel members who have a reputation for making sacrifices to help other channel members earn a reputation as a desirable partner. On the other hand, a firm which acts opportunistically likely suffers a reduction in reputation (Anderson & Weitz, 1992; Macaulay, 1963; Tesler, 1980).

The influence of trust on a party’s ability to do business, however, is hardly a new notion. The Maghribi traders network, active in the Mediterranean basin during medieval times (Greif, 1993), used trust and reputation as the driving control factors behind this early LA prototype. The Jewish Maghribi traders acted as agents for international distribution of goods, using Jewish law as the basic structuring device for the transactions (Greif, 1993). Maghribi traders were governed by a coalition, “a group of traders whose member merchants were expected to hire only member agents” (Greif, 1993, p. 535) to conduct transactions. To enforce group norms, the coalition barred from further transactions traders who cheated or acted opportunistically. If in the process of carrying out transactions the traders cheated, they lost the trust of the coalition, and their
reputation was destroyed. This example from medieval times clearly supports Hill’s (1990) contention that the market place avoids doing business with firms who possess a bad reputation for trustworthiness.

From this discussion, reputation is arguably a snapshot of the market’s assessment of how much Firm X can be trusted as of a given point in time. Reputation, however, is not a static perception - especially in ongoing relationships. The dimensions of the Cummings and Bromiley inter-unit trust model (1996) illustrate well the dynamics of reputation across active LA dyads:

**Keeps commitments.** Third-party logistics providers must be able to adequately perform the contracted tasks. Since failure rates are high for firms in the third-party logistics arena, shippers are reluctant to ally with a start-up logistics provider, preferring to partner with logisticians with a good reputation (Foster, 1996). For example, carriers often must undergo certification from a shipper to be eligible for the shipper’s business (Gibson, et al., 1995). Also, shippers must perform as reputable partners; larger third-party firms such as Ryder Integrated Logistics simply decline to work with potential clients judged to be either unprofitable or troublesome (Foster, 1996).

**Negotiates honestly.** Carrier responsibilities and compensation are two items prominent in LA contract negotiations. Shippers wish to avoid carriers who have a history of contracting to perform services beyond their capabilities (Foster, 1996). As for carrier compensation, many third-party firms are shifting from traditional cost-plus pricing to gain-sharing - including shipper cost savings as part of their remuneration (Foster, 1996). Thus, carriers want to ensure that shippers accurately identify areas of projected cost
savings during negotiations. Work by alliance partners to reduce information asymmetry, uneven levels of information across the dyad, represents activity to avoid opportunism and increase trust (Williamson, 1985).

**Eschews opportunism.** Opportunism involves actions by one party to take unfair advantage of a partner in a transaction. Examples of opportunistic behavior include outright cheating, deceit through information manipulation, and extraction of predatory economic gain due to spot market situations (Williamson, 1985). Both shipper and carrier have chances for opportunism. As mentioned above, shippers could hide potential areas of cost savings during contract negotiations. Information manipulation becomes progressively more difficult as the LA relationship advances from partnership toward integrated service agreement (Bowersox et al., 1989; Bowersox, 1990). The use of EDI, for example, helps build trust, since both shipper and carrier are exchanging proprietary information. A final example of opportunism, seeking predatory economic gain, recalls the early post-regulatory days in the motor carrier industry. During those days, shippers drove down carrier rates, bankrupted carriers, and ruined their own distribution-related customer service rating (Foster, 1988; Muller, 1988). Third-party logisticians also have chances at opportunism, such as charging shippers premium rates to help them out of any emergency situations. In both cases, the reputation of the opportunistic parties likely would suffer, with other firms in the market place less likely to trust them (Hill, 1990).

In summary, one critical decision factor in hybrid relationships involves balancing the risk of investment in specific assets with the benefits of a more efficient logistics operation. The long-term relationships of LAs are built upon mutual dependencies, with
day-to-day activities governed by trust. A failure to develop trust could prevent the relationship from getting beyond outsourcing to become an LA. Development of trust also relates to development of goal consensus and mutual understandings of the technical requirements of the transaction. In an atmosphere of trust, the shipper permits the carrier to act on its behalf during times of crisis and emergency, and visa versa. Ability to act quickly according to mutual goals is essential to successful logistics operations.

Desirability as a logistics partner in part arises from the firm’s reputation for making sacrifices for other channel members. Specific examples are manifest in examples of shipper and carrier behavior options under the three dimensions of trust: keeps commitments, negotiates honestly, and eschews opportunism. The proper position of trust in alliance models, however, remains unresolved. Thus, an argument from enhanced TCE theory about using trust as a moderator of the transaction characteristic-governance linkage is particularly interesting.

**Trust as an Integrating Mechanism for Behavioral Variables**

According to TCE, transaction characteristics influence choice of governance mechanism in the presence of behavioral assumptions. Of these behavioral assumptions, opportunism and bounded rationality are mentioned most frequently, with risk neutrality receiving lesser attention (Williamson, 1985). Arguments have emerged, however, that question the status of all three as static assumptions. Several scholars suggest that trust is more prevalent than opportunism in many economic relationships (Granovetter, 1985; Heide & John, 1992; Hill, 1990; Ring, 1996). Others argue that bounded rationality is diminished by the interchange of information common in long-term business relationships.
Risk neutrality likewise draws scrutiny. Neutrality works best under assumptions of objective costs of the "economic natural selection" branch of TCE; under the subjective costs of the more mainstream managerial choice branch of TCE, situational contingencies would cause variable risk postures among managers (Chiles & McMackin, 1996). Recent theory development involving trust and TCE, however, proposes to recast the behavioral assumptions, or constants, as moderator variables which influence the characteristics-governance linkage (Chiles & McMackin, 1996; Noorderhaven, 1994, 1995). This viewpoint also seeks to measure the interaction of the behavioral factors, which tend to be treated as discrete forces in the literature (Chiles & McMackin, 1996).

In the literature, Chiles and McMackin (1996) found that trust had links to all three behavioral variables. Thus, they selected trust as a tool with which to integrate the functions of the behavioral factors. Numerous authors have cited links between trust and opportunism (Bradach & Eccles, 1989; Cummings & Bromiley, 1996; Ghoshal & Moran, 1996; Granovetter, 1985; Larson, 1992). Others have linked trust and bounded rationality (Lincoln, 1990; Powell, 1990; Ring, 1996). Support also appears for linking trust and risk (Johnson-George & Swap, 1982; Mayer, et al., 1995; Ring, 1996; Ring & Van de Ven, 1992; Zucker, 1986). These trust-TCE interactions involve:

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Chiles and McMackin (1996) do not explicitly call the behavioral variables "moderators." Their research propositions, however, specified that trust and risk would influence the level of asset specificity at which firms would switch over to alternative governance mechanisms. According to Baron & Kenny (1986), a third variable which influences the level of the dependent variable is a "moderator."
**Opportunism.** One of the key debates surrounding TCE research involves whether opportunism, or trust, is more salient within economic transactions. Basic TCE argues for extreme vigilance against opportunism. Since opportunistic people do exist, and they are difficult to identify, transaction costs are minimized if managers assume all persons are opportunistic (Williamson & Ouchi, 1981). Although later discussion acknowledges that relationships based on trust are more enduring than those without trust, the warning against opportunism remains intact (Williamson, 1985). Several argue, however, that opportunism is overrated as a threat to protecting oneself in business transactions. These counter arguments offer such examples as damage which opportunism does to a firm's reputation (Hill, 1990); embeddedness (Granovetter, 1985); evidence that some firms maintain successful long-term business relationships based on mutual trust rather than formal contracts (Macaulay, 1963); social norms as behavior controls (Butler, 1991); and game theory's "shadow of the future," which says that the likelihood of future dealings with a party B makes party A less likely to cheat (Axelrod, 1984; Heide & Miner, 1992; Parkhe, 1993). In business negotiations, actors operating in a cooperative game style reach decisions much more quickly than actors operating in a competitive, tactical style (March, 1988).

Opportunism has been measured in both alliance and trust research. In his study of alliance structure and performance, Parkhe (1993) found that perceptions of opportunism correlate positively with contractual safeguards, and negatively with performance and cooperative history. Cummings and Bromiley's (1996) model of inter-unit trust includes as a factor the degree to which the referent party avoids opportunistic behavior. Thus, the
use of the Cummings and Bromiley (1996) model allows opportunism measures to be subsumed under the trust measures.

**Bounded Rationality.** Bounded rationality acts in relation to the amount of uncertainty in a given transaction situation (Williamson, 1975). Chiles and McMackin (1996) suggest that trust in a relationship would lead to looser controls on the exchange of critical information between firms, thus diminishing the degree of bounded rationality of parties in an LA. Powell (1990) argues that trust can reduce complexity more quickly than reliance on more formal governance mechanisms such as hierarchical decisions or bargaining.

Also, Williamson (1975) argues that the language problems' portion of bounded rationality could be attenuated through repeated interactions with a particular type of transaction. Idiosyncratic knowledge - details about the specifics of a situation - may accrue to those who frequently conduct such transactions (Williamson, 1975, citing Hayek, 1945). Furthermore, “informal team accommodations, attributable to mutual adaptation among parties engaged in recurrent contract” also represent a form of idiosyncratic knowledge (Williamson, 1975, p. 62). Of interest to this study, this type of team accommodation forms as a result of the joint system development of LAs. Team accommodations describe the type of activities which occur in the process component of relational governance. Thus, within the LA framework, bounded rationality would be attenuated by the intra-dyad process activities of relational governance. For example, the construct of information exchange has been measured in the context of relational activities (Heide & Miner, 1992; Warnock, 1996).
The above suggests that the nature of the LA relationship and the trust that develops will attenuate bounded rationality. Unlike opportunism or risk propensity, bounded rationality is a "state of nature" which is difficult to measure precisely. Further, whereas opportunism and risk propensity can vary up or down during the course of an LA, it can be argued that bounded rationality is an ever-decreasing phenomenon. Bounded rationality, thus, will not be explicitly measured.

**Risk Neutrality.** Ring and Van de Ven (1992) have shown a relationship between trust and risk. The nature of the complex interaction between these two factors, however, has not been clarified (Chiles & McMackin, 1996). Chiles and McMackin (1996) characterize trust-risk linkage as "subjective concepts embedded in a web of social relationships" (p. 90). They argue that this trust-risk linkage will influence both information-related transaction costs and likelihood of commitment of specific assets. The presence of trust influences information-processing transaction costs by (a) lessening the need for information exchange to verify behavior before acting on other party's behalf (Chiles & McMackin, 1996), and (b) increasing the likelihood the parties will exchange information which is comprehensive and timely (Zand, 1972) or proprietary (Ring & Van de Ven, 1992).

Examples of both these trust-based transaction cost reductions appear in LAs. Lessened need for behavior verification and sharing of critical information both appear in the quick-response systems which link some retailers with their manufacturers (LaLonde & Masters, 1994). Via EDI links, manufacturers monitor the retailer's sales figures and automatically replenish the retailer's stocks of given items to predetermined inventory.
levels. Similarly, the trust-risk linkage can influence the willingness of parties to invest in specific assets.

Chiles and McMackin (1996) suggest that using risk as a variable allows TCE users to gauge variable risk preference, which determines whether firms are risk averse, risk neutral, or risk seeking in their approach to asset specific investments. Variable risk preference is equivalent to the more well-established construct of risk propensity (McMackin, personal communication), which measures the degree to which the decision-maker either pursues or avoids risks (MacCrimmon & Wehrung, 1986; Sitkin & Pablo, 1992; Sitkin & Weingart, 1995). The range of responses runs on a scale from risk averse to risk seeking.

Risk propensity has both a dispositional and a situational component. Agents making decisions for their firm thus view the contingency at hand through the lens of their personal preference. However, as the agents’ tenure with their firm lengthens, a sense of what is and is not acceptable risk within the firm begins to become more salient in decisions than the disposition of the agents. Thus, this study will use the term risk propensity. If one views risk in terms of risk propensity rather than assuming risk neutrality in all cases, the trust-risk linkage can alter the thresholds at which a firm will commit specific assets to a transaction (Chiles & McMackin, 1996).

Trust - including a dimension of opportunism - and risk propensity thus are the behavioral factors contained explicitly in the Logistics Alliance Model, which is detailed in Figure 4. The stage now is set for an enhanced analysis of the governance-characteristics linkage, which will generate the study’s hypotheses.
FIGURE 4. Logistics Alliance Model
Influences on the Choice of Governance Mechanisms in LAs

According to the classical TCE framework, organizations select governance mechanisms for transactions based on the characteristics of the transactions, namely asset specificity, uncertainty, and frequency. In addition, the selection process takes place under the behavioral assumptions of opportunism, bounded rationality, and risk neutrality. In line with Noorderhaven (1994; 1995) and Chiles and McMackin (1996), however, the previous discussion made the case for treating the behavioral assumptions as variables. Likewise, a case has been made for using trust rather than opportunism and risk propensity rather than risk neutrality as the behavioral constructs. The following analysis will deal with the governance-transaction characteristic linkages under the Logistics Alliance Model, and the moderating influence of the behavioral variables; likewise, the analysis produces this study's hypotheses.

Asset Specificity. Basic TCE views asset specificity in terms of the degree to which assets involved in a transaction can be redeployed to other transactions without loss of value. In research on alliances, asset specificity was discussed in conceptual work (Chiles & McMackin, 1996; Schmitz, et al., 1995) and tested in empirical work (Maltz, 1993, 1994; Zaheer & Venkatraman, 1995). The four classical types of asset specificity are human, physical, place, and dedicated assets (Williamson, 1985). Each type will be addressed as it pertains to LAs:

Human. This type of asset specificity involves the hiring of persons with specific skills necessary for the transaction, or the training of existing personnel. As mentioned earlier, carriers often must give drivers special training to be able to handle
unique types of shipments (Gibson, et al., 1995). For both carriers and shippers, training of personnel in use of EDI logistics coordination systems can represent a high degree of asset specificity, especially if the system is proprietary to one firm (Walton, 1994).

**Physical.** Physical asset specificity indicates investment in either special equipment or special facilities for the transaction. An example of special equipment would be unique trailers for hauling specific types of cargo, such as freezer trailers for bulk food items (Andel, 1996b). For EDI coordination of logistics traffic, purchase of proprietary software and the setup and rental costs of telephone lease lines to carry the data signal represent specific assets (Leenders & Fearon, 1993). In the overall logistics arena, shippers often require carriers and buyers to install EDI systems in order to be considered as potential suppliers (Schmitz, et al., 1995; Walton, 1994). Technological changes, however, are making EDI assets more general-purpose in nature. In purchasing and logistics, the Internet provides the signal pathway for an increasing number of buyer-supplier linkages, with electronic “firewalls” protecting the security of the information (Andel, 1996a; Harler, 1996). An initial drawback, however, is that the Internet may be difficult to access during peak usage; time-sensitive data traffic could arrive past deadline if traveling the Internet during busy times of the day (Harler, 1996).

**Place.** This refers to fixed assets such as buildings which cannot readily be picked up and moved to a new location (Williamson, 1985). An example of site asset specificity would be the stack train terminal which Ford built for its auto plant in Hermosillo, Mexico, as part of its alliance with logistics provider American Presidents. The terminal system handles unloading of sealed intermodal containers of component parts
and feeding the parts into the JIT assembly process (Bowersox, 1990). The terminal, built next to the assembly plant it supports, would be difficult, if not impossible, to move if the assembly plant relocated.

Dedicated Assets. Dedicated assets represent equipment, or sometimes an entire system, which is purchased for priority or even exclusive use within one transaction. An example would be the Ryder Dedicated Logistics transportation system which supports JIT manufacturing at the Saturn auto plant (Bradley, 1994).

Shippers and carriers consider these four types of asset specificity when planning relational contracting arrangements and eventual LAs. Some researchers (e.g., Malone, et al., 1987; Zaheer & Venkatraman, 1995) have also considered procedural asset specificity, which arises as a long-term benefit of the process component of governance. Overall, the long-term orientation of alliances increases the willingness of dyad members to invest in specific assets (Bowersox, 1990; Schmitz, et al., 1995). Long-term relationships such as LAs rely on "credible commitments" by both parties to prevent opportunistic exploitation of the relationship (Williamson, 1985). The carrier wants guaranteed customers to protect assets, and shippers want to avoid the switching costs associated with changing carriers. Thus, the following hypothesis is suggested:

\[ H_{1a} : \text{Level of asset specificity is positively related to the degree of relational governance within the logistics alliance.} \]

Further, this linkage is unique among the three in that it has two theorized moderators, trust and risk propensity. Dealing first with trust, it has been theorized that the higher the degree of trust within the dyad, the lower the threshold for investing in specific assets.
Within their relational governance study, Zaheer & Venkatraman (1995) found in post hoc tests a significant positive relationship \( p < 0.1 \) for trust as a moderator between asset specificity and quasi-integration, a measure of governance structure. Therefore, the first moderator hypothesis for asset specificity is suggested:

\[ H_1 : Trust \text{ moderates the asset specificity-governance linkage: High levels of trust will weaken the relationship, whereas low levels of trust will strengthen it.} \]

The second possible moderator involves risk propensity, which functions as a combination of the decision-maker's personal tendencies and the learned norms regarding risk preferences of the firm. A firm's risk preferences could influence, among other things, the threshold at which decision-makers are willing to invest in specific assets. Arguably, a risk-averse firm would tend to have higher thresholds for committing specific assets to an LA, whereas a risk-seeking firm would tend to have lower thresholds, all things equal (Chiles & McMackin, 1996). Thus, a second moderator hypothesis relating to specific assets is suggested:

\[ H_2 : Risk \text{ propensity moderates the asset specificity-governance linkage: Risk aversion strengthens the relationship, whereas risk seeking weakens it.} \]

**Uncertainty.** The second characteristic, *uncertainty*, involves unexpected disturbances in the transaction relationship (Williamson, 1985). This differs from risk, in that risk involves the ability to assign probabilities to the occurrence of certain anticipated outcomes (Chiles & McMackin, 1996). Some researchers using TCE have addressed up
to three levels of uncertainty: (1) technological unpredictability, (2) volume unpredictability, and (3) performance ambiguity (e.g., Heide & John, 1990, and Walker & Weber, 1984). The managerial choice branch of TCE (Chiles & McMackin, 1996; Williamson, 1985), however, focuses strictly on the internal behavioral uncertainty of performance ambiguity, which is the degree of difficulty one has in gauging the alliance partner's accomplishment of contracted outputs (Williamson, 1985).

A firm's inability to measure a partner's performance leaves the firm open to opportunistic behavior. With LAs and other hybrid relationships, the fear of uncertainty also couples with degree of bounded rationality. As bounded rationality diminishes through repeated joint action, the uncertainty grows less. Also, the joint actions ideally foster dyad norms; if embraced bilaterally, these norms can lessen the need for monitoring the carrier. Thus, the following hypothesis emerges relating to uncertainty:

\[ H_{2a} : \text{The level of uncertainty is negatively related to the degree of relational governance.} \]

The joint action of governance process also continually adjusts the reputation of both shipper and carrier in the eyes of the other half of the dyad. Thus, longevity in LAs would tend to increase the amount of trust within the dyad. Further, if a behavioral problem arises within the dyad, it can sometimes be resolved by adjustments to the base contract of law (Macneil, 1980; Williamson, 1985). Thus, the following hypothesis is suggested:

\[ H_{2b} : \text{The degree of trust moderates the uncertainty-relational governance linkage. High levels of trust weaken the relationship, whereas low levels of trust will strengthen it.} \]
Frequency of Transaction. Classical TCE literature suggests that high-frequency transactions are the ones most likely to be internalized (Williamson, 1985, 1991). Others decline to consider frequency a transaction characteristic, on the grounds that recurrent transactions necessarily create a hybrid relationship (John & Weitz, 1988; Zaheer, personal communication). Recent logistics research, however, indicates a third consideration for frequency. A study of warehousing activities found a positive relationship between frequency of transaction and likelihood of outsourcing warehousing (Maltz, 1994) within the context of dyadic logistics relationships. The frequency-outsourcing relationship was positive and significant within all four industries surveyed: food/consumer, chemical, pharmaceutical, and auto parts. Even the chemical industry, which supplied only 26 of the 147 usable responses, yielded the same positive and significant relationship.

This corresponds with the previously mentioned trend toward the lean organization (Bruton, et al., 1996), that has resulted in many firms outsourcing activities not judged to be core capabilities (Porter, 1990). Bowersox (1990) notes that deregulation of the motor carrier industry has led to more frequent use of third-party carriers. Because of the increasing incidence of third-party carrier relationships, this research will test for replication of Maltz’s (1994) findings that frequency of transaction and likelihood of outsourcing are positively related. This represents a departure from the traditional TCE assumption that frequently performed transactions are the most likely to be internalized in a hierarchy (Williamson, 1985). Thus, the following hypothesis will be tested:

\[ H_{3a}: \text{Frequency of transaction is positively related to the degree of relational governance.} \]
Trust has been shown to be positively related to the number of interactions which take place between firms. Further, the presence of trust allows firms of the alliance dyad to focus on future operations (Ganesan, 1994). Repeated interactions of joint action diminish bounded rationality, which further increases trust. Thus, the following moderator effect is hypothesized for trust:

\[ H_{3b}: \text{Trust moderates the frequency-relational governance linkage. High levels of trust strengthens the relationship, and low levels weaken it.} \]

This concludes the discussion of the three characteristics of transactions - asset specificity, uncertainty, and frequency - as they relate to LAs under the managerial choice view of TCE (Williamson, 1985). Frequency deals with the number of times a transaction occurs. Research in logistics indicates that, counter to classical TCE assumptions (Williamson, 1985), firms are more likely to outsource frequent logistics activities than to internalize them. Uncertainty will be dealt with as performance ambiguity. Asset specificity also emerges as a transaction characteristic, with its classical dimensions of human, physical, place, and dedicated asset specificity, and the hybrid addition called procedural asset specificity. In the study of LAs, these transaction characteristics act upon a relational governance mechanism.

Also, with the reframing of the behavioral assumptions as variables, behavioral factors are hypothesized to have a moderator effect on the characteristic-governance linkages. Trust moderates all three linkages, and risk propensity (with trust) moderates the asset specificity linkage. The two hypothesis pairs and single hypothesis triad are summarized in Figure 5.
FIGURE 5. Hypothesis Summary for Logistics Alliance Model
Summary of Model Development and Hypothesis Generation

In summary, the Logistics Alliance Model draws on the work of researchers in both logistics and TCE. The emergence of LAs, especially the focal shipper-motor carrier LA, has been greatly facilitated by deregulation of the U.S. transportation industry. In the early days of deregulation, attempts by shippers to extract lowest possible price from carriers had ill effects for both sides (Johnson & Wood, 1993). This strident competition gave way to a tendency toward cooperation, enabled in part by long-term shipping contracts newly permitted under deregulation (Crum & Allen, 1990). Work on LAs has shown that one critical element for success appears to be quality, trust-based interpersonal relationships (Bowersox, 1990; LaLonde & Masters, 1994; Rogers & Daugherty, 1995).

Mutual trust appears critical for the functioning of the LA dyad. The trust facilitates both the coordination needed for joint system engineering and the capacity for quick, often unilateral solutions to problems in the fast-paced world of logistics. The real-world development of LAs serves as an excellent example of the hybrid relationships becoming increasingly important to the value of TCE. Hybrid relationships and other TCE enhancements further shape the model. The specification of relational governance and its possible relationships to the transaction characteristics of asset specificity and uncertainty (Zaheer & Venkatraman, 1995) form the base of the model. Next, the suggested use of trust as an integrating mechanism for the behavioral factors of TCE, and the respecification of these behavioral factors as variables (Chiles & McMackin, 1996; Noorderhaven, 1994; 1995), offers to increase the explanatory value of the TCE model. This led to the basic research question:
How does trust influence the relationship between environmental attributes of the transaction and governance mechanism in logistics alliances?

LAs, a distinctive type of hybrid relationship, provided the setting in which to analyze this question. Investigation of research gaps relating to the model generated a three-hypothesis cluster centering on asset specificity and two pairs of hypotheses centering on frequency and uncertainty. The model and hypotheses are summarized in Figure 5. This concludes Part II of the chapter, model development and hypothesis generation. The following work of Chapter III, Methodology, will outline the plan for testing the hypotheses.
CHAPTER III

METHODOLOGY

In Chapter II, a theoretical framework and related hypotheses were developed. Now, Chapter III presents the methodology with which to measure the phenomena and test the hypotheses. Topics covered in this chapter include the research design, sampling set and procedures, operationalization of constructs and selection of measurement instruments, development of an original scale, questionnaire design, pilot testing of the data gathering system, and the data analysis plan. To put this chain of activities into perspective, the discussion first will revisit the theory development process.

Research Design

Whereas Chapter II focused on the theory-building process, Chapter III focuses on the theory-testing process and developed a statistical model to test specific hypotheses about the Logistics Alliance Model. Since the dynamics of actual LA dyads proved difficult to simulate accurately in a laboratory, this study employs a field research strategy which tests hypotheses with information gathered from real-world situations. As described in Chapter I, this research is a study rather than an experiment, because the researcher does not actually manipulate, or intervene to change, the LA processes (Cook & Campbell, 1979). Snow and Thomas (1994) offer a theory development matrix (Table 5) for classifying field research activities in strategy. The matrix considers the stage of
<table>
<thead>
<tr>
<th>Description</th>
<th>Explanation</th>
<th>Prediction</th>
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<tr>
<td>1</td>
<td>Key question is 'what'. Identify key constructs and variables. Studies are usually based on observation (e.g., Mintzberg, 1973) and/or interviewing (e.g., Quinn, 1980).</td>
<td>Key questions are 'who', 'where' and 'when'. Examine boundary conditions of a theory. Result may be a middle-range theory (e.g., Eisenhardt and Bourgeois, 1988). Studies use observation, questionnaire surveys, and interviewing. Multiple methods are also employed.</td>
</tr>
<tr>
<td>Theory Building</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Focus is on developing and validating measured key constructs. Studies usually are questionnaire, surveys and/or interviews (e.g., Shortell and Zajac, 1990; Herbert and Deresky, 1987). Several conceptual articles have also been important.</td>
<td>Focus is on documenting relationships among variables through hypothesis testing. Large samples are frequently used with questionnaire surveys (e.g., Hitt and Ireland, 1985a,b; Snow and Hrebiniak, 1980) or field simulations (e.g., Thomas and McDaniel, 1990). Because causal links are examined or implied, researchers must be wary of common-method bias.</td>
</tr>
<tr>
<td>Theory Testing</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Focus is on testing competing theories of the same phenomenon through crucial experiments (e.g., Venkatraman, 1990; Cosier and Aplin, 1980). Because of the dearth of this type of study, no pattern in field research usage can be discerned.</td>
<td>From &quot;Field Research Methods in Strategic Management&quot; by C.C. Snow and J.B. Thomas, 1994, <em>Journal of Management Studies</em>, 31(4), p. 466. Copyright 1994 by Blackwell Publishers Ltd.</td>
</tr>
</tbody>
</table>
development - theory building or theory testing - in light of the purposes of theory -
description, explanation, or prediction. This study fell in cell 5 of their matrix, i.e., theory
testing/explanation. According to Snow and Thomas (1994), explanatory studies are
normally well grounded in theory that posits an association between specific variables (p.
468). This posited association, however, often involves inadequate or conflicting
arguments (p. 468) about the nature of the relationships. This study tests hypothesized
relationships between transaction characteristics and governance mechanisms, as
moderated by trust and risk propensity. This study addresses two questions: the possible
inadequacy of employing behavioral factors as general assumptions rather than variables
(Chiles & McMackin, 1996; Noorderhaven, 1995), and the debate about whether trust
(Chiles & McMackin, 1996; Hill, 1990) or opportunism (Williamson, 1985, 1991), is
more salient in business transactions. This study clearly fit the cell 5 parameters.

**Cross-Sectional Method.** For temporal boundaries, this study used the cross-
sectional method in which the researcher extracted a "snapshot" of a number of LAs at
one point in time. Cross-sectional studies employ post hoc statistical controls as a
substitute for the experimental controls available in a laboratory study (Cook & Campbell,
1979). The alternative, a longitudinal study, was problematic for both theoretical and
practical reasons which relate to the nature of field studies. The results of field studies
must be interpreted cautiously since the researcher was unable to actually manipulate the
variables of interest (Cook & Campbell, 1979; Pedhazur, 1982). Thus, the inclusion of
recurring measures over time could risk making the results extremely difficult to interpret.
On the practical side, this researcher's time and resource constraints placed a longitudinal analysis beyond the scope of this study.

**Data Gathering by Mail Survey.** Data-gathering methods available for field research included field observation, case study, interviews, and questionnaires, which are termed "written interviews" (Snow & Thomas, 1994). This study used a mail questionnaire for data gathering. This method delivers lower per-unit cost and incurs less risk of social-desirability bias than face-to-face or telephone interviews (Alreck & Settle, 1995; Snow & Thomas, 1994). Furthermore, mail questionnaires permit consultation, the ability of the respondent to check facts or records before making responses (Dillman, 1978). Although mail questionnaires have a reputation in some disciplines for low participation, response rates can be enhanced by tactics such as systematic questionnaire design technique (e.g., Dillman, 1978) and sponsorship by an agency with which the respondents have meaningful personal involvement (Alreck & Settle, 1995; Snow & Thomas, 1994). This study employed both these techniques.

Since the research involved solicitation of information from human subjects, the researcher sought clearance from the university's Institutional Review Board. The board granted approval for this project, as detailed in Appendix A.

**Sampling Set**

Theory testing involves the testing of hypotheses in an empirical, or real-world setting. Thus, this researcher selected a setting and sampling method appropriate to
testing the Logistics Alliance Model, analyzed the sampling plan for response bias, and conducted a power analysis to determine sample size.

Setting

Specification of the business setting identified the business environment, followed by sources of information within the environment, and unit of analysis for the study. This study investigated motor carrier-shipper LA relationships. Organizations involved were motor carrier firms, representing the logistics providers, and manufacturing firms, representing the shipper who normally arranges the shipment for the transaction.

Sources of Information. One possible avenue for access to representatives from both sides of the LA was professional associations such as the 40,000-member National Association of Purchasing Managers (NAPM) and the 13,000-member Council for Logistics Management (CLM). Both organizations initially had agreed to participate in the study. After considering these two professional groups, this researcher selected CLM for the following reasons. First, CLM has its membership list segmented by broad industry groups, including carriers and manufacturers. NAPM, on the other hand, maintained a singular membership-address list; use of this list would have required an extra administrative step to sort firms by industry groups in order to gain subjects from both sides of the LA dyad. Second, purchasing managers do not procure third-party carriage in all firms; increasingly, firms are coordinating it through a logistics or transportation department. Due to the increasing role of logistics departments, the researcher concluded that a more generalizable sample would arise from the CLM lists. For details on coordination of survey participation, see Appendix B.
**Unit of Analysis.** The unit of interest, the specific level at which the study focused its attention, was the LA dyad. The *unit of analysis*, however, was the key informants surveyed from either the carrier or shipper sub-populations who described their given LA. That is, key informants were appropriate operations managers from the shipper and carrier firms. In most cases, this is a purchasing manager or logistics professional for the shipper, and a shipping account coordinator or operations manager for the carrier.

Although some researchers have argued that high-level executives are the most reliable respondents (e.g., Miller & Roth, 1994), this particular setting required a critical review of this assumption. Consideration of the LA setting generated the conclusion that mid-level managers or specialists would make the best informants. Due to the operational nature of the information sought on LAs, mid-level managers in larger firms would likely be more aware of the particulars of the LA situation than CEOs or presidents. In smaller firms, high-level executives would be more likely to be aware of the LA particulars. Due to the extremely low response rate for surveys that attempt to gather information on both halves of an alliance dyad, this researcher decided to survey only on half of the dyad.

**Sampling Method**

Sampling method determines the procedures for selecting participants for the study (Babbie, 1992). The four factors which formed this study's sampling method were the following: The *element*, the unit from which information was sought, was the key informant. The *population* was the theoretical collection of all shippers and carriers in the United States. The *study population*, however, was the actual group which was sampled; in this case, shipper and carrier managers not members of CLM likely would be excluded.
from selection. And finally, the *sampling frame* consisted of the actual pool of LA firms from which the sample is drawn.

Babbie (1992) addresses two broad approaches to sampling, convenience sampling and probability sampling. In fact, researchers often decide that a combination of sampling designs best serves their study (Babbie, 1992). This study’s combination design started with a convenience study population, CLM members working for manufacturing (shipper) or carrier firms, and then applied probability sampling techniques to it to select the actual sampling frame. This researcher could find no lists of all the manufacturing firms, or all the motor carrier firms, in the United States. Thus, as is common practice in logistics research, this researcher approached professional organizations which offered large, practically attainable grouping of members from the populations of interest.

The investigator received permission from the Council of Logistics Management (CLM) to use their national-level membership list to select key informants for the study. CLM grants individual memberships to persons with an interest in professional logistics innovation. The CLM carrier sublist contained 1,043 names, and the manufacturer (shipper) sublist contained 3,800 names. Each listing included the person’s name, job title, and mailing address information in ZIP-code order.

The investigator used systematic sampling to select samples for both the pilot study and the main survey mailing (Babbie, 1992; Blalock & Blalock, 1968). The fact that the mailing lists were in ZIP-code sequence also lent a certain amount of stratification to the process; stratification helps reduce random error, ensuring samples which are more representative of the United States as a whole than would be a random sample (Babbie,
The selection process, however, did screen selected persons to ensure they would likely be qualified to respond to the survey. The person’s job title and the number of coworkers present in the list served as two screening criteria for inclusion in the sampling frame. If the selected person’s job title cast doubt on his or her qualifications for describing a logistics alliance, the person was bypassed in favor of a more qualified candidate. Examples of persons excluded were business consultants, data processing persons with no apparent connection to logistics, and public relations professionals. Another exclusion factor involved pruning of multiple persons from the same firm. Due to the ZIP-code sequence of the mailing list, some metropolitan areas yielded clusters of CLM members working for the same firm. Multiple persons from the same corporate site were selected only if a comparison of their job titles indicated they would be unlikely to give information on the same alliance. Some firms, for example, had logistics persons assigned to different regions or different industry groups. In such cases, more than one person from the same firm site was accepted for the sample.

Using this sampling method, 55 shippers and 55 carriers were selected for the pilot study. For the main survey mailing, 630 from each group were selected, along with backup lists of 50 shipper and 50 carrier names. The backup lists were prepared in case nondeliverable surveys proved problematic and needed to be replaced in order to achieve minimum power. The low incidence of nondeliverables, however, made use of the backup lists unnecessary.
Power Analysis and Sample Size

Power analysis has emerged as a tool to help researchers, among other things, determine proper sample size for a particular study (Cohen, 1988; Keppel, 1991; Pedhazur, 1982). Proper power and sample size help the researcher pursue statistical conclusion validity through a balanced lessening of both Type I and Type II errors (Keppel, 1991; Pedhazur, 1982). Type I errors refer to instances in which the researcher fails to detect statistically a substantive relationship. Type II errors, also called a false positive, refer to instances in which a researcher detects a statistically significant relationship where none substantively exists (Pedhazur, 1982).

Initial Power Decisions. Four components of the statistical model - level of significance, effect size, power, and overall sample size - drive power analysis. If a person knows three of these components, the fourth can be computed. For this study, the level of significance, which is also the likelihood of Type I error, is .05. Power is set at the recommended level of .80 (Cohen, 1988; Keppel, 1991; Mazen, Hemmasi & Lewis, 1987). Also, power analysis software such as GPOWER (Faul & Erdfelder, 1992) calculates refinements for the type of statistical test used. GPOWER's multiple-regression F-test package adjusted the power analysis to account for the three independent, two moderator, and four control variables active within this study's initial regression formula.

Results of the Power Analysis. GPOWER scenarios were run for small, medium and large effect sizes. For estimating probable effect size for this study, this researcher took into account that this is cell 5 research, which uses hypothesis testing to examine theorized relationships between variables (Snow & Thomas, 1994). Given the well-
developed theory and constructs within TCE, this researcher elected medium effect size as most appropriate for the study. Table 6 details the results of the power analysis.

Recommended sample size for medium effect is \( n = 114 \). Regression analysis, however, will not be the only statistical test involved in this study. A second type of test, confirmatory factor analysis, will be conducted on the contextually adjusted instrument scales; a factor analysis sample size is also needed. This study will use a conservative decision rule of seven observations per scale item to determine sample size needed for factor analysis (Hair, et al., 1992). Since the largest psychometric scale contained 12 items, a sample size of 84 was needed to allow for a proper factor analysis on all scales. Since the \( N = 114 \) size for the regression equation exceeds the number required

**TABLE 6**

**Power Analysis\(^1\) for Logistics Alliance Model Equation:**

**F-Test in Multiple Regression, A Priori Analysis, Accuracy Mode**

<table>
<thead>
<tr>
<th>Effect Size Scenario</th>
<th>Large</th>
<th>Medium</th>
<th>Small</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect size ( f^2 )</td>
<td>0.35</td>
<td>0.15</td>
<td>0.02</td>
</tr>
<tr>
<td>Total sample size</td>
<td>( n = 54 )</td>
<td>( n = 114 )</td>
<td>( n = 791 )</td>
</tr>
<tr>
<td>Critical F value</td>
<td>( F(9,43) = 2.1062 )</td>
<td>( F(9,103) = 1.9220 )</td>
<td>( F(9,780) = 1.8919 )</td>
</tr>
<tr>
<td>Lambda</td>
<td>18.9000</td>
<td>17.1000</td>
<td>15.8200</td>
</tr>
</tbody>
</table>

\(^1\)Analysis performed using GPOWER software. F. Faul and E. Erdfelder (1992). GPOWER: A priori, post hoc and compromise power analysis for MS-DOS (Computer program). Bonn, FRG: Bonn University, Department of Psychology.
for factor analysis, it became the target response rate for each group; the target total was rounded up to 120 to simplify administrative calculations.

**Size of Initial Survey Mailing**

Research in hybrid relationships of the buyer-supplier and logistics-alliance variety has produced median response rates clustered in the 24% to 30% range (see Table 7). Two studies, however, had response rates in excess of 50%. One survey with a high response rate - 73% - came in a study of leading-edge firms identified in a practitioner article on "Who's Who in Logistics." Leahy, et al. (1995) appealed to the firm's "who's who" status in soliciting replies. The other high-gain survey had a response rate of 67% due in part to heavy industry involvement from planning stage through completion (Anderson & Weitz, 1992). The 11 participating manufacturing firms each contributed an average of 38 manufacturer-distributor dyads to the study. Two other studies which attempted to build a pool of buyer-supplier dyads without firm-specific support had response rates of 9% and 11% (respectively, Anderson & Narus, 1990; Heide & Miner, 1992).

For this study, the indirect sponsorship of CLM likely will increase the response rate in two ways: (1) giving the researcher access to CLM national-level mailing lists, updated within six months of the mailing and segmented by industry group, and (2) through the mailing list, giving the researcher access to a professional group with a vested interest in the survey topic. On the other hand, this represents the researcher's first professional contact with these groups; thus, the lack of prior professional reputation may
<table>
<thead>
<tr>
<th>Study</th>
<th>Target Population</th>
<th>Mail n</th>
<th>Gross Return</th>
<th>Usable Return</th>
<th>Return Rate</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson, et al., 1987</td>
<td>Electronics executives</td>
<td>800</td>
<td>95</td>
<td>71</td>
<td>9%</td>
<td>Survey redone</td>
</tr>
<tr>
<td>Heide &amp; John, 1988</td>
<td>Manufacturing agents</td>
<td>800</td>
<td>199</td>
<td></td>
<td>25%</td>
<td>One mailing</td>
</tr>
<tr>
<td>Heide &amp; John, 1990</td>
<td>Manufacturing purchasers</td>
<td>579</td>
<td>175</td>
<td></td>
<td>30%</td>
<td>Screened 1,157</td>
</tr>
<tr>
<td>Noordewier, et al., 1990</td>
<td>OEM suppliers</td>
<td>483</td>
<td>150</td>
<td>140</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td>Anderson &amp; Narus, 1990</td>
<td>Wholesalers, manufacturers</td>
<td>5000</td>
<td>504</td>
<td>488*</td>
<td>9%</td>
<td>*Usable dyads</td>
</tr>
<tr>
<td>Anderson &amp; Weitz, 1992</td>
<td>Distributors, manufacturers</td>
<td>643</td>
<td>518</td>
<td>417*</td>
<td>65%</td>
<td>*Usable dyads</td>
</tr>
<tr>
<td>Heide &amp; Miner, 1992</td>
<td>Purchasing, supply reps</td>
<td>579/96</td>
<td>155/60*</td>
<td></td>
<td>11%</td>
<td>*Usable dyads</td>
</tr>
<tr>
<td>Maltz, 1993</td>
<td>In-house logisticians</td>
<td>488</td>
<td>147</td>
<td>138</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Parkhe, 1993</td>
<td>Senior alliance executives</td>
<td>342</td>
<td>140</td>
<td>111</td>
<td>32%</td>
<td></td>
</tr>
<tr>
<td>Zaheer &amp; Venkatraman, 1994</td>
<td>Insurance agents</td>
<td>400</td>
<td>120</td>
<td></td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Leahy, et al., 1995</td>
<td>Who's Who logisticians</td>
<td>51</td>
<td>37</td>
<td>37</td>
<td>73%</td>
<td></td>
</tr>
<tr>
<td>Rogers &amp; Daugherty, 1995</td>
<td>Public warehouse firms</td>
<td>2318</td>
<td>164</td>
<td>164</td>
<td>7%</td>
<td>463 undeliverable</td>
</tr>
<tr>
<td>Zaheer &amp; Venkatraman, 1995</td>
<td>Insurance agents</td>
<td>1000</td>
<td>329</td>
<td></td>
<td>33%</td>
<td></td>
</tr>
</tbody>
</table>
work to lessen the response rate. Thus, the projected survey response rate was a conservative 20 percent. Power analysis indicated that a usable n = 120 from both the shipper and carrier groups was needed as the minimum sample size for regression analysis; given this, an initial mailing of 600 surveys is needed for each group.

**Operationalization of Constructs**

This section describes how the constructs of interest in the study have been operationalized within the context of the shipper-motor carrier dyad. Constructs which were operationalized are transaction characteristics, behavioral variables, and relational governance variables. Control variables for the study also are identified.

This section also features reasons for selection of instruments for measuring the operationalized variables. Some instruments include psychometric scales or objective data-point measures acquired directly from other studies, while other instruments include existing scales adapted for the logistics alliance context. A final topic will be the validation procedures for adapting or refining measures for use in study of the shipper-carrier context.

**Classification of Shipper-Carrier Relationships**

Logistics researchers Rogers and Daugherty (1995) developed a system for classifying logistics providers as either transactional or relational in their dealings with customers. Drawing on Bowersox, et al. (1992), the two developed a five-stage continuum (see Figure 6) to describe buyer-seller relationships. Stages of the relationship range from a spot-market single purchase of carriage to integrated service agreements. The strategic-alliance relationships mirror those which Bowersox et al. (1989) used for
Transaction Characteristics in Logistics Alliances

Within Williamson's (1985) managerial choice approach to TCE, the three transaction characteristics are frequency of transaction, uncertainty, and asset specificity.
**Frequency of Transaction.** A number of TCE empirical studies of hybrid relationships do not consider frequency as a transaction characteristic (Anderson & Weitz, 1992; Heide, 1994; Heide & John, 1990; Walker & Weber, 1984; Zaheer & Venkatraman, 1994, 1995). As noted by Maltz (1994), empirical testing of frequency is rare. However, according to Williamson, frequency of transaction is important to TCE because "the cost of specialized governance structures will be easiest to recover for large transactions of a recurring kind" (1985, p. 60, emphasis added). This focus fits with Williamson's (1985) conceptualization of frequency as volume of transactions, which captures both the size and number of transactions between the two parties.

Operationalizations of frequency of transaction include the Noordewier, et al. (1990) use of number of orders placed per year in his study of buyer-vendor relationships for industrial supplies. Similarly, Heide and Miner (1992) used frequency of delivery, which was how many times per quarter that a manufacturer received shipments from an industrial supplier. Other studies have used comparative scales to measure frequency. Maltz, in his studies of make-or-buy decisions regarding private (in-house) motor carriers (1993) and third-party warehousing arrangements (1994), used comparative order frequency. In these studies, the logistics providers were asked to rank the focal customer against other customers for frequency of orders placed.

This study operationalized frequency in three ways. First, it used two objective operational measures, orders placed and total weight. Orders placed requested the average number of shipping transactions occurring within the LA during a typical month, and total weight asked for the total pounds of goods shipped within the LA in a typical
month. A subjective measure, comparative order frequency was also used. Use of both objective and comparative measures of frequency was intended to attenuate common-method variance.

**Uncertainty.** Williamson conceptualized uncertainty as performance ambiguity, the degree to which the buyer can monitor the contracted performance of the supplier (Williamson, 1985). In their studies of industrial purchasing alliances, Heide and John (1990) and Heide and Miner (1992) approached uncertainty by operationalizing it as performance ambiguity. For this study, the researcher likewise operationalized uncertainty as performance ambiguity (Heide & John, 1990; Heide & Miner, 1992; Williamson, 1985). This view would be most appropriate, considering it best fits this study’s modeling of the managerial choice view of TCE (Chiles & McMackin, 1996). To measure uncertainty, Heide and associates’ four-item performance ambiguity scale was selected; responses were gathered on a seven-point Likert format, with responses ranging from "strongly agree" to "strongly disagree." Heide and associates report a Cronbach’s α of .66 for both the buyer and supplier versions of the scale (Heide & John, 1990; Heide & Miner, 1992). Nunnally and Bernstein (1994) rate a Cronbach’s α in the .6 to .7 range as acceptable for a well-researched construct.

**Asset Specificity.** Asset specificity is the degree to which assets committed to the referent logistics alliance can be redeployed to other transactions without loss of value. Williamson (1985) has argued that asset specificity has four dimensions: human, which involves investments in hiring new employees or training existing employees for a specific project; physical, which involves movable tools or equipment used in the transaction;
place, which involves fixed assets; and dedicated, which involves investments made to
serve the needs of a single customer. Developing these four dimensions for a measure of
asset specificity has proven to be a troubling process. For example, Heide and John (1990)
attempted to develop multiple dimensions of asset specificity in their pilot study, but opted
to operationalize asset specificity as a singular construct in their final study. Several other
researchers have pursued asset specificity as a singular construct; however, their
measurement scales have included items which represent some or all of Williamson's

This study will operationalize asset specificity as a singular construct for
hypothesis testing. The asset specificity scale of Nooteboom et al. (1997) will be used.
This 10-item scale has a Cronbach's alpha of .84. As an added consideration, the
Nooteboom et al. (1997) scale contains four sub scales for asset specificity. They are
dedicated asset specificity (four items, alpha = .83); physical asset specificity (two items,
alpha = .70); knowledge specificity (three items, alpha = .68); and a single-item place
specificity measure. As previously mentioned, however, the initial hypothesis testing plan
approached asset specificity as a singular, 10-item scale.

Two alterations were made to these scale items. First, some items were changed
from a components manufacturer-purchaser context to a shipper-carrier context. Second,
the five-item Likert response format of the original study was altered to a seven-item
Likert format, to match the other scale formats in this study.
Behavioral Variables

As discussed in Chapter II, trust has been modeled as a coordinating mechanism for the behavioral variables which moderate the linkage between the characteristics of the transaction and the governance mechanism (Chiles & McMackin, 1996). Behavioral variables measured in this study included trust - with opportunism as a facet - and risk propensity.

**Trust.** Operationalizations of *trust* are based upon Cummings and Bromiley (1996), who model trust as a multidimensional construct. Individual A (or group A) trusts a specific referent other - individual B (or group B) - according to the degree that B: (1) negotiates honestly; (2) keeps commitments; and, (3), eschews opportunism. This study measured trust using the Organizational Trust Inventory developed by Cummings and Bromiley (1996). This is a 12-item scale comprising four-item sub-scales for each of the three dimensions of the Inter-Unit Trust model, with a minimum composite reliability rating of 0.90088. The overall Bentler Goodness-of-Fit Index (GFI) for the scale is .9844. A GFI of .95 or higher is considered a strong fit (Hair, et al., 1992).

**Risk Propensity.** For hybrid relationships, Chiles and McMackin (1996) define *risk propensity* as the tendency of a manager to be either risk averse, risk neutral, or risk-seeking in dealing with risk situations. Risk-scenario analysis assumes that a probability of occurrence can be assigned to different possible outcomes of a business transaction (Chiles & McMackin, 1996). This study will deal with risk propensity at the level of analysis of the individual decision-maker, as have previous researchers (MacCrimmon & Wehrung, 1990; Sitkin & Weingart, 1995; Sitkin & Pablo, 1992). Specifically, risk propensity
gauged the general willingness of decision-makers representing the shipper and carrier to take risks within LA relationships.

This study used a five-item risk propensity scale developed by the researcher. The author attempted, at first, to adapt a five-item scale which measured an individual's risk propensity in a decision-making scenario (Sitkin & Weingart, 1995). Initial analysis showed the adaptation, however, to be problematic for the logistics setting. Drawing on the work of MacCrimmon & Wehrung (1986), the author developed a five-item risk propensity scale for a logistics-alliance context. Pilot testing and factor analysis of the data produced a two-factor measure of risk propensity: RISKA ($\alpha = .55$) deals with pre-decision risk postures, and RISKB ($\alpha = .73$) deals with risk postures during and after decision making. Details on the theory and development of the scale are included in Appendix C.

Relational Governance

As mentioned in Chapter II, relational governance has two dimensions, structure and process (Macneil, 1980; Williamson, 1985; Zaheer & Venkatraman, 1994, 1995).

**Structure.** This deals with the basic contractual structure of the relationship (Zaheer & Venkatraman, 1995). It was operationalized using two variables:

*Quasi-Integration.* To determine the degree of de facto vertical integration between two firms, Zaheer and Venkatraman (1995) draw upon work by Blois, who defines quasi-integration as a "close relationship which is based primarily upon the (firm's) dependence for a significant portion of its total business upon a particular firm" (Blois, 1972, p. 267). For this study, quasi-integration measured both the percentage of the
shipper's total motor carrier costs spent on the referent carrier, and the percentage of the carrier's total operating revenues derived from the referent shipper. This is consistent with previous specification of the measure as percentage of sales to regular customers (John & Weitz, 1988) and “percentage of business (sales premiums) directed to focal carriers” (Zaheer & Venkatraman, 1995, p. 383.) Quasi-integration was measured using the single-item open-ended measure developed by Zaheer and Venkatraman (1995).

**Electronic Integration.** Electronic data interchange (EDI) has become a tool of increasing prominence in governing third-party logistics and logistics alliance relationships (Bowersox, et al., 1989; Bowersox, 1990; Walton, 1994; Gibson, et al., 1995). Two recent studies have used the construct of electronic integration to explain the EDI traffic between members of hybrid relationships. Zaheer and Venkatraman (1994), in a study of the insurance industry, operationalized electronic integration as the percentage of transactions between an independent insurance agent and focal carrier firm which took place electronically. Similarly, an airline industry study by Venkatraman and Christianse (1996) operationalized electronic integration as the percentage of transactions between travel agent and airline which took place electronically via the SABRE™ reservation system. In this study of logistics alliances, electronic integration is defined as the degree to which the shipper and carrier use EDI to coordinate mutual transactions. Electronic integration will be measured using the single-item, open-ended objective measure employed by Venkatraman and Christianse (1996) and Zaheer and Venkatraman (1994). In this study, electronic integration measured the percentage of shipper-carrier transactions within the LA which take place electronically.
Process. In hybrid relationships, this represents the procedures and activities between the two parties which allow the partnership to function on a daily basis. In their study of industrial purchasing alliances, Heide and John (1990) operationalized these procedures and activities as joint action, and Zaheer and Venkatraman (1995) also used it for their previously mentioned research in the insurance industry. For this study of LAs, joint action will be an alliance-level measure to identify the degree to which the alliance’s shipper and carrier coordinate their activities.

Different versions of a process scale originated by Heide and John (1990) appear in recent literature. For the original nine-item version of the scale, used in a study of industrial buyer-supplier relationships, Heide and John (1990) report a Cronbach's alpha of .70 for their nine-item scale. In a subsequent study of the insurance industry, Zaheer and Venkatraman (1995) reported a Cronbach's alpha of .82 for a three-item version of the scale. Both studies used a process scale which gathered responses in a seven-point Likert format, with response choices ranging from strongly agree to strongly disagree. This study used a version of the three-item Zaheer and Venkatraman (1995) process scale which was contextually altered to reflect a shipper-carrier alliance context.

Control Variables for Logistics Alliance Model

As mentioned during the theory development discussion, theory-based models operate under assumptions about time and space boundaries. Since this Logistics Alliance model qualifies as a midrange theory, the researcher needs to control for certain situation-specific variables to ensure they do not confound the study. Control variables emerging as
prominent ones from studies of alliance activities are firm size, industry, strategy, and length of relationship.

**Size of Alliance Transaction.** Firm size has long been a factor of interest in organizational research (Daft, 1992). Alliance research follows this trend. Parkhe (1993) found that firm size in terms of annual sales correlated significantly with nearly half the factors in his 12-variable model of strategic alliance structuring, including perceptions of opportunism and contractual safeguards. Likewise, size correlated significantly with quasi-integration in insurance carrier-agent relationships (Zaheer & Venkatraman, 1995), and vertical integration in motor carrier firms (Mixon & Upadhyaya, 1995).

For this study, the size of the alliance transaction, as measured by the structure components, is the focus of interest. Thus, firm size is not a factor in the main study. Actual firm size could be a useful component, however, for post-hoc analysis. If this is the case, such firm-level information could be extracted from industry databases. (This is viable, given that respondents are identifying themselves in the survey).

**Primary Industry of Shipper.** Industry has often been used in alliance studies as a control variable (Maltz, 1994; Parkhe, 1993). Heide and John (1990), in their study of industrial purchasing alliances, limited the sampling frame to three industries in order to "reduce extraneous sources of variance" (p. 29). This study of shipper-carrier alliances will operationalize industry as the primary, two-digit Standard Industrial Classification (SIC) of the shipper (e.g., Heide & John, 1990; Maltz, 1994).

**Competitive Advantage (Competitive Premise).** Porter (1980) argued that firms should position themselves to seek competitive advantage as either low-cost leaders or
differentiated providers. Gentry (1994) found significant differences based on firm competitive advantage in a study of buyer-supplier partnership (BSP) interactions with carriers. Other alliance researchers also have addressed firm competitive advantage as an independent or control variable (e.g., Maltz, 1994; McGee, Dowling, & Megginson, 1995). These researchers did not address competitive scope (broad market vs. niche); Maltz (1994) argued against addressing scope in dyad-level LA research because of the contextual focus on a single hybrid relationship as opposed to firm-wide trends.

This study operationalized competitive advantage as whether the firm seeks its primary competitive advantage through low-cost leadership or differentiation. The measurement tool was the cost importance index, as developed by Maltz (1994). Key informants were presented with five statements pertaining to reasons for selecting a third-party logistics provider (shipper), or for promoting logistics services to potential customers (carriers). The informants were asked to distribute 100 points among the five statements according to the relative importance of each on selection of the provider. Maltz operationalized it as a continuous scale, with complementary comparison between the sum of the two cost items and the three differentiation items.

**Duration of Relationship.** Discussion in Chapter 2 repeatedly addressed the influence of duration of LA relationships on factors such as building trust and diminishing bounded rationality. Researchers already have found duration of relationship to be a significant factor in alliance studies. Heide and John (1990) found historical length (of relationship) a significant indicator of intent to continue purchasing alliances, and Parkhe (1993) found that cooperative history, a dichotomous variable indicating whether or not
the two partners had engaged in previous alliances, correlated significantly with performance, frequency of interaction, and perceptions of opportunistic behavior.

This study operationalized length as the number of months' duration of the alliance. For the study, the duration measure underwent a loglinear transformation using the following formula:

\[
\ln\left(\frac{\text{Duration}}{12}\right)
\]

This transformation corrects for the tendency of duration measures to exert a nonlinear influence on alliance relationships (Heide & Miner, 1992).

The constructs contained in the Logistics Alliance model, with the exception of Risk Propensity, have now been operationalized as variables which can be measured during the empirical theory testing phase of this study. Variable groups include the independent variables of frequency of transaction, uncertainty, and asset specificity; the moderator variables of trust and risk propensity; and the dependent variables of relational governance, with its dimensions of structure and process. Also, the variables of competitive advantage and duration of relationship will serve as controls, or covariates, to attenuate confounding of the results. Details of the development of the Risk Propensity scale by the author are located in Appendix C.

Development of Survey Questionnaire

Scientists who develop empirical research designs must determine the best way to measure the variables involved in their models. Nunnally and Bernstein (1994) recommend drawing upon previously developed tests as much as possible, and altering them if necessary to transport the scale from one context to another. Factors influencing
measurement include types of measure, such as self-report vs. observation; situation or context of the study; subject population; and instrument format characteristics.

**Contextual Refinement of Measurement Scales and Items**

Contextual refinements had to be made to several of the tools used within this survey. Scales and numerical data items used in hybrid governance studies of buyer-supplier partnership and logistics alliances tend to be situation-specific. Because of the strict context in which they are framed, they do not generalize well to other industrial situations. Scales requiring contextual refinement included uncertainty/performance ambiguity, asset specificity, risk propensity, and joint action. Table 8 summarizes the actions taken to contextually refine each multi-item scale being used in the study.

An example of an item refinement involves the Performance Ambiguity Scale which was used in two studies of industrial purchasing alliances (Heide & John, 1990, p. 30; Heide & Miner, 1992, p. 291): The original item reads, "It is inadequate to evaluate this supplier based only on component prices." This item deals with a judgment on supplier behavior consistent with Williamson's (1985) discussion of performance ambiguity. The "supplier" and "component" framing, however, reflects a situation peculiar to fabricator-assembler relationships in manufacturing.

In its present form, the item would not generalize to shipper-carrier relationships. Thus, the researcher faces a twofold challenge: alter the item to reflect the shipper-carrier arena, but keep the sense of gauging whether price-based analysis is sufficient to analyze the vendor's performance. Contextual refinements also take place within a single study. Researchers sometimes use "near-mirror-image" questionnaires in surveys of discrete
<table>
<thead>
<tr>
<th>Scale</th>
<th>Source</th>
<th>Original Context</th>
<th>Shipper-Carrier Study Refinements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Action</td>
<td>Zaheer &amp; Venkatraman, 1995</td>
<td>Joint planning activities of independent insurance agent with focal carrier.</td>
<td>Change insurance-specific terms of one item from &quot;premium volumes&quot; to &quot;transportation volumes.&quot;</td>
</tr>
<tr>
<td>Performance Ambiguity</td>
<td>Heide &amp; Miner, 1992</td>
<td>Evaluation of behavior of components supplier</td>
<td>Change &quot;components supplier&quot; to &quot;shipper-carrier&quot; context</td>
</tr>
<tr>
<td>Risk Propensity</td>
<td>Sitkin &amp; Weingart, 1995</td>
<td>Orienting statement inquires about key informant's likelihood of investing firm's money in an auto racing team.</td>
<td>Change context of orienting statement to and certain items to reflect a shipper-carrier relationship.</td>
</tr>
<tr>
<td>Cost Importance Index</td>
<td>Maltz, 1994</td>
<td>Warehousing situation</td>
<td>Change warehousing situations to reflect analogous shipper-carrier situations.</td>
</tr>
</tbody>
</table>
groups which comment on the same phenomenon, such as buyers and suppliers (Gentry, 1996; Hendrick & Ellram, 1993). "The near-mirror-image concept is one by which all the same questions are asked on both surveys, yet certain questions are phrased differently to reflect the perspectives of each partner" (Gentry, 1996, p. 39). This study employed two near-mirror-image questionnaires, one framed for shippers and the other for carriers. Table 9 summarizes the measurement scales used within this study.

**Questionnaire Design**

The physical design of the questionnaire followed the principles outlined in Alreck and Settle (1995) and Dillman (1978). The survey contained 45 tasks, or distinct items, to which the key informant responds (Both carrier and shipper versions of the questionnaire are in Appendix E). As per Dillman's (1978) Total Survey Design technique, the questionnaire survey began with an orientation to the general topic. First-page response items also helped frame the context of the survey for the key informants, and asked for basic information on the key informant, including name and title. The front page also contained an address label for the firm to which the survey was sent. The name request and the label represented straightforward attempts to track the mailings for supplementary survey sending, and to verify respondent qualifications. The bottom of the page contained contact information for a researcher who could answer key-informant questions on the survey.

The second page included items for respondent classification of the focal LA, followed by the 10-item asset specificity scale. The third page contained a block of 19 items covering trust, performance ambiguity (uncertainty), and joint action (process). The
<table>
<thead>
<tr>
<th>Variable</th>
<th>Scale</th>
<th>Item</th>
<th>Reliability</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quasi-Integration</td>
<td>Zaheer &amp; Venkatraman, 1995</td>
<td>1</td>
<td>Not applicable.</td>
<td>Objective data request.</td>
</tr>
<tr>
<td>Electronic Integration</td>
<td>Zaheer &amp; Venkatraman, 1994</td>
<td>1</td>
<td>Not applicable.</td>
<td>Objective data request.</td>
</tr>
<tr>
<td>Frequency of Transaction</td>
<td>Monthly Orders Placed</td>
<td>1</td>
<td>Not applicable.</td>
<td>Objective data request.</td>
</tr>
<tr>
<td></td>
<td>Heide &amp; John, 1992; Noordewier, 1993</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Comparative Order Frequency</td>
<td>1</td>
<td>Not applicable.</td>
<td>Objective data request.</td>
</tr>
<tr>
<td></td>
<td>Maltz, 1994</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alliance Uncertainty</td>
<td>Performance Ambiguity</td>
<td>4</td>
<td>α = .66</td>
<td>Contextual refinement needed.</td>
</tr>
<tr>
<td></td>
<td>Heide &amp; John, 1990</td>
<td></td>
<td>α = .66</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heide &amp; Miner, 1992</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asset Specificity</td>
<td>Asset Specificity of Ego</td>
<td>10</td>
<td>α = .84</td>
<td>Contextual refinement needed.</td>
</tr>
<tr>
<td></td>
<td>Nooteboom, et al., 1997</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk Propensity</td>
<td>Risk Propensity</td>
<td>5</td>
<td>α = .89</td>
<td>New context statement will reflect shipper-carrier relationship.</td>
</tr>
<tr>
<td></td>
<td>Sitkin &amp; Weingart, 1995</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE 9 (Cont’d)

Questionnaire: Measurement Scales for Variables within Logistics Alliance Model (Demographics Omitted)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Scale</th>
<th>Item n</th>
<th>Reliability</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>Organizational Trust Inventory - SF</td>
<td>12</td>
<td>Bentler’s GFI = .9844</td>
<td>This is only scale which measures Inter-Unit Trust model elements.</td>
</tr>
<tr>
<td></td>
<td>Cummings &amp; Bromley, 1996</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keeps commitments</td>
<td>Dimension One</td>
<td>4</td>
<td>0.93508</td>
<td>Inter-Unit Trust model</td>
</tr>
<tr>
<td>Negotiates honestly</td>
<td>Dimension Two</td>
<td>4</td>
<td>0.93578</td>
<td></td>
</tr>
<tr>
<td>Eschews opportunism</td>
<td>Dimension Three</td>
<td>4</td>
<td>0.90088</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>Annual Sales // Maltz, 1994</td>
<td>1</td>
<td>Not applicable.</td>
<td>Categorical, financial</td>
</tr>
<tr>
<td>- Alliance Transaction</td>
<td>Industry SIC//Parkhe, 1993</td>
<td>5</td>
<td>Not applicable.</td>
<td>Categorical by U.S. license class.</td>
</tr>
<tr>
<td>- Shipper Size</td>
<td></td>
<td>3</td>
<td>Not applicable.</td>
<td></td>
</tr>
<tr>
<td>- Carrier Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shipper’s Primary Industry</td>
<td>Cost Importance Index Maltz, 1994</td>
<td>1</td>
<td>Not applicable.</td>
<td></td>
</tr>
<tr>
<td>Competitive Advantage</td>
<td></td>
<td>5</td>
<td>Not applicable.</td>
<td>Weighting method. (100 points assigned among five items.)</td>
</tr>
<tr>
<td>- Shipper</td>
<td></td>
<td></td>
<td></td>
<td>Contextual modification.</td>
</tr>
<tr>
<td>- Carrier</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of Relationship</td>
<td>Historical Length (months) Heide &amp; John, 1990</td>
<td>1</td>
<td>Not applicable.</td>
<td></td>
</tr>
</tbody>
</table>
block of 19 items was formed because all three scales used similar Likert scale anchors. This yielded two benefits: (1) The groupings were large enough to allow the key informant some clerical efficiency because of use of similar scale anchoring schemes, and (2) the groupings obscured the identity of the individual scales, making acquiescence bias less of a problem (Alreck & Settle, 1995).

The final page included two blocks: Items measuring integration and shipping frequency, and the five-item risk propensity scale. The first block contained four data-request items. Alreck and Settle (1995) recommend placing such items at the end of the questionnaire. They argue that the informant will be more likely to finish the questionnaire, since time has already been invested in starting it; placing such data request items at the front of questionnaires tends to lower response rates. The bottom item reminded the key informants that their responses would be kept confidential.

Each questionnaire fit on four 8 1/2 x 11-inch pages. The pages were printed front-to-back in booklet form, on 11 x 17-inch paper. The questionnaire then was "saddle folded" (Alreck & Settle, 1995, p. 188). This created a four-page, one-piece booklet that required no stapling. To enhance readability, the questionnaire used an 11-point type face and good-quality white paper to enhance readability (Alreck & Settle, 1995).

**Initial Tests of Data-Gathering System**

Prior to the main survey mailing, two phases of testing were done on experts external to the university. The first phase, the pre-pilot study, sought carrier and shipper critiques on the structure of the survey versions. The second phase, the pilot study, served as a test run of the overall data-gathering system.
Pre-Pilot Study

A January pre-pilot study was done to subject the questionnaires to the scrutiny of transportation professionals. The pre-pilot group consisted of a convenience sample of industry professionals with ties to the University and the local CLM chapter. The investigator prescreened participants by telephone and personal conversation to find persons who could deliver a one-week turn-around on the critique. The critique asked for feedback on the survey in terms of user-friendliness, instruction and item clarity, ability of respondent to readily answer questions, and appropriateness of terminology.

In all, nine carrier and eight shipper professionals received the survey by mail, fax, or hand delivery. Four from each group responded. From the critiques, minor adjustments were made in the format of the questionnaire and in the wording of some items.

Pilot Study

The pilot study mailing consisted of a test run of the main mailing using 55 each of carriers and shippers. The single-phase February mailing contained a personalized cover letter, the survey, and a self-addressed, stamped return envelope. In all, 15 carriers and 13 shippers returned surveys for an overall 27 percent response rate out of 110 total surveys sent. Further, only one shipper and one carrier survey from the pilot mailing were returned by the post office as non-deliverable.

Demographic information on the pilot study group is as follows: Key informants responded from 16 different states, and had an average tenure with their firm of 11 years. For type of logistics alliance relationship, nine of 13 shippers had a Type 1 basic
relationship, while seven of 15 carriers had a Type 2 system development relationship. In all, 15 of 28 key informants identified a Type 1 relationship. For industry representation, eight of 13 shippers came from chemical or pharmaceutical manufacturers, while carriers serviced predominantly retail and food manufacturing clients.

**Pilot Study Goals.** The pilot study had three main goals: preliminary data analysis, including tests for normality for variables of interest and tests of coefficient alpha for Likert and similar scales; checks for unusual data patterns which would indicate a flawed questionnaire item; and an estimate of likely response rate for the main mailing. The preliminary data analysis took place under conditions of n = 28 respondents, a situation of low statistical power. Thus, results of the statistical tests should be analyzed conservatively. The Shapiro-Wilk test was used to test for normality. This test is designed for groups with an N of from 6 to 2,000, with the caution that it is sometimes unstable if N is less than 30 (SAS, 1992). A significant test indicates a non-normal distribution. As shown in Table 10, all five psychometric scales had scores indicating normal data patterns. Single-item cardinal numbers, on the other hand, mostly indicated non-normal data patterns. Structure (STRUC), the mean of QINT and EINT, was the exception among cardinal values in scoring as normal. Its components, however, scored as non-normal.

The three measures of frequency of transaction all scored as non-normal. These were comparative order frequency (FRE), monthly shipments (SM), and monthly tonnage (TM). Natural log transformations (SMLN and TMLN) brought the monthly measures into normality, but not so with FRE as FRELN. Another item, the control variable for
duration of relationship in months (DUR), was brought into normality with a special log transformation.

**Pilot Reliability Assessment.** Next, we will discuss the tests of coefficient $\alpha$ conducted on the Likert scales. Among the independent variables (IVs), the 10-item Ego Asset Specificity scale (ASPEC) produced a coefficient $\alpha$ of .57. This was difficult to interpret, since one needs about 50 cases to analyze a 10-item scale. One computer-recommended adjustment would be removal of item A4, which would raise $\alpha$ to .70. Uncertainty also proved troubling. UNC showed a coefficient $\alpha$ of .38 only if item U1R was eliminated. The developers of the scale (Heide & John, 1990; Heide & Miner, 1992) found different coefficient $\alpha$ figures for sample subgroups of buyers and suppliers. Thus, use of shipper and carrier in subgroups, or possibly a covariate, was included as one way of analyzing this scale when the larger sample N of the main survey is available. This scale will be revisited in the Preliminary Data Analysis discussion relating to the main survey.

Of the remaining Likert-item scales, Trust and Process both showed more robust reliability ratings. The 12-item TRUST scale revealed a coefficient $\alpha$ of .87, and the PRCS triad delivered an $\alpha$ of .80. The remaining scale, Risk Propensity, which the author developed, was previously discussed in Chapter III. With coverage of the pilot study's data analysis complete, the next topic is the review of data patterns.

Data patterns were reviewed for instances of unusual responses, usually a clustering of missing values for an item or unexpected response patterns for items. The investigator clarified the operational definitions of several variables and scale items for the key informants. This included consultation with the Texas Motor Transport Association
(TMTA) for advice on proper terminology and wording of the items which gathered operational shipment information.

**TABLE 10.**

**Pilot Study: Shapiro-Wilk Test of Normality**

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>s.d.</th>
<th>Statistic</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASPEC</td>
<td>3.88</td>
<td>.81</td>
<td>.958</td>
<td>28</td>
<td>.387</td>
</tr>
<tr>
<td>UNC</td>
<td>4.24</td>
<td>.91</td>
<td>.955</td>
<td>28</td>
<td>.351</td>
</tr>
<tr>
<td>FRE</td>
<td>5.96</td>
<td>1.07</td>
<td>.831</td>
<td>23</td>
<td>.010**</td>
</tr>
<tr>
<td>FLN</td>
<td>1.77</td>
<td>.91</td>
<td>.814</td>
<td>23</td>
<td>.010**</td>
</tr>
<tr>
<td>TRUST</td>
<td>5.32</td>
<td>.86</td>
<td>.978</td>
<td>28</td>
<td>.798</td>
</tr>
<tr>
<td>RISKP</td>
<td>32.76</td>
<td>12.87</td>
<td>.959</td>
<td>28</td>
<td>.412</td>
</tr>
<tr>
<td>PRCS</td>
<td>3.20</td>
<td>1.49</td>
<td>.960</td>
<td>28</td>
<td>.420</td>
</tr>
<tr>
<td>EINT</td>
<td>18.91</td>
<td>4.30</td>
<td>.223</td>
<td>25</td>
<td>.010**</td>
</tr>
<tr>
<td>EINTLN</td>
<td>-.60</td>
<td>1.67</td>
<td>.798</td>
<td>19</td>
<td>.010**</td>
</tr>
<tr>
<td>QINT</td>
<td>3.03</td>
<td>.80</td>
<td>.259</td>
<td>24</td>
<td>.010**</td>
</tr>
<tr>
<td>QILN</td>
<td>-1.9</td>
<td>1.38</td>
<td>.862</td>
<td>24</td>
<td>.010**</td>
</tr>
<tr>
<td>SM</td>
<td>(See below)</td>
<td></td>
<td>.303</td>
<td>24</td>
<td>.010**</td>
</tr>
<tr>
<td>SMLN</td>
<td>6.50</td>
<td>2.37</td>
<td>.934</td>
<td>24</td>
<td>.153</td>
</tr>
<tr>
<td>TM</td>
<td>(See below)</td>
<td></td>
<td>.567</td>
<td>17</td>
<td>.010**</td>
</tr>
<tr>
<td>TMLN</td>
<td>9.50</td>
<td>3.48</td>
<td>.914</td>
<td>17</td>
<td>.138</td>
</tr>
</tbody>
</table>

SM has a Mean of 62,410.85 and a s.d. of 17,096.8
TM has a Mean of 820,184.0 and a s.d. of 453,241.1

**This is an upper bound of the true significance.**

**Main Survey**

This section covers the activities surrounding the main survey mailing. It deals with both the mailing plan and efforts to enhance the response rate.

**Survey Mailing Plan**

The main survey mailing, with an M-Day (initial phase mailing day) of March 16, was conducted according to the plan summarized in Table 11. This survey yielded more
usable responses than the minimum required for hypothesis testing. Details of the
response rate are covered in Chapter IV.

**TABLE 11**

**1998 Logistics Alliance Survey - Schedule for Main Mailing**

<table>
<thead>
<tr>
<th>Event</th>
<th>Mailing Activity</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>Introductory post card sent</td>
<td>M-Day</td>
</tr>
</tbody>
</table>
| Phase II| Initial survey sent                    | Carriers $M + 8$
|         |                                        | Shippers $M + 11$
| Phase III| Thank you-tickler post card sent       | Carriers $M + 19$
|         |                                        | Shippers $M + 21$
| Phase IV| Supplementary survey sent              | Carriers $M + 31$
|         |                                        | Shippers $M + 37$

**Minimizing Non-Response**

Efforts to minimize non-response consisted of sampling-pool screening activities and survey content factors. Sampling-pool screening activities began with selection of a representative logistics group with a good mailing list. Computer diskettes containing the mailing lists in ASCII format were sent to the investigator by CLM. This eliminated the risk of error inherent in transcribing information from paper mailing lists to a merge-mail database. Further, the CLM mailing list had undergone an annual update about three months before the investigator received it. This helped ensure the currency of both member records and information on the members. Also, as discussed previously, care was taken during sampling to ensure qualified persons were selected as key informants to provide survey information.
Efforts taken during physical preparation of the survey instrument and supporting materials also served to minimize non-response. CLM had declined to directly sponsor the study, out of a desire to protect the privacy of their members. This increased the investigator's challenge to create a direct benefit for key informants who participated in the study. For direct benefit, the investigator offered respondents a custom report on how their firm compared to competitors on key survey measures.

To help market this idea, the investigator personalized the mailing items as much as possible on a limited budget. Post cards for Phases 1 and 3 were all personally signed by the main investigator. The survey mailings in Phases 2 and 4 included merge-mail cover letters - signed by both the investigator and the major professor - and stamped, self-addressed return envelopes with the survey mailing. All postage consisted of actual first-class stamps to enhance both prompt delivery and tracking. Also, the colorful stamp increased the likelihood the inbound envelope would be differentiated from metered junk mail. The four-phase mailing plan itself helped foster the image of a serious, well-orchestrated project.

Data Analysis

Sampling of the target population yields raw data, which must be examined in order to draw conclusions about the relationships among the variables of the study. Through the ensuing data analysis, researchers accomplish two goals. First, they examine the characteristics of the data base to determine if the sample adheres to the assumptions of the statistical tool or tools which are being used. Second, they draw judgments about
the falsifiability of their hypotheses based upon the results which their statistical tools yield. This section will address the three main topics relating to data analysis: justification of selection of regression analysis for this study, a review of potential problems inherent in regression analysis, and specification of the variables and presentation of initial regression model.

**Justification of Use of Regression Analysis**

Appropriateness of multiple regression analysis in this study can be justified from the viewpoint of the statistical definition and qualities of regression. Multiple regression analysis involves use of multiple independent, or predictor, variables - and possibly covariate, mediator, and moderator variables - to predict the behavior of a dependent, or criterion, variable. The dependent variable is continuous (Hair, et al., 1992; Pedhazur, 1982). This study's initial model, which arose from the literature review of Chapter II, fits these requirements. It contains three independent variables, four covariates, and two moderator variables. The base regression model will be presented at the end of this section.

Despite the frequent use of regression in social science and business research, some specialists in research methods have identified cautions for users of this tool. The first, problems with determining causality from the results of a field study, will be discussed in the Limitations section of Chapter V. The second, adjustments taken when the assumptions of regression analysis are violated, will be discussed here.

Regression analysis operates under basic assumptions about the nature of the data, which represents the variables being analyzed in a given study. These assumptions include
a statistical relationship among the variables, linearity of the regression model, normality, equal variance of the dependent (criterion) variable, and uncorrelated error terms (Achen, 1982; Hair, et al., 1992; Pedhazur, 1982). Multiple regression analysis, which employs multiple independent variables, has the additional assumption of independence among independent variables. Specific diagnostic tests to detect violations of these assumptions, along with corrective actions for violations, are addressed in Chapter IV.

Structure of Initial Regression Model

Specification of variables and determination of the initial regression equation comprise the two topics within the structure of the initial regression model. Table 12 shows the variables of the initial regression model, and the initial regression equation. The model tests whether the dependent variable, Relational Governance (RG), is influenced by independent variables Frequency (FRE) and Uncertainty (UNC), as moderated by Trust (TRUST), and Asset Specificity (ASPEC) as moderated by TRUST and Risk Propensity (RISKP). Pilot testing of the RISKP measure indicates two dimensions, RISKA and RISKB, likely would be entered into the model. Prospective control variables, or covariates, include Duration of Relationship (DURLN), Shipper Industry (SIC), and Competitive Advantage (CA).

Summary

This chapter discussion has focused on the methodology for testing hypotheses dealing with trust and governance in logistics alliances. The introduction revisited the theory development process, and explained the bridge from the theory development of Chapter II to the theory testing of Chapter III (Bacharach, 1989). Topics in Chapter III
TABLE 12
Logistics Alliance Model: Hierarchical Sequence of Variable Entry

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Coefficient</th>
<th>Variable</th>
<th>Name</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent</td>
<td></td>
<td>Relational Governance (RG)</td>
<td>Y₅</td>
<td>STRUC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Structure</td>
<td>Y₉</td>
<td>PRCS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Process</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Block 1</strong> Covariates</td>
<td></td>
<td>Duration of Relationship</td>
<td>B₁</td>
<td>DURLN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cost Posture</td>
<td>B₂</td>
<td>COST</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carrier or Shipper</td>
<td>B₃</td>
<td>CS</td>
</tr>
<tr>
<td><strong>Block 2</strong> Independents</td>
<td></td>
<td>Asset Specificity</td>
<td>B₄</td>
<td>ASPEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uncertainty</td>
<td>B₅</td>
<td>UNC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frequency of Transaction</td>
<td>B₆</td>
<td>FREQ</td>
</tr>
<tr>
<td><strong>Block 3</strong> Moderators</td>
<td></td>
<td>Trust</td>
<td>B₇</td>
<td>TRUST</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Risk Propensity (RISKP)</td>
<td>B₈</td>
<td>RISKA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre-Decision Posture</td>
<td>B₉</td>
<td>RISKB</td>
</tr>
<tr>
<td><strong>Block 4</strong> Moderation Interactions</td>
<td></td>
<td>TRUST x ASPEC</td>
<td>B₁₀</td>
<td>TxA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TRUST x UNC</td>
<td>B₁₁</td>
<td>TxU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TRUST x FREQ</td>
<td>B₁₂</td>
<td>TxF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RISKA x ASPEC</td>
<td>B₁₃</td>
<td>RAXA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RISKB x ASPEC</td>
<td>B₁₄</td>
<td>RBxA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TRUST x RISKA x ASPEC</td>
<td>B₁₅</td>
<td>TxAxA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TRUST x RISKB x ASPEC</td>
<td>B₁₆</td>
<td>TxCB</td>
</tr>
</tbody>
</table>

included research design, sampling set, operationalization of constructs and selection of measurement tools, development of survey instrument and data analysis plan. The research design employed is a field study using a mail survey to gather cross-sectional data on LAs. According to the Snow and Thomas (1994) classification system, this is a "cell 5" study which seeks to test theory for the purpose of explanation.
Next came a discussion of the sampling set for the study. The population of interest is shipping and motor carrier firms involved in logistics alliances. The unit of interest is the logistics alliance dyad; however, the actual unit of analysis is the key informant representing either a carrier or shipper. Key informants are the LA interface personnel at the shipper and carrier firms; access to the personnel comes through the Council of Logistics Management. Power analysis was used to determine the sample size needed for the study. A sample size of 120 for both shippers and carriers would be sufficient for all necessary statistical tests.

The following section covered operationalization of variables and selection of measurement instruments. The dependent variable is governance mechanism; independent variables are asset specificity, frequency of transaction, and uncertainty (performance ambiguity); and the control variables were established as competitive advantage and length of relationship. Measurement tools came primarily from the buyer-supplier partnership and logistics alliance literature.

In development of the survey instrument, the researcher contextually refined a number of the scales and items to reflect a shipper-motor carrier situation. The questionnaire itself was constructed using standard guidelines from Alreck and Settle (1995) and Dillman (1978). Questionnaire development included a two-phase pilot study. In Phase I, the emergent 51-item questionnaire underwent a review of industry and academic experts on a range of issues from psychometrics to readability. In Phase II, the survey was mailed to 55 shippers and 55 carriers. The goals included a trial run of the mailing system, a pilot data analysis, and a qualitative analysis of response patterns to serve as a final check on the questionnaire. The mailing plan, including ways to minimize non-response, was likewise discussed.
The capstone section, data analysis, explained the selection of moderated hierarchical regression analysis (MHRA) as the analysis tool, and outlined the equation for the base model. The nature of the data and the structure of the model indicated MHRA as the best analysis tool for the research project.
CHAPTER IV

DATA ANALYSIS & RESULTS

This chapter reports and briefly describes the results of analysis of the data from the Logistics Alliance Survey. The chapter addresses survey response rate and respondent vs. nonrespondent comparison, data protocols, characteristics of the sample, preliminary data analysis, results of the hypothesis tests, and post-hoc statistical tests. Discussions about the findings, however, will be reserved for Chapter V.

Main Survey Response Rate

The main mail survey yielded sufficient responses from both carriers and shippers to satisfy the minimum statistical power requirements of a 20 percent response rate from each group. The mailings to 1,260 professionals (630 carriers and 630 shippers) yielded the results shown in Table 13. Following adjustments for non-useable replies, the survey yielded a net overall response rate of 26.9 percent, or 324 usable responses. Carriers yielded \( n = 175 \) usable responses for a 29.0 percent net response rate, and shippers yielded \( n = 149 \) usable responses for a 24.9 percent net response rate.

Nonusable Replies

Nonusable replies came in the form of 31 nondeliverables and 27 disqualifications. Nondeliverables consisted of mailed survey items which were returned by the post office due to inability to find the addressee. Among carriers, the primary reason for non-delivery proved to be improper address information; among shippers, the primary reason was that
the addressee no longer worked at the firm. Disqualifications consisted of surveys returned by the key informants or their firm in which the respondent declined to participate. Among carriers, the primary reason for disqualification was participation in another transportation mode (e.g., ocean-shipping or railroad); also, one company had ceased operations, and the other manufactured truck equipment. Among shippers, primary reason for disqualification was nonuse of third-party motor carriers or a product requirement for another mode (e.g., one medical trauma systems firm used overnight air freight as their outside carrier). Also, four persons had shifted to jobs not related to logistics, one came from a firm which does not participate in surveys, and one correctly alerted this investigator to the fact that he had completed the survey twice.

**TABLE 13**

1998 Logistics Alliance Survey Response Results

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Non-Deliv</th>
<th>Gross Replies</th>
<th>Gross Reply %</th>
<th>Disqual</th>
<th>Net Replies</th>
<th>Net Reply %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carriers</td>
<td>630</td>
<td>14</td>
<td>187</td>
<td>30.4%</td>
<td>12</td>
<td>175</td>
<td>29.0%</td>
</tr>
<tr>
<td>Shippers</td>
<td>630</td>
<td>17</td>
<td>164</td>
<td>26.8%</td>
<td>15</td>
<td>149</td>
<td>24.9%</td>
</tr>
<tr>
<td>Total</td>
<td>1,260</td>
<td>31</td>
<td>351</td>
<td>28.6%</td>
<td>27</td>
<td>324</td>
<td>26.9%</td>
</tr>
</tbody>
</table>

Respondents vs. Nonrespondents

Efforts to gauge the representativeness of the sample involve, in part, comparison of respondents with nonrespondents on factors key to the study. As mentioned in Chapter III, one standard method for doing this involves use of early and late survey respondents,
respectively, as surrogates for respondents and nonrespondents from each group. For
both the carrier and shipper subgroups, this researcher randomly selected 30 early and 30
late respondents. The early and late groups were compared, using independent-sample t-
tests, on four key factors of the study. The nonsignificant results of the t tests (see Table
14) show that early respondents are equivalent to late respondents. Interpreted via the
surrogate relationship, this suggests that nonrespondents are equivalent to respondents,
indicating that the respondents are representative of their populations as a whole. Hence,
the findings of this study can be generalized to most motor-carrier logistics alliance
situations.

**TABLE 14**

**Survey Respondents (R) vs. Nonrespondents (NR): t tests on Key Factors**

<table>
<thead>
<tr>
<th>Carriers</th>
<th>Early (R) x</th>
<th>Late (NR) x</th>
<th>df</th>
<th>t</th>
<th>Signif.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure (STRUC)</td>
<td>29.67</td>
<td>25.89</td>
<td>58</td>
<td>.706</td>
<td>.483</td>
</tr>
<tr>
<td>Process (PRCS)</td>
<td>3.71</td>
<td>3.94</td>
<td>58</td>
<td>-.674</td>
<td>.503</td>
</tr>
<tr>
<td>Tenure with Firm (YR)</td>
<td>8.60</td>
<td>10.60</td>
<td>58</td>
<td>-.991</td>
<td>.326</td>
</tr>
<tr>
<td>Duration of LA (DUR)</td>
<td>70.13</td>
<td>58.47</td>
<td>58</td>
<td>.729</td>
<td>.469</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shippers</th>
<th>Early (R) x</th>
<th>Late (NR) x</th>
<th>df</th>
<th>t</th>
<th>Signif.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure (STRUC)</td>
<td>32.43</td>
<td>32.48</td>
<td>58</td>
<td>-.008</td>
<td>.994</td>
</tr>
<tr>
<td>Process (PRCS)</td>
<td>2.42</td>
<td>2.64</td>
<td>58</td>
<td>-.615</td>
<td>.541</td>
</tr>
<tr>
<td>Tenure with Firm (YR)</td>
<td>10.27</td>
<td>10.87</td>
<td>58</td>
<td>-1.157</td>
<td>.252</td>
</tr>
<tr>
<td>Duration of LA (DUR)</td>
<td>55.45</td>
<td>61.63</td>
<td>58</td>
<td>-.472</td>
<td>.639</td>
</tr>
</tbody>
</table>

**Data Protocols and Missing Data**

The statistical package SPSS 7.5 for Windows was used to analyze the data in this
report. One of the decisions required of researchers using any statistical package is choice
of method for handling missing data within file records. This investigator chose substitution of variable mean in order to prevent “correlation coefficients that are based on entirely different groups of cases” (Norusis, 1995, p. 476). This decision to substitute the variable means was made only after two variables were eliminated from analysis due to a high incidence of missing values; the elimination of the variables, both related to monthly shipping activity, will be discussed under Preliminary Data Analysis.

Overall, the returned surveys showed excellent attention to detail by the key informants. For example, the individual items which comprised the scales for Asset Specificity, Uncertainty, Cost Posture, Process and Risk Propensity had a completion rate exceeding 98 percent (less than 2 percent missing values); the top scale was Risk Propensity, in which every respondent completed all five items. Because of minimal incident of missing values, there is little likelihood of losing reliability by substituting the item mean for the occasional missing value.

Most categorical variables, such as job, SIC, and type of LA relationship, and the cardinal number requests, such as respondent’s years with firm and duration of LA, had a completion rate for both groups of 95 percent or better. The remainder served as indicators (e.g., job, tenure with firm, duration of LA) of whether the response was qualified for inclusion in the database; the high response rates enhanced the reliability of survey acceptance screening. Overall, the initial analysis of the data during survey coding indicated a response pattern by key informants that met the data-gathering goals set by the researcher.
Characteristics of the Survey Sample

The 324 usable responses to the survey represented a wide variety of U.S. regions and industrial situations. A profile of the responses will address the key informant, firm, and alliance levels of analysis. Comments addressing all 324 responses will be called “overall” remarks, and remarks addressing specific shipper-carrier differences will be identified as such.

Key Informants

Information on key informants deals with both years of employment with the firm and job classification. Years of employment with the firm ranged from one to 37 years, with an overall mean of 10.4 years and a median of 8.0 years (see Table 15). Respondents from shippers had somewhat more experience than those from carriers, with an edge of more than two years in both mean and median tenure. This slight difference, however, should not be a significant factor in the study.

TABLE 15

Characteristics of the Key Informants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Carrier</th>
<th>Shipper</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenure (Years) with Firm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>1-34</td>
<td>1-37</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>9.3</td>
<td>11.8</td>
<td>10.4</td>
</tr>
<tr>
<td>Median</td>
<td>7.0</td>
<td>10.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Job Category Count</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>President / CEO</td>
<td>26</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>Division Head / Account Manager</td>
<td>131</td>
<td>134</td>
<td>265</td>
</tr>
<tr>
<td>Technical / Support Specialist</td>
<td>14</td>
<td>11</td>
<td>25</td>
</tr>
<tr>
<td>None Reported</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>175</td>
<td>149</td>
<td>324</td>
</tr>
</tbody>
</table>
To determine job classification, key informants were asked to list their job title; using qualitative analysis, the investigator then placed them into one of three categories (see Table 15). Overall, 82 percent of respondents listed Division Head / Account Manager as their job title. In the President / CEO category, carriers had 26 and the shippers had none. Carriers and shippers each had a dozen or so Technical / Support Specialists. As mentioned in Chapter III, the researcher sought key informants who could provide accurate information on either the carrier or shipper side of an LA. Respondents from all three job categories showed themselves to be familiar with the operations of the firm, as indicated in previous discussion affirming the completeness of the responses; no patterns of missing data, when it did occur, could be attributed to job categories.

An ANOVA, supported by a Tukey HSD test (Keppel, 1991), compared the job categories on this study's variables of interest. These tests sought to explore the potential of job category as a covariate for the study (see Table 16). Results indicate that the only significant differences within job category came in carrier Trust ($F_{(2,170)} = 5.824, p < .004$. President / CEO ($\bar{x} = 5.78$) and technical / support specialist ($\bar{x} = 4.71$) had a Tukey HSD mean difference of 1.07, significant at $p < .005$. In this case, the small portion of the carrier sample size represented by the technical specialists (8.0 percent) precluded the need to account for the significant difference in the model. This judgment was borne out statistically: A comparison of research models run with and without the technical / support specialists included in the database showed no appreciable difference in results.

Overall, the respondents from both carriers and shippers appear to be reasonably experienced, with the vast majority of key informants in both groups in the department
TABLE 16

ANOVA: Selected Variables of Interest x Job Category

<table>
<thead>
<tr>
<th>Variable</th>
<th>Carriers</th>
<th></th>
<th>Shippers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$F_{2,173}$</td>
<td>Signif.</td>
<td>$F_{l,148}$</td>
<td>Signif.</td>
</tr>
<tr>
<td>Asset Specificity (ASPEC)</td>
<td>.469</td>
<td>.627</td>
<td>.000</td>
<td>.986</td>
</tr>
<tr>
<td>Uncertainty (UNC)</td>
<td>1.339</td>
<td>.265</td>
<td>.155</td>
<td>.694</td>
</tr>
<tr>
<td>Frequency (FRE)</td>
<td>.696</td>
<td>.500</td>
<td>.261</td>
<td>.610</td>
</tr>
<tr>
<td>Trust (TRUST)</td>
<td>5.824</td>
<td>.004</td>
<td>.983</td>
<td>.323</td>
</tr>
<tr>
<td>Risk Propensity (RISKP)</td>
<td>.131</td>
<td>.877</td>
<td>.403</td>
<td>.527</td>
</tr>
<tr>
<td>Structure (STRUC)</td>
<td>.487</td>
<td>.615</td>
<td>.140</td>
<td>.708</td>
</tr>
<tr>
<td>Process (PRCS)</td>
<td>1.107</td>
<td>.333</td>
<td>.274</td>
<td>.601</td>
</tr>
</tbody>
</table>

F-score degrees of freedom indicate three job categories among Carriers, and two among Shippers.

head / account manager job category. These mid-level managers fit the requirements needed of key informants. Within the groups, shippers have somewhat more firm-specific tenure than do the carriers; both groups, however, have a median time of eight years with the firm. These experience levels, coupled with the diligence shown by the groups in completing survey items, suggests that the data in the survey responses should be quite representative of the sample population.

Firm-Level Demographics

Demographics revealed that the 324 firms represented a broad range of states and industries. Overall, firms responded from 39 states; the top four states in total number of responses were Illinois with 45, California with 35, Ohio with 22 and Texas with 17 (see Table 17). Other states with 10 or more responses included Michigan, Wisconsin, Florida,
Pennsylvania, Tennessee, Massachusetts, Georgia, and North Carolina. Of states with no respondents, the only geographically-contiguous cluster was North Dakota, South Dakota and Wyoming. This can be explained possibly by CLM’s low membership in these three states. Any regional or state differences should be neutralized as an effect because of the randomization resulting from having 39 of 50 states represented in the sample.

**TABLE 17**

Demographics of the Firms

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Carrier</th>
<th>Shipper</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top States Represented</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illinois</td>
<td>26</td>
<td>19</td>
<td>45</td>
</tr>
<tr>
<td>California</td>
<td>19</td>
<td>18</td>
<td>37</td>
</tr>
<tr>
<td>Ohio</td>
<td>11</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>Texas</td>
<td>7</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Leading SICs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20  Food Products</td>
<td>16</td>
<td>30</td>
<td>46</td>
</tr>
<tr>
<td>26  Paper / Allied Products</td>
<td>7</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>28  Chemical / Pharmaceutical</td>
<td>16</td>
<td>27</td>
<td>43</td>
</tr>
<tr>
<td>35  Industrial Machinery / Computers</td>
<td>5</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>36  Electronics (not computer)</td>
<td>21</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td>37  Transportation Equipment</td>
<td>16</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>38  Measuring / Medical Tools</td>
<td>3</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>53  General Retailing</td>
<td>20</td>
<td>0</td>
<td>20</td>
</tr>
</tbody>
</table>

In terms of industrial settings, 41 different two-digit Standard Industrial Classifications (SICs) were represented overall. The top eight SICs are addressed in Table 17, with food products manufacturing and chemical-pharmaceutical manufacturing being prominent industries with both shippers and carriers. Again, any industry effects should be neutralized by the randomization of having two-score industries represented in the sample.
Characteristics of the Alliances

The nature of LA relationships, primary types of motor carriage provided and sought, and the direct-indirect nature of service provided several insights into the alliances themselves. In terms of alliance relationships, the Type 1 “basic coordination” LA was recorded by 62 percent of shippers (93) and 37 percent of carriers (64) (see Table 18). Carriers, on the other hand, had more Type 3 “logistics utility” relationships, 35 percent (61) as compared to 17 percent (25) for shippers.

TABLE 18

Characteristics of the Logistics Alliances

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Carrier</th>
<th>Shipper</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 1 - Basic Coordination</td>
<td>64</td>
<td>93</td>
<td>157</td>
</tr>
<tr>
<td>Type 2 - Joint System Development</td>
<td>45</td>
<td>30</td>
<td>75</td>
</tr>
<tr>
<td>Type 3 - Logistics Utility</td>
<td>61</td>
<td>25</td>
<td>86</td>
</tr>
<tr>
<td>Unspecified</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Service Linkage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Motor Carriage Provider</td>
<td>93</td>
<td>110</td>
<td>203</td>
</tr>
<tr>
<td>Transportation / Logistics Coordinator</td>
<td>75</td>
<td>34</td>
<td>109</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Carrier/Shipper: Primary Service Provided/Used</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truckload (TL)</td>
<td>48</td>
<td>48</td>
<td>96</td>
</tr>
<tr>
<td>Less-Than-Truckload (LTL)</td>
<td>25</td>
<td>30</td>
<td>55</td>
</tr>
<tr>
<td>Package Delivery</td>
<td>20</td>
<td>15</td>
<td>35</td>
</tr>
<tr>
<td>Transportation / Logistics Coordination</td>
<td>75</td>
<td>—</td>
<td>75</td>
</tr>
<tr>
<td>Mixed</td>
<td>6</td>
<td>40</td>
<td>46</td>
</tr>
<tr>
<td>None of the Above</td>
<td>1</td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>

As for service linkage, 57 percent of carriers and 74 percent of shippers were involved in direct-provider relationships. About 27 percent of the shippers checked
multiple items for primary use, and 11 percent left the checkoff item blank; only a handful of carriers failed to identify a specific dominant service provided. This suggests that shippers see third-party carriage as providing multiple types of service, whereas most carriers approach clients from the standpoint of being able to provide one primary service.

**Trends Within the Sample**

Overall, analysis of the sample group indicates a variety of U.S. states and SICs, which supports the goal of a generalizable, national-level study in which regional and industry differences are controlled by randomness of the sample. The characteristics of key informants and alliances show both differences and similarities between the carrier and shipper groups. Although the main job level for both groups is Department Head / Account Manager, shippers have longer job tenure than carriers. As for alliance characteristics, shippers reported having predominantly Type 1 relationships, whereas carriers had a more balanced mix among the three types. Along with these differences are the significant differences between carrier and shipper in eight out of 13 of the study’s variables of interest (see Table 19). Therefore, because of the emergence of these differences, the carrier-shipper distinction will be added as a covariate in the model.

**Preliminary Data Analysis**

Before the hypotheses could be tested, the researcher explored the nature of the data gathered on variables of interest. The exploration tools include confirmatory factor analysis and reliability tests of the data in psychometric scales, variations on forms of cardinal-number variables, and tests for significant differences among levels of categorical variables. These explorations have identified situations in which diagnostic adjustments
TABLE 19

Independent Means Test: Carriers vs. Shippers

<table>
<thead>
<tr>
<th>Variable Description</th>
<th>Code</th>
<th>Carrier Mean</th>
<th>Shipper Mean</th>
<th>t test</th>
<th>Signif.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Posture</td>
<td>COST</td>
<td>18.44</td>
<td>25.39</td>
<td>-4.600</td>
<td>.000</td>
</tr>
<tr>
<td>Duration of Alliance</td>
<td>DUR</td>
<td>69.54</td>
<td>58.65</td>
<td>1.358</td>
<td>.176</td>
</tr>
<tr>
<td>Asset Specificity</td>
<td>ASPEC</td>
<td>4.08</td>
<td>3.77</td>
<td>2.554</td>
<td>.011</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>UNC</td>
<td>4.28</td>
<td>4.37</td>
<td>-0.899</td>
<td>.370</td>
</tr>
<tr>
<td>Frequency</td>
<td>FREQ</td>
<td>5.55</td>
<td>5.09</td>
<td>3.150</td>
<td>.002</td>
</tr>
<tr>
<td>Electronic Integration</td>
<td>EINT</td>
<td>46.33</td>
<td>38.72</td>
<td>1.693</td>
<td>.091</td>
</tr>
<tr>
<td>Quasi-Integration</td>
<td>QINT</td>
<td>10.92</td>
<td>28.14</td>
<td>-7.765</td>
<td>.000</td>
</tr>
<tr>
<td>Structure</td>
<td>STRUC</td>
<td>28.81</td>
<td>33.02</td>
<td>-1.623</td>
<td>.106</td>
</tr>
<tr>
<td>Process</td>
<td>PRCS</td>
<td>3.68</td>
<td>2.95</td>
<td>4.633</td>
<td>.000</td>
</tr>
<tr>
<td>Pre-Decision Risk</td>
<td>RISKA</td>
<td>49.88</td>
<td>34.73</td>
<td>6.625</td>
<td>.000</td>
</tr>
<tr>
<td>Decision Risk</td>
<td>RISKB</td>
<td>30.90</td>
<td>25.15</td>
<td>3.644</td>
<td>.000</td>
</tr>
<tr>
<td>Risk Propensity</td>
<td>RISKP</td>
<td>40.39</td>
<td>29.94</td>
<td>7.390</td>
<td>.000</td>
</tr>
<tr>
<td>Inter-Firm Trust</td>
<td>TRUST</td>
<td>5.32</td>
<td>5.48</td>
<td>-1.562</td>
<td>.119</td>
</tr>
</tbody>
</table>

were made during data analysis to account for anomalies within the data which violate the assumptions of the regression model (see Chapter III, pp. 110-111).

Dependent Variable: Relational Governance

*Relational Governance* was measured on two dimensions, Structure and Process.

Table 20 shows the correlations between structure and process, and structure’s two dimensions. *Structure* is measured using the arithmetic mean of its two dimensions, quasi-integration (QINT) and electronic integration (EINT). Both QINT and EINT were
measured using a single item on a 100-point scale. In the context of the logistics alliance, QINT reported either the percentage of revenues the carrier derived from the LA’s referent shipper, or the percentage of total motor carrier costs paid to the referent carrier by the shipper. EINT reported the percentages of transactions between LA partners which took place electronically. Preliminary data analysis showed no appreciable benefit to using the logarithmic transformations of the data that some previous research had used (e.g., Caves & Bradburd, 1988; Zaheer & Venkatraman, 1995). Therefore, the raw data was used in the study.

**Process**, the second dimension of Relational Governance, was measured using the arithmetic mean of the three-item joint action scale (Heide & Miner, 1992). Confirmatory factor analysis (CFA) of the joint-action survey data revealed the theorized single-dimension variable. Reliability analysis revealed $\alpha = .72$ for respondents, acceptable for testing established constructs (Nunnally & Bernstein, 1994). Hence, the items were combined arithmetically, as per Heide and Miner. Table 21 shows the inter-item correlations for the Process scale.

### TABLE 20

Relational Governance Components: Inter-Item Pearson Correlations

<table>
<thead>
<tr>
<th>Item (N=324)</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PRCS</td>
<td>3.35</td>
<td>1.44</td>
<td></td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>2. STRUC</td>
<td>30.83</td>
<td>23.67</td>
<td>.116*</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>3. QINT</td>
<td>18.82</td>
<td>21.36</td>
<td>-.027</td>
<td>.496**</td>
<td>1.000</td>
</tr>
<tr>
<td>4. EINT</td>
<td>42.82</td>
<td>39.74</td>
<td>.159**</td>
<td>.876**</td>
<td>.017</td>
</tr>
</tbody>
</table>

One-tailed correlations: * $p < .05$ // ** $p < .01$
TABLE 21
Joint Action Scale (PROCESS): Inter-Item Pearson Correlations

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. J1</td>
<td>2.22</td>
<td>1.62</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>2. J2</td>
<td>2.83</td>
<td>1.75</td>
<td>.485**</td>
<td>1.000</td>
</tr>
<tr>
<td>3. J3</td>
<td>3.92</td>
<td>1.87</td>
<td>.522**</td>
<td>.494**</td>
</tr>
</tbody>
</table>

All correlations significant at p < .001

Independent Variables: Asset Specificity, Uncertainty, and Frequency

The independent variables consist of the "characteristics of the transaction" from TCE. These characteristics include asset specificity, uncertainty, and frequency of transaction. Asset specificity was measured using the Ego Asset Specificity scale, a 10-item instrument with four possible subscales (Nooteboom, et al., 1997). Reliability analysis of the 10-item scale yielded $\alpha = .83$ for respondents, a level acceptable for established constructs. This study used the arithmetic mean of three of the four subscales, coded as ASPEC, to measure asset specificity (see Table 22). This supports the

TABLE 22
Summary of Asset Specificity Subscales

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Code</th>
<th>Items</th>
<th>Mean</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated Asset Specificity</td>
<td>AS1</td>
<td>A1, A2, A3, A4</td>
<td>4.26</td>
<td>.82</td>
</tr>
<tr>
<td>Physical Asset Specificity</td>
<td>AS2</td>
<td>A5, $A6^R$</td>
<td>2.63</td>
<td>.58</td>
</tr>
<tr>
<td>Knowledge Specificity</td>
<td>AS3</td>
<td>A7, A8, A9</td>
<td>4.76</td>
<td>.78</td>
</tr>
<tr>
<td>Place Specificity$^D$</td>
<td>AS4</td>
<td>A10</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Combined Subscales$^D$</td>
<td></td>
<td></td>
<td>11.65</td>
<td>.74</td>
</tr>
</tbody>
</table>

$^R$ Item reverse-coded for data analysis.  $^D$ AS4 subscale dropped from study due to low fit.
TABLE 23

Asset Specificity Scale: Inter-Item Pearson Correlations (N = 324)

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>3.61</td>
<td>1.93</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>3.81</td>
<td>1.84</td>
<td>.546**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>4.88</td>
<td>1.71</td>
<td>.526**</td>
<td>.392**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>4.75</td>
<td>1.73</td>
<td>.594**</td>
<td>.473**</td>
<td>.649**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>3.14</td>
<td>1.97</td>
<td>.430**</td>
<td>.388**</td>
<td>.400**</td>
<td>.476**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6r</td>
<td>2.12</td>
<td>1.51</td>
<td>.267**</td>
<td>.208**</td>
<td>.105</td>
<td>.207**</td>
<td>.423**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A7</td>
<td>4.96</td>
<td>1.55</td>
<td>.459**</td>
<td>.425**</td>
<td>.483**</td>
<td>.542**</td>
<td>.410**</td>
<td>.117*</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A8</td>
<td>4.15</td>
<td>1.73</td>
<td>.386**</td>
<td>.447**</td>
<td>.318**</td>
<td>.435**</td>
<td>.438**</td>
<td>.220**</td>
<td>.516**</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>A9</td>
<td>5.19</td>
<td>1.58</td>
<td>.309**</td>
<td>.288**</td>
<td>.396**</td>
<td>.433**</td>
<td>.264**</td>
<td>.086</td>
<td>.546**</td>
<td>.551**</td>
<td>1.00</td>
</tr>
<tr>
<td>A10</td>
<td>4.10</td>
<td>2.04</td>
<td>.119*</td>
<td>.093</td>
<td>.159**</td>
<td>.203**</td>
<td>.157**</td>
<td>.012</td>
<td>.161**</td>
<td>.068</td>
<td>.156**</td>
</tr>
</tbody>
</table>

One-tailed correlations: * p < .05 / ** p < .01

r indicates item has been reverse-coded for data analysis.
research model's view of asset specificity as a singular construct. Item A10, a stand-alone dimension of the firm's location relative to alliance counterpart, did not fit well with the other three dimensions. Its removal raised the inter-subscale \( \alpha \) from .60 to .78. Table 23 shows inter-item correlations for the overall scale.

Uncertainty (UNC) was measured using the mean of the four-item Performance Ambiguity scale (Heide & Miner, 1992). The correlation matrix is shown in Table 24. Next, a reliability analysis of the scale produced a coefficient \( \alpha \) of .39 for the respondents. Since this fell below the .5 threshold for a reliable scale, the researcher further analyzed the item group. Table 25 shows that Items U2 and U3, which both mention performance in their statements, are correlated at the \( p < .01 \) level; no other item pairs sharing significant correlations. A principal-components factor analysis revealed a two-factor solution (Table 25). Coefficient \( \alpha \) was .45 for factor 1, made up of two items which both mentioned performance in their text. Coefficient \( \alpha \) was only .19 for factor 2, indicating that the factor was not internally cohesive. Since the theory supporting this established scale indicates a single factor (Heide & Miner, 1992), and the data analysis is unequivocal
in test results for configuration of multiple factors, this researcher treated the scale as unidimensional and used the arithmetic mean of items U2 and U3 (factor 1) for the study.

**TABLE 25**

*Performance Ambiguity (UNCERTAINTY) Scale: Factor Analysis*

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Rotated Components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Cum. % Variance</td>
</tr>
<tr>
<td>1</td>
<td>1.326</td>
<td>33.143</td>
</tr>
<tr>
<td>2</td>
<td>1.207</td>
<td>63.327</td>
</tr>
<tr>
<td>Item</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>U1*</td>
<td>-.188</td>
<td>.807</td>
</tr>
<tr>
<td>U2</td>
<td>.827</td>
<td>-.188</td>
</tr>
<tr>
<td>U3</td>
<td>.695</td>
<td>.426</td>
</tr>
<tr>
<td>U4</td>
<td>.351</td>
<td>.583</td>
</tr>
</tbody>
</table>

Extraction: Principal Components Analysis
Rotation: Varimax with Kaiser Normalization

*Frequency of transaction* (FREQ) was measured using the single-item, 7-point Likert instrument comparative order frequency (Maltz, 1994). Data was also gathered on two other frequency measures, number of shipments (OP1) and total shipment weight (OP2) for a typical month within the LA. Missing data problems, however, precluded the use of these two variables in the study. For example, package-delivery situations yielded many instances of the OP2 missing data, in which key informants often made margin notes to the effect that weight was not a consideration for such delivery. Thus, FREQ became the only frequency measure used in the study.

**Moderators: Risk Propensity and Trust**

Moderators in the model included risk propensity and trust. For the Risk Propensity (RISKP) scale, the highest inter-item correlation was $r = .445$, below the .80 threshold of multicollinearity (see Table 26). Since the scale was developed especially for
this research by the investigator, the scale underwent a principal-components factor analysis.

### TABLE 26

Risk Propensity Scale: Inter-Item Pearson Correlations

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. R1</td>
<td>40.50</td>
<td>27.08</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. R2</td>
<td>45.33</td>
<td>24.28</td>
<td>.445**</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. R3&lt;sup&gt;R&lt;/sup&gt;</td>
<td>18.48</td>
<td>14.89</td>
<td>.037</td>
<td>-.064</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>4. R4&lt;sup&gt;R&lt;/sup&gt;</td>
<td>29.16</td>
<td>29.16</td>
<td>.174**</td>
<td>.113*</td>
<td>.272**</td>
<td>1.000</td>
</tr>
<tr>
<td>5. R5&lt;sup&gt;R&lt;/sup&gt;</td>
<td>37.14</td>
<td>20.84</td>
<td>.058</td>
<td>-.015</td>
<td>.168**</td>
<td>.328**</td>
</tr>
</tbody>
</table>

Two-tailed correlations: * p < .05 / ** p < .01  
<sup>°</sup> indicates item reverse-coded for data analysis.

The factor analysis for RISKP indicated a two-factor solution, with items R1 and R2 loading on factor 2 and items R3, R4, and R5 loading on factor 1 (see Table 27). R1 and R2 are logically expected to hang together because they indicate risk-taking tendencies of the manager in the planning/initialization phases prior to making a risky decision. Called RISKA, for predecision risk, these two items from component 2 had a coefficient α of .61. The other three items reflect risk-taking tendencies during and after the actual decision-making process. As the factor RISKB, for decision and post-decision risk, these three items from component 1 had a coefficient α of .51. Both subscales individually achieved the minimum reliability score for a newly designed scale; RISKA and RISKB, however, only shared an inter-subscale coefficient α of .18. Hence, the researcher elected to use RISKA and RISKB as separate measurements of risk propensity within the study.
TABLE 27

Risk Propensity Scale: Factor Analysis

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Rotated Components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Curr. % Variance</td>
</tr>
<tr>
<td>1</td>
<td>1.637</td>
<td>32.732</td>
</tr>
<tr>
<td>2</td>
<td>1.366</td>
<td>60.043</td>
</tr>
<tr>
<td>3</td>
<td>.833</td>
<td>76.703</td>
</tr>
<tr>
<td>4</td>
<td>.624</td>
<td>89.182</td>
</tr>
<tr>
<td>5</td>
<td>.541</td>
<td>100.000</td>
</tr>
</tbody>
</table>

Extraction: Principal Components Analysis
Rotation: Varimax with Kaiser Normalization

Trust was measured using the 12-item Organizational Trust Inventory (Cummings & Bromiley, 1996). The OTI correlation matrix is shown in Table 28. A reliability analysis was performed on the scale. Since Cummings and Bromiley had already performed multiple validations of the trust instrument, this investigator's task was to test the data from this survey to see if the trust subscales held together as theorized. The items of the scale were adjusted to fit the logistics context, but not to the degree that the effect of the instrument was changed. A reliability analysis revealed acceptable coefficient α levels for all three of the theorized subscales. The Keeps Commitments subscale (TR1KC) has a coefficient α of .85, the Negotiates Honestly (TR2NH) subscale has a coefficient α of .88, and the Avoids Opportunism (TR3OP) subscale has a coefficient α of .83. All are well above the standard cutoff of .6 to .7 for established scales (see Table 29). Therefore,
### TABLE 28

Organizational Trust Inventory: Inter-Item Pearson Correlations (N = 324)

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. T1</td>
<td>5.38</td>
<td>1.23</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. T2</td>
<td>5.61</td>
<td>1.12</td>
<td>.628**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. T3</td>
<td>5.81</td>
<td>1.14</td>
<td>.645**</td>
<td>.773**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. T4\textsuperscript{R}</td>
<td>4.61</td>
<td>1.73</td>
<td>.130*</td>
<td>.069</td>
<td>.150**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. T5\textsuperscript{R}</td>
<td>4.97</td>
<td>1.57</td>
<td>.368**</td>
<td>.362**</td>
<td>.430**</td>
<td>.607**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. T6\textsuperscript{R}</td>
<td>5.54</td>
<td>1.38</td>
<td>.483*</td>
<td>.436**</td>
<td>.598**</td>
<td>.367**</td>
<td>.623**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. T7</td>
<td>5.45</td>
<td>1.23</td>
<td>.670**</td>
<td>.539**</td>
<td>.614**</td>
<td>.201**</td>
<td>.390**</td>
<td>.520**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. T8</td>
<td>5.51</td>
<td>1.10</td>
<td>.610**</td>
<td>.555**</td>
<td>.609**</td>
<td>.136*</td>
<td>.340**</td>
<td>.468**</td>
<td>.754**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. T9</td>
<td>5.47</td>
<td>1.13</td>
<td>.651**</td>
<td>.548**</td>
<td>.632**</td>
<td>.122*</td>
<td>.369**</td>
<td>.507**</td>
<td>.707**</td>
<td>.805**</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. T10\textsuperscript{R}</td>
<td>5.75</td>
<td>1.26</td>
<td>.500**</td>
<td>.483**</td>
<td>.603**</td>
<td>.188**</td>
<td>.430**</td>
<td>.565**</td>
<td>.610**</td>
<td>.555**</td>
<td>.603**</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>11. T11</td>
<td>5.29</td>
<td>1.15</td>
<td>.540**</td>
<td>.518**</td>
<td>.619**</td>
<td>.205**</td>
<td>.424**</td>
<td>.496**</td>
<td>.691**</td>
<td>.621**</td>
<td>.624**</td>
<td>.563**</td>
<td>1.000</td>
</tr>
<tr>
<td>12. T12\textsuperscript{R}</td>
<td>5.35</td>
<td>1.59</td>
<td>.414**</td>
<td>.304**</td>
<td>.443**</td>
<td>.296**</td>
<td>.483**</td>
<td>.484**</td>
<td>.467**</td>
<td>.377**</td>
<td>.428**</td>
<td>.564**</td>
<td>.525**</td>
</tr>
</tbody>
</table>

One-tailed correlations: * p < .05 / ** p < .01  
\textsuperscript{R} indicates that item has been reverse-coded for data analysis.
for this study, the investigator arithmetically combined these subscales under the overall variable TRUST, which has a coefficient $\alpha$ of .77.

**TABLE 29**

Summary of Organizational Trust Inventory Subscales

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Code</th>
<th>Items</th>
<th>Mean</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeps Commitments</td>
<td>TR1KC</td>
<td>T2, T3, T8, T10&lt;sup&gt;R&lt;/sup&gt;</td>
<td>5.67</td>
<td>.83</td>
</tr>
<tr>
<td>Negotiates Honestly</td>
<td>TR2NH</td>
<td>T1, T7, T9, T11</td>
<td>5.40</td>
<td>.87</td>
</tr>
<tr>
<td>Avoids Opportunism</td>
<td>TR3OP</td>
<td>T4&lt;sup&gt;R&lt;/sup&gt;, T5&lt;sup&gt;R&lt;/sup&gt;, T6&lt;sup&gt;R&lt;/sup&gt;, T12&lt;sup&gt;R&lt;/sup&gt;</td>
<td>5.12</td>
<td>.75</td>
</tr>
<tr>
<td>Combined Subscales</td>
<td></td>
<td></td>
<td>16.54</td>
<td>.77</td>
</tr>
</tbody>
</table>

<sup>R</sup> Indicates item was reverse-coded for data analysis.

**Control Variables**

The three control variables for the study are Duration (DURLN), Competitive Advantage (COST), and Carrier-Shipper (CS). *Duration* of the LA in months served two functions. First, it served as a screening mechanism for responses to ensure that the particular LA met the six-month existence threshold. Second, it served as a control variable for analyzing alliance relationships, as used by previous researchers (Heide & Miner, 1992; Parkhe, 1993). Duration (DURLN) underwent loglinear transformation for the study.

*Competitive advantage* was measured using elements of the Cost Importance Index, which was designed specifically for a logistics context (Maltz, 1994). Table 30 showed significant correlations among the five items. When respondents' data was factor analyzed (see Table 31), it indicated that the cost item (low-transportation solution)
### TABLE 30

**Cost Importance Index: Pearson Inter-Item Correlations (N=324)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. C1</td>
<td>16.46</td>
<td>10.40</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. C2</td>
<td>11.30</td>
<td>7.77</td>
<td>.103*</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. C3</td>
<td>21.85</td>
<td>13.96</td>
<td>-.398**</td>
<td>-.235**</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>4. C4</td>
<td>17.48</td>
<td>11.49</td>
<td>-.232**</td>
<td>-.117*</td>
<td>-.190*</td>
<td>1.000</td>
</tr>
<tr>
<td>5. C5</td>
<td>32.65</td>
<td>14.28</td>
<td>-.205**</td>
<td>-.291**</td>
<td>-.395**</td>
<td>-.381**</td>
</tr>
</tbody>
</table>

Two-tailed correlations: * p < .05 / ** p < .01

---

loaded independently of the remaining items. Two of the other items, management flexibility and suitability of trucking equipment, which measure a flexibility dimension, loaded on one factor. Speed of delivery and consistency of service, two items reflecting quality, also loaded separately. Since flexibility and quality are measures of the firm's

### TABLE 31

**Cost Importance Index: Principal Components Factor Analysis**

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Rotated Components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Cum. % Variance</td>
</tr>
<tr>
<td>1</td>
<td>1.539</td>
<td>30.788</td>
</tr>
<tr>
<td>2</td>
<td>1.440</td>
<td>59.590</td>
</tr>
<tr>
<td>3</td>
<td>1.145</td>
<td>82.490</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extraction: Principal Components Analysis  
Rotation: Varimax with Kaiser Normalization
posture. Therefore, Maltz’s scale can be interpreted to have both cost and differentiation dimensions. Given that the scale used a statistical tool of a 100-point forced distribution scale, if cost is x, then differentiation is 100-x; the two dimensions are complementary. Hence, this study used a firm’s posture in the cost dimension (COST), the single item C3, as its measure of competitive advantage.

Carrier-Shipper is the third covariate within the study. As discussed several times, shippers and carriers have different perspectives on the LA. This was borne out earlier in this chapter in t tests in which carriers and shippers were significantly different on a majority of the variables of interest within this study. Therefore, although carrier-shipper was not derived as a variable in Chapter 3, it has since emerged as a possibly very valuable covariate within the study.

Tests of Hypotheses

The moderated hierarchical regression model described in Chapter III was used to test the hypotheses (see Table 32). The same scenario was run for both the Structure and Process dimensions of Relational Governance. Table 32 describes the data-entry sequence for the model. This section starts with a brief discussion of the correlation matrix for the model, followed by a report of the results of the two scenarios and the hypotheses tests.

Correlation Matrix

A review of the correlation matrix initially identified instances of potential multicollinearity problems, which are indicated by correlations above the .80 threshold (see Table 33). All seven potential instances of multicollinearity involved correlations which contained at least one interaction term in the pair; multicollinearity involving
TABLE 32

Logistics Alliance Model: Hierarchical Sequence of Variable Entry

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Coefficient</th>
<th>Variable</th>
<th>Name</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Y_s</td>
<td>Relational Governance (RG)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Y_p</td>
<td>Structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block 1</td>
<td>B_1</td>
<td>Duration of Relationship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covariates</td>
<td>B_2</td>
<td>Cost Posture</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B_3</td>
<td>Carrier or Shipper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block 2</td>
<td>B_4</td>
<td>Asset Specificity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independents</td>
<td>B_5</td>
<td>Uncertainty</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B_6</td>
<td>Frequency of Transaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block 3</td>
<td>B_7</td>
<td>Trust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderators</td>
<td></td>
<td>Risk Propensity (RISKP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre-Decision Posture</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td>Decision Posture</td>
<td></td>
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<tr>
<td>Block 4</td>
<td>B_{10}</td>
<td>TRUST x ASPEC</td>
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<td></td>
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<tr>
<td>Moderation</td>
<td>B_{11}</td>
<td>TRUST x UNC</td>
<td></td>
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<tr>
<td>Interactions</td>
<td>B_{12}</td>
<td>TRUST x FREQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B_{13}</td>
<td>RISKA x ASPEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B_{14}</td>
<td>RISKB x ASPEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B_{15}</td>
<td>TRUST x RISKA x ASPEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B_{16}</td>
<td>TRUST x RISK x ASPEC</td>
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</tr>
</tbody>
</table>

Interactions and a related main effect is a common problem (Bobko, 1986; Cortina, 1993).

Three of the seven clustered in a downward diagonal in columns 5 through 7 of Table 33:

TxAS * ASPEC, r = .864; TxUNC1 * UNCI, r = .890; and, TxFREQ * FREQ, r = .802.

Three more appeared in columns 8 and 9: RAxAS * RISKA, r = .873; TxRAxAS *

RISKA, r = .825; and RBxAS * RISKB. The seventh involved a correlation between
<table>
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<th>Item</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<td>.024</td>
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<td></td>
</tr>
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<td>-.034</td>
<td>-.084</td>
<td>1.000</td>
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</tr>
<tr>
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<td>1.16</td>
<td>.198**</td>
<td>.301**</td>
<td>.148**</td>
<td>-.100*</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNC</td>
<td>3.76</td>
<td>1.29</td>
<td>.083</td>
<td>.220**</td>
<td>-.038</td>
<td>-.121*</td>
<td>.118*</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FREQ</td>
<td>5.34</td>
<td>1.29</td>
<td>.137**</td>
<td>.139**</td>
<td>.192**</td>
<td>-.027</td>
<td>.319**</td>
<td>.050</td>
<td>1.000</td>
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</tr>
<tr>
<td>TRUST</td>
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<td>.93</td>
<td>.013</td>
<td>.085</td>
<td>.134**</td>
<td>-.057</td>
<td>.037</td>
<td>.055</td>
<td>-.017</td>
<td>1.000</td>
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<tr>
<td>RISKA</td>
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<td>21.84</td>
<td>.207**</td>
<td>.153**</td>
<td>.018</td>
<td>-.094*</td>
<td>.161**</td>
<td>.091</td>
<td>-.033</td>
<td>.030</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>RISKB</td>
<td>28.26</td>
<td>14.42</td>
<td>-.102*</td>
<td>-.020</td>
<td>-.039</td>
<td>-.020</td>
<td>.006</td>
<td>-.009</td>
<td>-.131*</td>
<td>.105*</td>
<td>1.000</td>
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</tr>
<tr>
<td>TXAS</td>
<td>21.00</td>
<td>7.51</td>
<td>.172**</td>
<td>.293**</td>
<td>.185**</td>
<td>-.099*</td>
<td>.864**</td>
<td>.125*</td>
<td>.265**</td>
<td>.515**</td>
<td>.135**</td>
<td>-.055</td>
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<td>TXUNC1</td>
<td>20.34</td>
<td>7.88</td>
<td>.077</td>
<td>.229**</td>
<td>.027</td>
<td>-.139**</td>
<td>.120*</td>
<td>.890**</td>
<td>.042</td>
<td>.474*</td>
<td>.103*</td>
<td>-.069</td>
</tr>
<tr>
<td>TXFRE</td>
<td>28.93</td>
<td>8.59</td>
<td>.120*</td>
<td>.154**</td>
<td>.223**</td>
<td>-.041</td>
<td>.279**</td>
<td>.066</td>
<td>.802**</td>
<td>.569**</td>
<td>-.032</td>
<td>-.076</td>
</tr>
<tr>
<td>RAxAS</td>
<td>170.79</td>
<td>106.21</td>
<td>.264**</td>
<td>.261**</td>
<td>.071</td>
<td>-.096*</td>
<td>.557**</td>
<td>.128*</td>
<td>.115*</td>
<td>.020</td>
<td>.873**</td>
<td>.083</td>
</tr>
<tr>
<td>RBxAS</td>
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<td>65.81</td>
<td>.009</td>
<td>.127*</td>
<td>.025</td>
<td>-.072</td>
<td>.486**</td>
<td>.056</td>
<td>.126*</td>
<td>-.087</td>
<td>.166**</td>
<td>.841**</td>
</tr>
<tr>
<td>TXRAXAS</td>
<td>923.46</td>
<td>612.94</td>
<td>.275**</td>
<td>.260**</td>
<td>.092</td>
<td>-.087</td>
<td>.530**</td>
<td>.140*</td>
<td>.095*</td>
<td>.291**</td>
<td>.825**</td>
<td>.044</td>
</tr>
<tr>
<td>TXRBxAS</td>
<td>587.70</td>
<td>368.01</td>
<td>.008</td>
<td>.141**</td>
<td>.056</td>
<td>-.068</td>
<td>.484**</td>
<td>.070</td>
<td>.123*</td>
<td>.198**</td>
<td>.158**</td>
<td>.781**</td>
</tr>
</tbody>
</table>

One-tailed correlations:  * p < .05  //  ** p < .01
interactions: for RBxAS * TxRBxAS, r = .947. Multicollinearity was addressed only in cases where theorized moderator relationships proved significant.

**Sequence of Hypothesis Tests**

Hypothesis testing included one scenario for both Structure and Process. Each scenario contains four models, each of which corresponds with the sequential addition of variable blocks in the regression sequence. Hierarchical regression with stepwise entry within blocks was used. The discussion of each scenario addresses which models were significant, and which variables contributed to the significance; some variables may remain in the model with a p-value above .05 since the probability level for removal from the model (POUT) for the stepwise entry is .10. The results of the hypothesis tests and variance-inflation-factor scores follow the scenario results.

**Structure**

**Structure Results.** The Structure scenario yielded a terminal model on the fourth iteration (see Table 34). Model 4 was significant overall (change in $F_{4,30} = 21.657, p < .000$), and had a cumulative $R^2 = .132$. Contributing to the significance were covariates Carrier-Shipper ($t = 4.416, p < .000$) and Duration ($t = 1.820, p < .070$), independent variable Asset Specificity ($t = 3.533, p < .000$), and moderator RiskA ($t = 4.654, p < .000$). Patterns were as follows: Carrier-Shipper entered at $t = 2.133$ ( $p < .035$), and got progressively stronger on each iteration. Duration, however, grew weaker after initial entry at $t = 2.253$ ( $p < .025$). The introduction of Asset Specificity weakened Duration to $t = 1.726$ ( $p < .085$); the addition of RiskA helped Duration regain some strength, but not to the $p < .05$ level. Another result was that no interaction terms were significant.
### TABLE 34

**Structure: Hierarchical Regression Model Summary and Significant Coefficients**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>Adj R²</th>
<th>$\sigma_e$</th>
<th>$R^2_\Delta$</th>
<th>$F_\Delta$</th>
<th>df</th>
<th>Sig.</th>
<th>D-W</th>
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<tbody>
<tr>
<td>1</td>
<td>.117</td>
<td>.014</td>
<td>.011</td>
<td>23.393</td>
<td>.014</td>
<td>4.465</td>
<td>1,322</td>
<td>.035</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>.170</td>
<td>.029</td>
<td>.023</td>
<td>23.246</td>
<td>.015</td>
<td>5.077</td>
<td>1,321</td>
<td>.025</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>.270</td>
<td>.073</td>
<td>.064</td>
<td>22.750</td>
<td>.044</td>
<td>15.159</td>
<td>1,320</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>.363</td>
<td>.132</td>
<td>.121</td>
<td>22.049</td>
<td>.059</td>
<td>21.657</td>
<td>1,319</td>
<td>.000</td>
<td>1.925</td>
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</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficient</th>
<th>$\beta$</th>
<th>$\sigma_e$</th>
<th>Std. $\beta$</th>
<th>t</th>
<th>Sig.</th>
</tr>
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<tbody>
<tr>
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<td>1.768</td>
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<td>16.001</td>
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<tr>
<td></td>
<td>CS</td>
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<td>2.608</td>
<td>.117</td>
<td>2.113</td>
<td>.035</td>
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<tr>
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<td>.121</td>
<td>2.204</td>
<td>.028</td>
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<tr>
<td></td>
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<td>.124</td>
<td>2.253</td>
<td>.025</td>
</tr>
<tr>
<td>3</td>
<td>(Constant)</td>
<td>6.959</td>
<td>5.053</td>
<td></td>
<td>1.377</td>
<td>.169</td>
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<tr>
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<td>.163</td>
<td>2.976</td>
<td>.003</td>
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<tr>
<td></td>
<td>DURLN</td>
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<td>1.468</td>
<td>.094</td>
<td>1.726</td>
<td>.085</td>
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<td>1.128</td>
<td>.216</td>
<td>3.893</td>
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<tr>
<td>4</td>
<td>(Constant)</td>
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<td>5.530</td>
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<td>-9.03</td>
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<tr>
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<td>4.416</td>
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<tr>
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<td>1.820</td>
<td>.070</td>
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<td>.191</td>
<td>3.533</td>
<td>.000</td>
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<td></td>
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<td>.280</td>
<td>.060</td>
<td>.260</td>
<td>4.654</td>
<td>.000</td>
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</tbody>
</table>

**Structure Hypothesis Tests.** Hypothesis 3A, which posits a positive relationship between Asset Specificity and Structure, was supported. The beta was significant and positive, confirming the hypothesis. Hypothesis 1C, which posits a positive moderation of the Asset Specificity-Structure linkage by RiskA, received indirect support. RiskA proved
significant as a main effect, but no interaction relationships were significant. No other hypotheses proved significant.

**Process**

**Process Results.** The Process scenario yielded a terminal model on the third iteration (see Table 35). Model 3 was significant overall (change in $F_{1,320} = 13.306, p < .000$), and showed a cumulative $R^2 = .163$. Contributing to the significance were the covariate Carrier-Shipper ($t = -3.791, p < .000$), and the independent variables Asset Specificity ($t = 4.538, p < .000$) and Uncertainty ($t = 3.648, p < .000$). No interaction effects were significant.

**TABLE 35**

**Process: Hierarchical Regression Model Summary and Significant Coefficients**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>$R^2$</th>
<th>Adj $R^2$</th>
<th>$\sigma_\epsilon$</th>
<th>$R^2_\Delta$</th>
<th>$F_\Delta$</th>
<th>df</th>
<th>Sig.</th>
<th>D-W</th>
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<td>.060</td>
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<td>.128</td>
<td>.122</td>
<td>1.352</td>
<td>.065</td>
<td>24.012</td>
<td>1,321</td>
<td>.000</td>
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<tr>
<td>3</td>
<td>.403</td>
<td>.163</td>
<td>.155</td>
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<td>.035</td>
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<td>1,320</td>
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<td>2.055</td>
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<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficient</th>
<th>$\beta$</th>
<th>$\sigma_\epsilon$</th>
<th>Std. $\beta$</th>
<th>t</th>
<th>Sig.</th>
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<tbody>
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<td>.000</td>
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<td>-.198</td>
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<td>.000</td>
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<tr>
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<td>.261</td>
<td>4.900</td>
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</tr>
<tr>
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<tr>
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<td>.151</td>
<td>-.198</td>
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<td>.239</td>
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<td></td>
<td>UNCI</td>
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<td>.058</td>
<td>.188</td>
<td>3.648</td>
<td>.000</td>
</tr>
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</table>
Process Hypothesis Tests. Two main effects hypotheses were upheld, both in significance and in direction. Hypothesis 1A posits a positive relationship between Asset Specificity and Process, and Hypothesis 2A posits a positive relationship between Uncertainty and Process. No other hypotheses were significant.

Overall Remarks on Hypotheses

In terms of hypothesis tests, the main effects hypothesis for Asset Specificity was upheld under both Structure and Process. A linkage between Risk (both A and B) and Asset Specificity is also hypothesized, with Risk moderating the Asset Specificity-Governance (both Structure and Process) linkage. The significance of RiskA under Structure, however, comes as main effect. No moderating interactions were significant, so judgment is reserved on whether Risk components actually moderate that linkage. As for the Uncertainty-Governance linkage, this was significant only under Process.

Multicollinearity Diagnostic

To assess the degree of multicollinearity, variance inflation factor (VIF) scores were analyzed (see Table 36). Low VIF scores indicate a low incidence of collinearity. For example, a VIF of 5.7 would indicate that a variable had a correlation of .90 with at least one other variable (Hair et al., 1992). The highest VIF score among the variables is 1.336 for Carrier-Shipper. Thus, collinearity appears to pose no threat to this study.

<table>
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<th>Variable</th>
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</tr>
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</tr>
<tr>
<td>COST</td>
<td>1.130</td>
</tr>
<tr>
<td>Cor S</td>
<td>1.336</td>
</tr>
<tr>
<td>ASPEC</td>
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<td>RISKA</td>
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<tr>
<td>RISKB</td>
<td>1.179</td>
</tr>
</tbody>
</table>
Post-Hoc Tests

The results of the data analysis and hypothesis tests brought two thoughts to mind. Could reframing of the variables have an influence on their effect in the model, and were missing key variables possibly overlooked? The first test addresses the possibility order entry influencing the significance.

Placement of Behavioral Variables

The initial analysis called for analyzing the influence of the behavioral variables through their interaction effects with the main TCE variables. An alternative approach, however, might be to consider these behavioral variables as controls. Such an approach, consistent with the views of Chiles and McMackin (1996), argues that as behavioral influences of the TCE model, risk and trust should be accounted for before TCE’s characteristics of the transaction.

To assess this possibility, the main models for both Structure and Process were rerun. All the variables were entered in the same order as in the initial analysis with the exception of RiskA, RiskB, and Trust, which were entered in one step along with the other control variables. For the Structure equation, results were similar to the original, with RiskA and Asset Specificity both significant. In addition, though, Frequency was now also significant ($t = 2.184, p < .03$). For the Process equation, results were again similar to the original, with Asset Specificity and Uncertainty1 being significant, but now Trust was retained in the equation. It should be noted, however, that while Trust was clearly significant in the early iterations of the model, it was only marginally significant in the final model ($t = 1.638, p < .10$).
Industry as a Covariate

One variable mentioned in Chapter III as a candidate for post-hoc study was that of industry. A further question surrounding the study was the apparent dichotomy of carrier and shipper within response patterns. Overall, carriers and shippers differed on a number of variables of interest. The question arose on the nature of the differences. Would carriers and shippers from the same industry seemingly be similar on their views of LA activities common to both?

As previously mentioned, industry was not initially used as a covariate in the main study because 41 different two-digit SIC codes appeared in the survey responses; such a covariate would consume excessive degrees of freedom and deplete the model's power. A review of the responses, however, revealed that the two largest SICs accounted for 28 percent of the respondents. These SICs were food products manufacturing (n = 46) and chemical/pharmaceutical manufacturing (n = 43). Combined together, these formed a group of 89 cases.

The first step of the post-hoc data analysis was a two-way ANOVA to assess whether the Carrier-Shipper distinction or Industry would be the most significant within and among the groups. The model tested the main effects of the Carrier-Shipper and SIC variables, plus their interaction (see Table 37.) The ANOVA was run on both the Structure and Process dimensions of relational governance.

For Structure, the model proved nonsignificant \( F_{(3, 85)} = .190, p < .903 \). For Process, the model also proved nonsignificant \( F_{(3, 85)} = 1.806, p < .152 \). Main effects and interactions likewise proved nonsignificant. Since no significant differences were found
within the Food - Chemical composite group of 89 on Carrier-Shipper and SIC dichotomies, the two groups might be considered as a large one for further tests.

### TABLE 37

ANOVA: Relational Governance Dimensions x Carrier-Shipper, SIC

<table>
<thead>
<tr>
<th></th>
<th>Structure</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>df</td>
<td>F</td>
</tr>
<tr>
<td>Main Effects (Combined)</td>
<td>2</td>
<td>.024</td>
</tr>
<tr>
<td>C_S</td>
<td>1</td>
<td>.027</td>
</tr>
<tr>
<td>SIC</td>
<td>1</td>
<td>.022</td>
</tr>
<tr>
<td>Interaction: C_S x SIC</td>
<td>1</td>
<td>.522</td>
</tr>
<tr>
<td>Model</td>
<td>3</td>
<td>.190</td>
</tr>
<tr>
<td>Residual</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td></td>
</tr>
</tbody>
</table>

Accordingly, the regression models for both Structure and Process were rerun on this subsample as an alternative means of controlling for both industry and the carrier-shipper dichotomy. The results, however, were not significantly different from those obtained from the whole sample. Implications emerging from both of the post-hoc analyses will be addressed in the next chapter.

### Summary

This chapter dealt with data analysis and results of the study. Initial topics included the survey response rate, a comparison of respondents and non-respondents, data protocols and characteristics of the survey sample. Then came preliminary data analysis, hypothesis testing, and post hoc tests.
The main survey response rate for 324 usable responses out of 1260 total items mailed was 24.9 percent. In a carrier-shipper breakout, carriers had a 29 percent response rate and shippers 29 percent. The surveys were for the most part complete; due to low incidence of missing data, item means were substituted for missing data points. Also, a t test of key study variables suggested that respondents and nonrespondents were not significantly different from one another. Also, 39 states and 41 SICs were represented in the sample group, which supported the study's goal of generalizability. Most respondents were middle-level managers or account executives. A t-test on shippers and carriers showed the two groups were significantly different on eight of 13 factors; due to these findings, Carrier-Shipper was added to the model as a third covariate.

Preliminary data analysis involved the final data checks and analysis before the hypothesis test. As a result, the following adjustments were made: A location-specificity dimension was dropped from the Asset Specificity scale, two items were dropped from the Uncertainty scale (yielding Uncertainty 1), and Risk Propensity was partitioned into two factors, RiskA (predecision) and RiskB (decision and post-decision).

The hypothesis tests produced three significant and one partially-significant hypotheses out of seven. Among these, the Asset Specificity-Governance linkage was significant for both Structure and Process. Post-hoc tests dealt with a breakout sample of 89 food-product and chemical/pharmaceutical manufacturers, and the resultant ANOVA showed carriers and shippers are not significantly different within-industry on Structure and Process. A second post-hoc test repositioned both Trust and Risk earlier in the model; this selectively strengthened the influence of each. This concludes Chapter IV. Next comes Chapter V, which contains the discussion of the findings.
CHAPTER V

DISCUSSION

The preceding chapter reported the results of the data analysis and hypothesis testing for this study. Now, this final chapter presents a discussion of the meaning of these findings for the overall TCE and logistics alliance fields of study. The results are discussed in relationship to issues previously raised in the theoretical foundations and methodology chapters. This three-part chapter addresses implications of the findings, the limitations of the study, and future research issues.

Implications of the Findings

This section discusses the results of the hypothesis tests and offers possible explanations for the findings. The seven hypotheses can be divided into two types: main effect and moderator-interaction. Each type receives separate treatment initially; then, an integrative discussion follows concerning recommended changes to the model.

Main Effects: Characteristics of the Transaction

The variables of asset specificity, uncertainty, and frequency are theorized in TCE to be the determinants of the governance mechanism. In this study, governance is addressed in terms of relational governance.

Asset Specificity. Long considered the bedrock influence on governance mechanism, asset specificity was posited to have a positive relationship with relational governance. Specifically, as the amount of investment in specific assets increased, the
amount of relational governance would increase. Hypothesis 1A was supported for both the Structure and Process dimensions of relational governance. In both cases, the relationship was significant at \( p < .001 \), and added appreciably to the variance explained.

This is important because it shows that asset specificity is influential in logistics alliances, which are service operations. Current trends have suggested that third-party logistics providers may be attempting to avoid investments in specific assets. The trends show that logistics providers are pressing to “leverage capital,” which involves pursuit of scale and scope economies through utilization of assets across a wide range of customers (Whipple, et al., 1996). Leveraging of capital includes both physical assets, such as transportation equipment and EDI systems, and human assets, such as personnel adequately trained to serve the shippers. This raises the question of whether third-party providers might find the need for investments in specific assets to be waning. According to these findings, however, asset-specific investments remain critical in service operations.

Uncertainty. Uncertainty dealt with the degree to which the shipper monitored the performance of the carrier. Hypothesis 2A, which argued that the greater the uncertainty about ability to monitor the performance of the other party, the higher would be the degree of relational governance, was partially upheld. While 2A was nonsignificant for Structure, it was significant for Process. That uncertainty would be significant only for Process is understandable. During LA structuring, uncertainty certainly is a concern on the organizational checklist. In the early stages, however, the shipper would rely primarily on the carrier’s industry reputation. Once the alliance is launched, however, and process
interactions begin, uncertainty becomes more salient. In fact, if performance of the carrier proved to be a problem during the ongoing LA process interaction, inability to monitor might contribute to the termination of the alliance.

**Frequency.** Hypothesis 3A, which posited a positive relationship between frequency of transaction and relational governance, was not upheld. Two possible explanations exist for this, one related to theory and a second related to sampling.

Theoretically, frequency has been a controversial transaction characteristic within TCE studies. The classical TCE model (e.g., Williamson, 1985) holds that frequency is negatively related to degree of governance. In practical terms, the more frequently a transaction occurs, the less likely a firm is to outsource it, or externalize it. Other researchers, however, have disagreed with this. An alternative, which led to the current hypotheses, argues that frequency is *positively* related to the degree of governance (Maltz, 1994). This can be explained by the trend of firms to outsourcing activities which fall outside the firm’s core capabilities. That is, as the frequency of shipping increases, and to the extent that shipping is not a value-adding activity of the firm, the shipping firm is expected to form an LA with the carrier, an association guided by relational governance mechanism.

Taking this view further, some have argued that any frequency of transaction beyond a minimal amount necessitates an alliance, or hybrid, relationship (John & Weitz, 1988; Zaheer, personal communication). Thus, says the argument, frequency has a step rather than a continuous function; once the threshold of frequency is crossed, a hybrid relationship exists. When the sample was being developed for this study, key informants
were screened to ensure they were members of alliances; this screening likely ensured that most respondents were above the threshold. Analysis of residuals confirms this view. The residual plot for frequency featured a tight elliptical pattern within plus- or minus-one standard deviation of the x axis, indicating that frequency appears to function more as a constant rather than a variable. This would support the theoretical argument that crossing the frequency threshold necessitates establishment of a hybrid, or alliance, relationship (John & Weitz, 1988; Zaheer, personal communication).

Although the residual analysis tends to support the threshold argument for frequency, the combined weight of these two approaches is not sufficient cause to rule out other arguments. Therefore, final judgment will be reserved on the role of frequency within TCE. Possible remedies will be discussed in the Future Research section.

**Behavioral Moderators/Interactions**

Four hypotheses dealt with the role of trust and risk as moderators of the main-effect hypothesis links. Three of these hypotheses dealt with the role of trust as a moderator of the linkages of asset specificity, uncertainty, and frequency to relational governance. A fourth hypothesis posited risk propensity as a moderator of the link between asset specificity and relational governance. None of these four interactions proved to be significant. The tests did reveal significance for trust and risk, however, as direct main effects.

One possible explanation for the nonsignificance of the moderator interactions is in the comparison of research methods in field studies (such as this) and experiments. Field studies tend to find less variability among variables than do experiments, because field
studies lack the experimental capability to manipulate the environment. Thus, due to this lesser ability to control the environment, researchers in field studies tend to find less significance, especially in interactions, than do their experimental counterparts (McClelland & Judd, 1993).

As mentioned previously, the behavioral moderators did prove significant to a varying degree when entered as main effects - positioned as control variables - on relational governance. This use of behavioral factors as control variables has begun appearing in some TCE works. In a theorized process and control model of interfirm relationships, trust and opportunism are placed in a control loop for the model (Nootboom, 1996). Further, in an empirical study on relational risk, uncertainty avoidance (a cultural-level measure of risk propensity) proved significant as a control variable for probability of loss assigned to alliance projects (Nootboom, et al., 1997).

**Risk Propensity.** As a main-effect variable, risk propensity proved significant for Structure only. Given that Structure embodies the "starting point" of a relationship, the decision to commit specific assets could be influenced by risk assessments. This is interesting in that RISKA (or predecision risk), is significant for Structure, but not RISKB (decision and post-decision risk). This significance was borne out both in the original hypothesis tests, and a post-hoc test in which the sequence of the behavioral variables' entry into the equation assumed a control position. In this earlier entry of RISKA into the model, RISKA not only remained significant, but the relocation strengthened the model.

**Trust.** In post-hoc tests which involved entering the two moderators at an earlier point in the regression model, trust was retained in the Process model. This indicates that
trust may have a role primarily under Process. That trust is more salient for the joint activities of Process than the base activities of Structure is indeed a curious finding. In fact, one could argue that few firms would even consider an alliance without some evidence of trust in early dealings with another party.

In closing this discussion on risk and trust, another way to test the role of the behavioral assumptions within TCE would be to employ them as main effects. Discussion follows on this point in the segment on adjustments to the LA model.

**Adjustments to the Model**

One criticism of TCE involves its lack of a “time line” for assessing interfirm relationships (Noorderhaven, 1994; Nooteboom, 1996). The specification of governance as relational implies a time line with its two dimensions of Structure and Process. Structure is the basic interfirm framework under which the transactions will occur, and Process is the joint action undertaken within the alliance day to day to carry out the transactions (Macneil, 1980; Zaheer & Venkatraman, 1995). This line of thought, combined with the results obtained here, suggests changes to the Logistics Alliance model that involve a temporal split in the emphasis which Structure and Process occupy during the life of a hybrid transaction. Separate treatments follow for Structure and Process.

**Structure.** Structure, under the revised two-part model, would be considered more dominant during the formative and early stages of the LA. From this research, the model would involve the effects of asset specificity and risk upon Structure (see Figure 7). Carrier-Shipper and Duration would remain as covariates.
One perspective which supports this treatment of Structure theorizes a role sharing by asset specificity and risk propensity in determining the basic framework for the LA. As previously discussed, Chiles and McMackin (1996) have suggested that the risk propensity of the firm's managers can serve to raise or lower the threshold at which the firm will invest in specific assets. Risk seekers would invest at a lower threshold, and risk averters at a higher threshold. While their theory suggests a moderator role, this model would test for direct effects of risk propensity on Structure. Then, interaction tests could be run for the two main effects.
**Process.** Process, under the revised two-part model, would increase in importance as the LA became active. From this research, the model would involve the effects of asset specificity, uncertainty, and trust upon Process (see Figure 7). Carrier-Shipper would remain as a covariate.

The revised model for Process, as in the case of Structure, also contains asset specificity. Hybrid activities generate norms and procedures for doing business which have been referred to as *procedural asset specificity* (Malone, et. al., 1987; Zaheer & Venkatraman, 1995). As for uncertainty and trust, their roles tie back to previous discussion in this chapter on the role of reputation during the formulation of the LA. Then, once the LA is under way, the joint actions of Process allow the two halves of the LA dyad to make situation-specific judgments on uncertainty and trust.

**Total Model: Structure-Process Relationships.** Discussions on contracting (e.g., Macneil, 1978, 1980; Williamson, 1985) spawned the idea of relational governance with its Structure-Process dichotomy (Zaheer & Venkatraman, 1995). And, as dimensions of governance, Structure and Process share a correlation of .12 (p < .05). Questions remain, however, on the nature of their relationship. The relational governance discussion suggests that Structure, as the basic framework of the LA, would be more salient early in the relationship. Further, the idea of incorporating a time line within TCE studies (Nooteboom, et al., 1997) begs the question of how Structure and Process might vary comparatively over the life of the LA. Two initial possibilities come to mind: (1) Structure begins as the dominant dimension, and then begins to decline in importance; Process starts out as subordinate and becomes stronger as the duration of the LA
increases. (2) Structure begins as the dominant dimension, and remains strong throughout; Process, meanwhile, starts out as subordinate, but eventually matches or surpasses Structure in salience.

Limitations and Validity Issues

Numerous issues are available for the scientist to consider when addressing the validity, reliability, and generalizability of the results of a research project. The Cook and Campbell (1979) validity checklist, for example, contains more than two dozen such issues scattered across four general categories. The following issues are relevant to the study:

Generalizability

The sampling plan applied the probability sampling technique of systematic sampling to a convenience sampling frame of CLM members. Babbie (1992) suggests that combination sampling designs can often give researchers the best approach to their topic. As previously mentioned, no master list existed for all the motor carrier (trucking) firms, nor for all the manufacturing firms, in the United States. Thus, using professional groups for access to the population represents the most logical approach to the problem.

The sample selected for the mail survey represented a tradeoff of “ideal” generalizability for reasonable response rates. In terms of ideal generalizability, firms that are not members of CLM had no chance of being selected. The systematic sampling technique, however, as previously discussed, tends to ensure a representative mix of the sampling frame that is often superior to that derived from random sampling. In this case, it led to respondents from 39 U.S. states and 41 SICs. Thus, the sample produced a group of respondents representing a wide mix of national and industry interests.
Further, the use of CLM helped prevent low response rates that plague some mail surveys. Researchers who approach firms without sponsorship often find their surveys have low response rates. Approaching key informants through their professional organizations tends to increase response rates. By assessing the goals of the organization, the researcher is better able to frame the research in such a way that the organization’s membership makes a psychological buy-in to the study’s topic (Alreck & Settle, 1995).

Thus, the only limitation on generalizability relates to the nature of CLM members themselves in relation to all carrier and shipper personnel: CLM members likely will be above the 50th percentile in their receptiveness and acceptance of innovation. With this caveat, the results should be generalizable to most other logistics alliance situations involving shippers and motor carriers.

**Statistical Conclusion Validity: Survey Response Bias**

The goal of probability sampling is to obtain a sample from the frame that qualifies as a microcosm of the larger target population (Babbie, 1992). Once the sample group is selected, however, certain problems arising during data collection can result in response biases (Alreck & Settle, 1995). Pertinent issues of response biases addressed in this study were:

*Social Desirability.* Social desirability looms as a potential problem for this study since its topics - trust, risk propensity and behavioral ambiguity - are assessed using socially sensitive contents in their representative scale items. In such situations, subjects may skew their answers on questions to reflect the norms of their social group, rather than giving answers that express their true feelings. Mail surveys, however, have a much lower
incidence of social desirability than direct-contact survey methods such as telephone or face-to-face interviews (Dillman, 1978). Thus, this should not be a significant problem with this study.

**Acquiescence.** This researcher used three approaches to limit acquiescence, the tendency of some subjects to try to please the researcher. First, informants were assured that the researcher wanted their honest personal assessment of the situation in question. Second, the structure of the survey instrument obscured the goals of the study as much as possible to make acquiescence more difficult (Alreck & Settle, 1995). Furthermore, the qualifications of the key informants were scrutinized to determine their standing within the firm; the ideal key informants are skilled professionals, whose tendency toward acquiescence should be lower than that of the general population.

**Percept-Percept Inflation.** This inflation problem arises when persons are asked to make a judgment about a peculiar situation that may be outside their experience. In such situations, the person may have to partially contrive a response which may not be a valid assessment of the phenomenon (Crampton & Wagner, 1994). This researcher attenuated percept-percept inflation in two ways: (1) targeted the mailed surveys toward qualified logistics professionals; and (2) examined the job title and tenure of responding informants, and certain objective data requests, to assess whether respondents have sufficient knowledge of the LA to provide valid answers to the survey’s questions.

**Key Informant Bias.** Researchers normally determine key informants by industry trends for duties performed in different job titles. Problems arise if the person selected has short tenure in either the industry or the firm involved in the survey, and may not be as
knowledgeable as needed about the phenomenon being researched (Phillips, 1981).

Actions taken within this study to ensure knowledgeable of the key informants included careful screening of job classifications before the survey, and use of demographic items within the survey questionnaire to indicate the experience level of the informant (Heide & John, 1990; Noordewier et al., 1990).

*Single-Source Bias.* Gathering all information about the phenomenon from one source increases the degree to which individual differences of the informant may skew the responses on a topic. With multiple informants, individual differences tend to cancel each other out (Kerlinger, 1986). Single-source bias was attenuated indirectly by surveying both shippers and carriers, thus getting the views of two distinct groups on the dynamics of LAs. Due to the nature of the theory base, however, single-source bias would be a lesser problem in this study than in others. This study uses the managerial-choice version of TCE in which judgments regarding costs are subjective (Chiles & McMackin, 1996). Thus, the researcher had little choice but to survey managers. In choosing managers for the study, however, experienced managers were sought as surrogates for the firm; previously mentioned studies of risk propensity have found that the longer a manager remains with a firm, the more managerial risk propensity mirrors that of the firm (Sitkin & Weingart, 1995). It can be argued that this assumption holds true for other factors, too.

One way to lessen single-source bias would have been to survey both sides of each dyad, to get both shipper and carrier impressions for every L.A. This snowballing technique, in which the researcher asks all carrier firms for the shipping partner in their focal LA (or vice versa), has proved problematic. Snowballing has often delivered low
response rates for complete dyads, often in the 10 percent range (e.g., Anderson & Narus, 1992; Heide & Miner, 1992). Thus, this researcher declined to use snowballing.

**Non-Response Bias.** To check for non-response bias, this researcher compared early and late respondents on demographic data to determine if any significant differences existed between these subgroups (Armstrong & Overton, 1977; Lambert & Harrington, 1990). Research has shown that late respondents have more in common with non-respondents than with early respondents. Several logistics researchers (e.g., Heide & John, 1990; Maltz, 1994) have used this technique. These t tests, addressed in Chapter 3, showed no significant differences between early and late respondents on the selected variables of interest.

**Statistical Conclusion Validity: Power**

As mentioned in Chapter III, proper power and sample size help the researcher pursue statistical conclusion validity through a balanced lessening of the chance of both Type I and Type II error (Keppel, 1991; Pedhazur, 1982). After the initial results of the hypothesis testing, some concern arose about the power of the tests. From initial planning for the study, the researcher anticipated medium effect sizes for the variables. For medium effect sizes, Cohen (1988) recommends a power of .80 in order for the researcher to have a reasonable chance of detecting significance.

Power analysis was used to determine sample size for this study. Estimated minimum sample size proved somewhat low after preliminary data analysis, due to the addition of the Carrier-Shipper covariate and the split of the risk moderator into RISKA and RISKB. Two occurrences more than covered for this shortfall: First, the carriers and
shippers were included in a common database; employing the distinction as a covariate, rather than splitting the database, saved several degrees of freedom. Second, the usable response rate was 24.9 percent overall, rather than the projected 20 percent.

**TABLE 38**

Post-Hoc Power Analysis of Models and Significant Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>Variable</th>
<th>$\lambda$</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td></td>
<td>63.18</td>
<td>&gt; .99</td>
</tr>
<tr>
<td></td>
<td>Asset Specificity</td>
<td>14.86</td>
<td>.88</td>
</tr>
<tr>
<td></td>
<td>Risk A</td>
<td>20.29</td>
<td>.95</td>
</tr>
<tr>
<td>Process</td>
<td></td>
<td>49.24</td>
<td>&gt; .99</td>
</tr>
<tr>
<td></td>
<td>Asset Specificity</td>
<td>22.21</td>
<td>.98</td>
</tr>
<tr>
<td></td>
<td>Uncertainty</td>
<td>11.62</td>
<td>.82</td>
</tr>
<tr>
<td>Post-hoc Process</td>
<td>Trust</td>
<td>3.56</td>
<td>.30</td>
</tr>
</tbody>
</table>

A post-hoc power analysis was conducted following the hypothesis tests. Using Cohen's (1988) formulas and tables, the researcher determined the power of the models and significant variables (see Table 37). The two overall models had power exceeding the maximum value in the tables with their high degree of power, which was > .99 for both. The only significant variable of low power was trust in the post-hoc test (due to small effect size). Thus, this researcher argues power is sufficient to find existing effects. Rather, insignificant findings should be reviewed in terms of unspecified variables, scale refinement, and the inherent difficulties in finding interaction effects in field studies.
Causality, Field Studies, and Regression

As mentioned previously, limitations emerging from regression center on the nature of field studies and the ensuing cautions on the interpretation of inferential statistical tests (Achen, 1982; Hair, et al., 1992; Pedhazur, 1982). In interpretation of data, the type of research strategy determines the degree of certainty with which researchers can make causal assumptions about variables from the results of regression analysis. Field studies have inherent limitations due to their nonexperimental design; this calls for a more conservative approach to interpretation of results than in the case of experiments (Achen, 1982; Pedhazur, 1982).

The danger with bold, sweeping attribution of causality to independent variables in nonexperimental research lies in the area of control. In field studies, the researcher cannot control the environment to the degree that experimental researchers do. Field studies, or quasi-experimental designs, attempt to substitute post hoc statistical controls for the experimental controls of random assignment (Cook & Campbell, 1979). The degree to which causal interpretation can be made about the effect of a given independent variable on the dependent variable depends in part on proper specification of the model. "Without correct specifications, conventional statistical theory gives no assurance that the impact of the variable will be estimated accurately" (Achen, 1982, p. 11).

Construct Validity: Refinement of Scales

A model can be either underspecified, appropriately specified, or overspecified. In this study of study of L.As, the specifications of individual variable groups have differing levels of development. The independent variable group characteristics of the transaction -
frequency of transaction, uncertainty, and asset specificity - all have been studied
extensively in transaction-cost models. The covariates - length of relationship, firm size,
industry, and generic strategy - have also been used extensively in research on TCE and
hybrid relationships. The coupling of trust and risk propensity as moderators, however,
represents a fairly untested way of looking at hybrid governance-transaction characteristic
linkages (Chiles & McMackin, 1996; Zaheer & Venkatraman, 1995).

Further, construct validity concerns arise when measuring the behavioral influences
on TCE. The Risk Propensity scale, and to a certain extent the OTI, are new scales. The
original Risk Propensity scale, with its understandable but unexpected split into the factors
RISKA and RISKB, met the minimum coefficient α threshold for an internally cohesive
scale. However, it needs more refinement to enhance its validity. Further, a post-hoc
factor analysis of the OTI revealed that items tend to load on two dimensions, rather than
the theorized three. Thus, construct validity problems may have contributed to the low
impact of trust upon the model. A third scale which proved problematic in terms of
reliability was Uncertainty. This is a well-tested scale which normally has stable, though
not spectacular, coefficient α figures. In this study, however, the contextually modified
Uncertainty scale had α figures below minimum standards. Thus, these three scales all
present limitations for the study. Recommendations for refining these scales are covered in
future research recommendations.

Summary

Limitations to this study involve three areas, which are generalizability, response
bias, and the nature of field studies involving regression. For generalizability, the
application of a systematic random sampling plan to a convenience sample represents the
most practical approach to accurately assessing the target population. Further, due to the representation within the sample of multiple states and industries, the study’s results should be generalizable to most logistics alliance situations within the U.S. In the statistical conclusion validity area of response bias, single-source bias appeared as a possible problem. However, given the nature of the “managerial choice” approach to TCE theory used in this study, this was simply a given for conducting this type of study. And finally, the interpretation of the results maintains the cautious approach towards attributing causality to the results of non experimental field studies.

**Future Research**

Complex research using proper scientific method rarely answers “all the questions” asked about a particular topic. In fact, it may spawn more questions than answers. Discussion of the implications of the study in the first section of Chapter 5 pointed to a number of possible explanations for the unsupported hypotheses. Revisiting those points, the discussion now addresses future research projects suggested to advance the findings and rectify the limitations of this study. Topic headings include TCE theory, psychometrics, and alliance populations.

**TCE Theory**

*Structure, Process, and Time Line.* The introduction of a time line into Logistics Alliance modeling was previously discussed under adjustments to the model. The time line would allow the researcher to test the idea that Structure tends to be more salient during the forming of the LA, while Process becomes more salient once the LA is under way. Two possible approaches come to mind for implementing such a study. One path
would require a longitudinal design in which the researcher would track the development of alliances from the initial contacts up through termination of the relationship. A second path would require a cross-sectional study in which firms in different stages of alliance development would be compared across common factors.

**Frequency Construct.** In the discussion of hypothesis testing, judgment was reserved on the role of frequency within TCE. To resolve this issue for both the special case of LAs and the general case of hybrid relationships, research focusing specifically on frequency would be useful. Some would say that this idea ignores the criticism that the TCE model has seldom been tested as a whole (Chiles & McMackin, 1996). In this case, however, such research focusing on frequency would be a natural outgrowth of research on the overall model. Comparing the frequency phenomenon across a few well-controlled situations, using multiple types of measurements, could possibly help resolve the interesting quandary which the frequency variable generates.

**TCE's Behavioral Variables.** Moderators are only one type of “third variable” which can influence the relationship between independent and dependent variables. A second type, mediators, represent a step which occurs between the two main variables. Procedures described by Baron and Kenney (1986) can be used to test for this type of relationship with TCE. A third type, control variables, has previously been discussed with this chapter.

**Psychometrics**

Data analysis within the study raised several questions about the reliability of the measurements of the behavioral variables within TCE. Risk propensity was measured by an original scale; the scale needs refinement.
Risk Propensity. The risk preference variable, under preliminary factor analysis, broke into two factors, termed RISKA (pre-decision risk) and RISKB, (decision risk). Also, varied factor loadings leave a question as to the proper factor for item R3. For these reasons, the risk propensity scale needs refinement to become more valuable as a research tool. Further, this scale is tailored specifically for logistics settings.

Organizational Trust Inventory. Cummings and Bromiley (1996) described in detail the pilot testing of the OTI on MBA students and undergraduates. In allowing this author and others to adapt the scale to specific field research situations, Professor Cummings (personal communication) had hoped to build a set of norms for the test. The methodology section previously addressed reliability analysis of the OTI scale and subscales using Cronbach’s alpha tests. Since the theorized dimensions of trust produced robust coefficient alphas for the trust items, the OTI was accepted as valid.

When trust showed but marginal significance as a variable, however, confirmatory factor analysis was run on the scale. The CFA generated two factors, one containing the Opportunism items and the second containing a mix of the “keeps commitments” and “negotiates honestly” scale items. Thus, additional work needs to be done on testing and validating the OTI.

Uncertainty. As indicated by its problematic coefficient α, this study’s uncertainty scale needs refinement. A thorough review of the scale items for sentence structure, construct fit and contextual appropriateness is in order. Such an LA-specific scale would be quite useful for research in this area.
Populations and Subgroups

Industry of Shippers. During post-hoc tests, a two-way ANOVA (Industry x Carrier-Shipper) was run on several key variables of the study. It showed that within the two manufacturing industries, Food Products and Chemical/Pharmaceutical, carriers and shippers were not significantly different. This is curious, given that Carrier-Shipper was significant as a covariate in both the Structure and Process scenarios. This also brings to mind the previously mentioned use of industry as a covariate in other alliance-related studies. Hence, one research possibility involves simultaneous study of the shippers and carriers from three different industry groups. By selecting industries which differ widely on such factors as volatility and profitability, tests could follow which focally address the differences and similarities between carriers and shippers within these industries.

Segmentation Among Carriers. The carrier population had a number of subgroups which, as mentioned previously, could have differing views of logistics alliances. The major breakdown involves firm specialization as either logistics coordinator or direct motor carriage provider. Further, within the direct providers, one can find subgroups which specialize in truckload carriage, less-than-truckload carriage, and package delivery. Other subgroups include those represented by specialty professional associations, such as the Regional and Distribution Carriers Conference, the Regular Common Carriers Conference, the National Moving & Storage Association, and the Independent Truckers & Drivers Association (Mahe & Rothbart, 1993). As suggested with the shippers, parallel studies of different segments of the motor carrier industry would allow for comparisons across the different segments.
Conclusions

This chapter closes with discussion of the possible uses of the results of this study. The potential value of these findings is addressed as benefits to theory and to practice.

Benefits to Theory

Potential benefits to academic theory development center around better specification of the TCE model and developments in psychometrics within the context of relational governance. Regarding the TCE model, this study respecified its behavioral assumptions as variables, tested TCE cross-sectionally in a service-based LA setting, and used the results to suggest incorporation of a time line into TCE studies. Foremost, this study tested the idea of using the behavioral assumptions of TCE as behavioral variables. Although the behavioral factors of trust and risk propensity did not function as moderators, as suggested by Chiles and McMackin (1996), they did prove significant as main effects on relational governance. Future research should test the role of trust and risk propensity as mediators and control variables. Also, the research showed that certain TCE principles did hold up in service relationships such as LAs. Early TCE studies dealt primarily with manufacturing relationships, so a service-related study will help expand TCE's generalizability. And finally, the study's revised model suggests incorporation of a time line into the study of LA and other hybrid relationship. A time factor possibly would enhance understanding of the Structure-Process dichotomy.

In the area of psychometrics, the study provided a field test of the Organizational Trust Inventory adapted for LAs, and developed an original Risk Propensity scale for an LA setting. The study identified both strengths and weaknesses of these scales, and laid
the groundwork for further development of them. In addition, the findings of this study generated a comprehensive discussion of the frequency variable in TCE, with suggestions on how to better measure it.

Benefits to Practice

This study offers the business community a multi-industry, cross-sectional look at the role of trust in LAs. Prominent earlier work on LAs has suggested that trust was much more salient in LA relationships than in simple outsourcing; the bulk of this work, however, was anecdotal (e.g., Bowersox, 1990) or derived from case studies (e.g., Gentry 1994; Frankel, 1995). If industry has a better understanding of the role of trust within LAs, in certain cases trust mechanisms could possibly be substituted for more costly legal contracting mechanisms. Likewise, trust mechanisms could be coordinated with legal contracting with the goal of finding the optimum Structure-Process governance mix.
APPENDIX A.

APPROVAL LETTER,
INSTITUTIONAL REVIEW BOARD
ON
HUMAN SUBJECTS RESEARCH
November 1, 1997

Mr. John Orr
1721 Teasley Lane, Apt 159
Denton, TX 76205

Re: Human Subjects Application No. 97-238

Dear Mr. Orr:

As permitted by federal law and regulations governing the use of human subjects in research projects (45 CFR 46), I have conducted an expedited review of your proposed project titled “Trust and Governance in Hybrid Relationships: An Investigation of Logistics Alliances.” The risks inherent in this research are minimal, and the potential benefits to the subjects outweigh those risks. The submitted protocol and informed consent form are hereby approved for the use of human subjects on this project.

The UNT IRB must re-review this project prior to any modifications you make in the approved project. Please contact me if you wish to make such changes or need additional information.

If you have questions, please contact me.

Sincerely,

[Signature]

Walter C. Zacharias, Jr., Ed.D.
Chair, Institutional Review Board

cc: IRB Members
APPENDIX B.

CORRESPONDENCE REQUESTING ASSISTANCE
FROM
COUNCIL OF LOGISTICS MANAGEMENT
May 9, 1997

Elaine Winter  
Research Coordinator  
Council for Logistics Management  
2803 Butterfield Road  
Oak Brook, IL 60521

Dear Ms. Winter:

One of the big questions facing logistics alliances today is the degree to which interpersonal trust can substitute for legalistic contracts in governing alliances and partnerships. I am researching this topic, and Dr. Donald Bowersox of Michigan State suggested that you might be able to assist me.

My dissertation has the working title of Trust and Governance in Hybrid Relationships: An Investigation of Logistics Alliances. The focal type of logistics alliance for the study involves shippers of goods and third-party motor carriers. I plan to survey both shippers and carriers on the trust topic.

Since CLM has a number of trucking companies as member firms, I am approaching you about using your membership as a survey population. Would you be able to supply me with a sample of about 600 trucking companies for my study?

If you could arrange for a sample stratified according to size of trucking firm, it would allow me to perform a study of interest to all your members. Trucking firms are rated by size as Class I, II, or III by the federal government for licensing purposes.

Your members could certainly benefit from my study. Please contact me regarding what sort of membership sample list you can provide. I appreciate your assistance.

Sincerely,

John Patrick Orr  
Ph.D. Candidate
John Patrick Orr  
PhD Candidate  
Department of Management  
University of North Texas  
PO Box 13677  
Denton, TX 76203-6677  

Dear John,

I received the copy of your May 9 letter and wish to assure you that yes, we will be able to provide you with address labels (or a list) of Council of Logistics Management members who are employed by carriers (of all types), manufacturers, and/or retailers. Unfortunately, we are unable to stratify carriers according to size of trucking firm; we do not capture this information from our members.

We ask that you use this information only for research related to your doctoral dissertation and that you refrain from mentioning the Council in any of your correspondence with these members. I hope that this will help. Please contact me around July 2 to place a specific order for what you need.

In the meantime, thanks for your kind wishes on my dissertation defense. I'm happy to report that it went well (thanks, undoubtedly to the very Lakota spirits you referenced). Good luck to you on your reserve duty. Semper fi!

Sincerely,

Elaine M. Winter  
Director of Communication and Research
APPENDIX C

DEVELOPMENT OF ORIGINAL RISK PROPENSITY SCALE
Development of an Original Scale for Risk Propensity

As mentioned in Chapter III, scientists are encouraged to use existing measurement tools whenever possible in order to increase both the generalizability of their research and the efficiency of their research efforts (Nunnally & Bernstein, 1994). In some instances, however, no existing instrument can be found for the particular construct of interest which is appropriate for a given context. Such was the case with risk propensity in this logistics-alliance study. The multistep process for developing a psychometrically validated instrument produced an acceptable scale for this project. This section contains four sequential parts: a primer on risky decision behavior, justification for development of an original scale, the decision-risk model upon which the scale is based, and the three-stage item development process which culminated in a two-factor risk propensity scale.

A Primer on Risky Decision Behavior

In broad terms, the verb risk is defined as "to expose to chance of injury or loss" (MacCrimmon & Wehrung, 1986, p. 9). The ability of a person to choose the exposure is critical, and the magnitude of possible loss has two components: actual physical loss, and opportunity cost of activities foregone. The basic risk paradigm involves a situation with two possible actions: sure action, which opts for the status quo, and risk action, which can result in two possible outcomes: gain or loss. Without the threat of loss, no risk is involved. Further, exposure to loss not only affects the decision maker, but also the decision maker’s social unit - in this case, the firm - and sometimes society as a whole (MacCrimmon & Wehrung, 1986). Risk is conceptually distinct from uncertainty. Risk
situations offer the ability to make probabilistic estimates of the outcome, whereas uncertainty situations do not offer the opportunity to make probabilistic estimates (Chiles & McMackin, 1996; Orbell, 1993.)

Identifiable determinants of the risk inherent in a situation are the degree to which control, information, and time are lacking within the decision process. A key decision risk concept holds that the more vague are the risk components of the situation, the greater the subjectivity of the manager’s decision process (MacCrimmon & Wehrung, 1986). With this foundation laid for understanding risky decisions, the reason behind the development of an original scale will be discussed.

**Justification for Development of an Original Risk Propensity Scale**

Instruments to measure managerial risk propensity generally take three forms: standardized situations, naturally occurring situations, and self-ratings. The strengths and weaknesses of each are listed in Table C-1.

Initially, the investigator attempted to adapt an existing scale drawn from the naturally occurring situation, the Kelly Racing Team scenario (Sitkin & Weingart, 1995). The five items, answered on a 7-point Likert scale, recorded decisions relating to the scenario. Pilot tests of the adapted scales on University of North Texas MBA students and non-traditional working undergraduates indicated respondents had difficulty understanding some of the items. Further, a panel of experts consisting of university researchers questioned whether the items accurately captured the risk decisions inherent in the LA environment.
### TABLE C-1.

**Standard Approaches to Measurement of Risk Behaviors**

<table>
<thead>
<tr>
<th>Approach</th>
<th>Strength</th>
<th>Weakness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardized Situations</td>
<td>Theory-based; uniformity</td>
<td>Hypothetical in nature</td>
</tr>
<tr>
<td>Naturally Occurring Situations</td>
<td>Reality based</td>
<td>Comparison with other contexts difficult</td>
</tr>
<tr>
<td>Self-Ratings</td>
<td>Direct assessment</td>
<td>Possibility of misperception</td>
</tr>
</tbody>
</table>


With this information, the investigator sought help from Sim B. Sitkin, the researcher who had helped developed the Kelly scenario. When asked if he knew of a universal risk propensity scale, Dr. Sitkin (telephone communication) stated he knew of none. Further, he said such an instrument was needed, since a major corporation had approached him to obtain such an instrument, and he was unable to help them. Another researcher in organizational decision-making, Lew Taylor (personal communication), said that decision risk is a rather straight-forward construct to measure directly. Thus, he said, researchers often develop their own risk scales for specific contexts. Due to the lack of an existing appropriate scale, this investigator elected to design an original one.

**Theoretical Basis of Risk Propensity Scale**

One of the key tenets of this study’s enhanced TCE model is the framing of risk as a variable rather than a constant within TCE (Chiles and McMackin, 1996). This enhanced model incorporates the subjective view of risk inherent in Williamson’s managerial choice branch of TCE (Chiles & McMackin, 1996; Nooteboom, et al., 1997).
Therefore, an appropriate way to measure this is through the managerial decision-making vehicle of risk propensity, the tendency of a manager to be either risk seeking or risk averse (e.g., MacCrimmon & Wehrung, 1986, Sitkin & Weingart, 1995). Providing the manager is experienced within the firm, the manager’s risk propensity makes an excellent surrogate for the variable risk posture of the firm.

Research on the trait concept of risk propensity suggests that risk propensity is most malleable during the early stages of a person’s career with a firm. The longer managers remain with a firm, the more the collective effect of experiences with the firm shape the manager’s risk propensity (Sitkin & Weingart, 1995). Experiences with the firm tend to establish within the manager both formal and informal parameters for handling risky decisions. This idea meshes well with earlier findings dealing with risky decisions and organizational culture. First, managers acknowledge that the firm’s risk parameters have a strong influence on their own risk propensity (Shapira, 1986, in March & Shapira, 1987). Second, Deal and Kennedy’s (1982) model of organizational culture divides organizations into four types according to how the culture frames risky decisions. The conclusion thus can be drawn that the longer a person remains with a firm, the more the person’s risk propensity mirrors the firm’s risk preferences. Further, it is logical to assume that a manager whose risk propensity does not match his firm’s risk propensity would be highly likely to move to another firm, driven by either personal or original firm’s preference. Therefore, this study will use the risk propensity of experienced managers as a surrogate for the firm’s risk preference.
Development of the Original Scale

The REACT model (MacCrimmon & Wehrung, 1986) supplied the theoretical framework for development of the risk propensity scale. REACT hypothesizes five phases of behavior in the course of risky decision making. The phases range from predecision to post decision. Each of the phases can be characterized by differing behavioral tendencies from risk seeking and risk averse managers (see Table C-2). The investigator developed items for each phase which would detect whether the person tended to be risk averse or risk taking for this particular decision phase.

**TABLE C-2.**

**Dichotomy of Risky Decision Behaviors Under REACT**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Risk Averter</th>
<th>Risk Taker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognize</td>
<td>Exaggerates risk</td>
<td>Underestimates risk</td>
</tr>
<tr>
<td>Evaluate</td>
<td>Questions information; visualizes worst-case scenario</td>
<td>Takes information at face value; overly optimistic</td>
</tr>
<tr>
<td>Adjust</td>
<td>Significant risk modification effort</td>
<td>Minimal risk modification effort</td>
</tr>
<tr>
<td>Choose</td>
<td>Safer alternative</td>
<td>Riskier alternative</td>
</tr>
<tr>
<td>Track</td>
<td>Greater tracking of ensuing events</td>
<td>Lesser tracking of ensuing events</td>
</tr>
</tbody>
</table>


Although risky decision behavior has been characterized theoretically as risk seeking, risk neutral and risk averse, researchers tend to measure it on a continuous, rather than categorical, scale (e.g., MacCrimmon & Wehrung, 1986; Sitkin & Weingart, instrument has been shown to reveal better variance than fixed-interval Likert scales. Each item is anchored by polar-opposite statements on the topic in question; respondents
then place an "X" on the line at the point which describes their position on the item. The researcher then measures the "X" point on each line prior to data entry.

Development of the scale involved three phases: Focus group, scenario test of items, preview of scale during survey feedback assessment, and pilot test of items on logistics professionals during pilot test of survey. Final adjustments were made to the scale following preliminary data analysis of the main study.

Focus Group. Items representing behaviors common to each phase of the REACT model were drafted by the investigator. The items were then given to a focus group of researchers familiar with decision-risk studies. After analysis of the list by the group for readability, applicability to a logistics situation, and face validity in describing behaviors of each REACT phase, the list was trimmed from 11 to eight.

Initial Testing. Initial reliability and validity testing of the eight items came under the form of the Logistics Decision Survey. This survey used the brief scenario that the respondent was an operations manager for a third-party trucking company, and should respond to the questions in terms of how he or she would deal with shipping clients. Other items requested were the person's age, primary job, and academic class; these demographics were used to assist in data analysis. The 79 business students participating in the survey were primarily MBA students in their capstone course, or non-traditional undergraduates.

The researcher had hoped that the items would load on factors representing their appropriate dimension within the REACT model. The items, however, loaded on four factors, and not always with their projected dimension partner (Data analysis located in
Appendix B). Hence, the investigator eliminated three items which were judged by the focus group to be the least specific of the five to logistics situations, while still maintaining one item from each of the five REACT dimensions. A followup, Factor Analysis B, was run on the remaining five items using the entire database; a three-factor solution resulted, but did not increase clarity of the situation. A second followup, Factor Analysis C, proved somewhat more enlightening.

Factor Analysis C was run on an "experienced" subset of the database composed of MBA students, and undergraduates 26 years of age or older. These criteria were designed to select a group with work experience more like that of the shipper and carrier managers; also, the size (n=34) approached the goal of having seven observations per five scale items to ensure a robust factor analysis. This analysis yielded a two-factor solution which had a logical thread for its fallout. Items Q1, Q2, and Q5 clustered together for factor 1. Q1 and Q2 dealt with pre-decision risk, while Q5 dealt with monitoring activity after the decision; Q5, however, proved to be the weak item in a reliability analysis of the factor: the removal of Q5 raised the coefficient α from .01 (sic) to .20. Factor 2, containing Q6 and Q8, both dealt with decision-making risk activity, and had a coefficient α of .73. Further conclusions on the emerging scale were reserved until after the pilot test on carrier and manufacturer professionals.

Pilot Test on Logistics Professionals. The scale was further tested following the pilot study in which the proposed survey was mailed to 110 logistics professionals (for details, see pages 104 to 107). The survey produced 28 usable responses; although this number did not reach the desired threshold of 35 for a five-item factor analysis, the results
proved similar to those from the "experienced" subgroup from the initial testing. Items R1 and R2, which dealt with pre-decision risk, again clustered together, along with R3 (formerly Q5). R3, however, only had a loading of .482 on factor 1; its factor 2 loading was .226. An ensuing reliability analysis of factor 1 produced a coefficient $\alpha$ of .55; this raised to .68 when R3 was eliminated. Factor 2 consisted of items R4 and R5, formerly items Q6 and Q8 respectively; these had a coefficient $\alpha$ of .73. Although R3 was proving to be a troublesome item, the investigator retained it in the scale in order to have all five phases of the REACT model represented.
Logistics Decision Survey

DIRECTIONS
- Assume that you are the operations manager of a third-party motor carrier (trucking) firm.
- Answer the following questions to indicate how you would deal with shipping clients.
- Mark an “x” on the line below indicating your answer. Do NOT circle the words at the end of the scale.

1. How cautious are you in approaching new offers for Logistics Alliances?
   Not cautious at all ___________________________ Extremely cautious

2. How comfortable are you relying on shippers to provide planning information?
   Not at all comfortable ___________________________ Extremely comfortable

3. A logistics project has a 50% chance of turning a 20% profit or a 50% chance of breaking even. Would you support it?
   No, not support at all ___________________________ Yes, strongly support

4. How confident are you when you make a decision with missing information?
   Not confident at all ___________________________ Very confident

5. If you accept a new shipping contract, how closely would you monitor its progress?
   Almost no monitoring ___________________________ Very close monitoring

6. To avoid losing a contract, would you make a decision with key information missing?
   Not likely at all ___________________________ Very likely

7. How willing would you be to support an innovative but unproven technology?
   Unwilling ___________________________ Very willing

8. How often do you make a decision based primarily on gut feeling?
   Always ___________________________ Never

What is your job title? (Please be specific) ___________________________

Please check your correct age group.
- ☐ 25 or under
- ☐ 26 to 35
- ☐ Over 35
   (# indicates item dropped after initial factor analysis.)
## Risk Propensity Scale - Initial Testing

### Factor Analysis A.

#### Descriptive Statistics

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<th>Std. Deviation</th>
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<th>Missing N</th>
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<tr>
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a. For each variable, missing values are replaced with the variable mean.

#### Total Variance Explained

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#### Rotated Component Matrix

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<td>.158</td>
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Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.
Factor Analysis B.

Descriptive Statistics

<table>
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<tr>
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<th>Mean</th>
<th>Std. Deviation</th>
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<th>Missing N</th>
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a. For each variable, missing values are replaced with the variable mean.

Total Variance Explained

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Rotated Component Matrix

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</thead>
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Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.
Factor Analysis C.

**Descriptive Statistics**

<table>
<thead>
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<th>Variable</th>
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<td>46.41</td>
<td>27.00</td>
<td>34</td>
<td>0</td>
</tr>
<tr>
<td>Q8r</td>
<td>57.00</td>
<td>21.92</td>
<td>34</td>
<td>0</td>
</tr>
</tbody>
</table>

a. For each variable, missing values are replaced with the variable mean.

**Total Variance Explained**

<table>
<thead>
<tr>
<th>Component</th>
<th>Total</th>
<th>% of Variance</th>
<th>Cumulative %</th>
<th>Total</th>
<th>% of Variance</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.662</td>
<td>33.230</td>
<td>33.230</td>
<td>1.659</td>
<td>33.181</td>
<td>33.181</td>
</tr>
<tr>
<td>2</td>
<td>1.209</td>
<td>24.175</td>
<td>57.405</td>
<td>1.211</td>
<td>24.224</td>
<td>57.405</td>
</tr>
<tr>
<td>3</td>
<td>.941</td>
<td>18.819</td>
<td>76.223</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>.797</td>
<td>15.933</td>
<td>92.157</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>.392</td>
<td>7.843</td>
<td>100.000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Rotated Component Matrix**

<table>
<thead>
<tr>
<th>Component</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1r</td>
<td>.231</td>
<td>.709</td>
</tr>
<tr>
<td>Q2</td>
<td>-.277</td>
<td>.569</td>
</tr>
<tr>
<td>Q5r</td>
<td>-1.3E-02</td>
<td>-.502</td>
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<tr>
<td>Q6</td>
<td>.874</td>
<td>.113</td>
</tr>
<tr>
<td>Q8r</td>
<td>.875</td>
<td>-9.1E-02</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.
### Factor Analysis - Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Analysis N</th>
<th>Missing N</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>37.04</td>
<td>27.73</td>
<td>28</td>
<td>0</td>
</tr>
<tr>
<td>R2</td>
<td>46.04</td>
<td>26.40</td>
<td>28</td>
<td>0</td>
</tr>
<tr>
<td>R3r</td>
<td>17.68</td>
<td>13.93</td>
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<td>0</td>
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<tr>
<td>R4r</td>
<td>29.75</td>
<td>29.80</td>
<td>28</td>
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</tr>
<tr>
<td>R5r</td>
<td>33.32</td>
<td>22.76</td>
<td>28</td>
<td>0</td>
</tr>
</tbody>
</table>

### Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>R1</th>
<th>R2</th>
<th>R3r</th>
<th>R4r</th>
<th>R5r</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>1.000</td>
<td>.517</td>
<td>.155</td>
<td>.038</td>
<td>- .231</td>
</tr>
<tr>
<td>R2</td>
<td>.517</td>
<td>1.000</td>
<td>.102</td>
<td>.045</td>
<td>- .211</td>
</tr>
<tr>
<td>R3r</td>
<td>.155</td>
<td>.102</td>
<td>1.000</td>
<td>1.000</td>
<td>- .142</td>
</tr>
<tr>
<td>R4r</td>
<td>.038</td>
<td>.045</td>
<td>1.75</td>
<td>1.000</td>
<td>.352</td>
</tr>
<tr>
<td>R5r</td>
<td>- .231</td>
<td>- .211</td>
<td>- .142</td>
<td>.352</td>
<td>1.000</td>
</tr>
</tbody>
</table>

### Total Variance Explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total % of Variance</td>
<td>Cumulative %</td>
</tr>
<tr>
<td>1</td>
<td>1.738</td>
<td>34.761</td>
</tr>
<tr>
<td>2</td>
<td>1.315</td>
<td>26.306</td>
</tr>
<tr>
<td>3</td>
<td>.956</td>
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<td>10.246</td>
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<tr>
<td>5</td>
<td>.478</td>
<td>9.561</td>
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</table>

### Rotated Component Matrix

<table>
<thead>
<tr>
<th>Component</th>
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<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>.811</td>
<td>-.126</td>
</tr>
<tr>
<td>R2</td>
<td>.786</td>
<td>-.121</td>
</tr>
<tr>
<td>R3r</td>
<td>.482</td>
<td>.226</td>
</tr>
<tr>
<td>R4r</td>
<td>.229</td>
<td>.863</td>
</tr>
<tr>
<td>R5r</td>
<td>-.344</td>
<td>.739</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Reliability Analysis (Initial Testing)

**RELIABILITY ANALYSIS – SCALE (ALPHA)**

### Item-total Statistics

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>Variance</th>
<th>Corrected Mean</th>
<th>Variance</th>
<th>Item-Total Correlation</th>
<th>Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>if Item</td>
<td></td>
<td>if Item</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deleted</td>
<td></td>
<td>Deleted</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1R</td>
<td>304.5190</td>
<td>5339.4323</td>
<td>.0906</td>
<td></td>
<td></td>
<td>.5319</td>
</tr>
<tr>
<td>Q2</td>
<td>304.7595</td>
<td>5486.0055</td>
<td>.0977</td>
<td></td>
<td></td>
<td>.5209</td>
</tr>
<tr>
<td>Q3</td>
<td>280.2785</td>
<td>5141.0240</td>
<td>.2325</td>
<td></td>
<td></td>
<td>.4728</td>
</tr>
<tr>
<td>Q4</td>
<td>311.7595</td>
<td>4690.3389</td>
<td>.3215</td>
<td></td>
<td></td>
<td>.4353</td>
</tr>
<tr>
<td>Q5R</td>
<td>326.9114</td>
<td>5910.4408</td>
<td>.0645</td>
<td></td>
<td></td>
<td>.5169</td>
</tr>
<tr>
<td>Q6</td>
<td>304.2405</td>
<td>4324.9030</td>
<td>.3602</td>
<td></td>
<td></td>
<td>.4129</td>
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<tr>
<td>Q7</td>
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<td>.3262</td>
<td></td>
<td></td>
<td>.4393</td>
</tr>
<tr>
<td>Q8R</td>
<td>290.9241</td>
<td>4782.1224</td>
<td>.3620</td>
<td></td>
<td></td>
<td>.4237</td>
</tr>
</tbody>
</table>

**Reliability Coefficients:**  
Alpha = .5063

### Reliability - Initial Factor Subscales

**Factor 1 Item-Total Statistics**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>Variance</th>
<th>Corrected Mean</th>
<th>Variance</th>
<th>Item-Total Correlation</th>
<th>Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>if Item</td>
<td></td>
<td>if Item</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deleted</td>
<td></td>
<td>Deleted</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>95.6962</td>
<td>1571.5988</td>
<td>.2627</td>
<td></td>
<td></td>
<td>.6519</td>
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<tr>
<td>Q6</td>
<td>119.6582</td>
<td>959.3304</td>
<td>.4000</td>
<td></td>
<td></td>
<td>.3407</td>
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<td>Q8R</td>
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<td>1295.6637</td>
<td>.4669</td>
<td></td>
<td></td>
<td>.3841</td>
</tr>
</tbody>
</table>

**Factor 1 Reliability Coefficient:**  
Alpha = .5838

**Factor 2 Reliability Coefficient (Q2, Q4):**  
Alpha = .4097

**Factor 3 Reliability Coefficient (Q1, Q7):**  
Alpha = .4244

**Factor 4 Reliability Coefficient (Q5):**  
None.
Reliability Analysis - Initial Testing
Experienced subset \( (n = 34) \)

**Factor 1 Item-Total Statistics**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean Deleted</th>
<th>Variance if Item Deleted</th>
<th>Item-Total Correlation Corrected</th>
<th>Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1R</td>
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<td>-.0815</td>
</tr>
<tr>
<td>Q2</td>
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<td>661.1025</td>
<td>.0859</td>
<td>-.2439</td>
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<tr>
<td>Q5R</td>
<td>81.2647</td>
<td>1049.1702</td>
<td>-.1242</td>
<td>.1986*</td>
</tr>
</tbody>
</table>

**Factor 1 Reliability Coefficient:** \( \text{Alpha} = .0045^* \)

**Factor 2 Item-Total Statistics**

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<th>Scale</th>
<th>Mean Deleted</th>
<th>Variance if Item Deleted</th>
<th>Item-Total Correlation Corrected</th>
<th>Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q6</td>
<td>57.0000</td>
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<tr>
<td>Q8R</td>
<td>46.4118</td>
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</table>

**Factor 2 Reliability Coefficient:** \( \text{Alpha} = .7349 \)
### Reliability Analysis (Pilot Test)

#### Reliability Analysis - Scale (Alpha)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std Dev</th>
<th>Cases</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>37.0357</td>
<td>27.7335</td>
<td>28.0</td>
</tr>
<tr>
<td>2</td>
<td>46.0357</td>
<td>26.3951</td>
<td>28.0</td>
</tr>
<tr>
<td>3</td>
<td>17.6786</td>
<td>13.9312</td>
<td>28.0</td>
</tr>
<tr>
<td>4</td>
<td>29.7500</td>
<td>29.7989</td>
<td>28.0</td>
</tr>
<tr>
<td>5</td>
<td>33.3214</td>
<td>22.7613</td>
<td>28.0</td>
</tr>
</tbody>
</table>

#### Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>R1</th>
<th>R2</th>
<th>R3R</th>
<th>R4R</th>
<th>R5R</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>.5175</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R3R</td>
<td>.1552</td>
<td>.1021</td>
<td>1.0000</td>
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<td></td>
</tr>
<tr>
<td>R4R</td>
<td>.0380</td>
<td>.0447</td>
<td>.1747</td>
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</tr>
<tr>
<td>R5R</td>
<td>-.2308</td>
<td>-.2115</td>
<td>-.1418</td>
<td>.3518</td>
<td>1.0000</td>
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</table>

N of Cases = 28.0

#### Statistics for Scale

<table>
<thead>
<tr>
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<th>Variance</th>
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<th>Variables</th>
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<tbody>
<tr>
<td>Scale</td>
<td>163.8214</td>
<td>4138.5966</td>
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</table>

#### Item-total Statistics

<table>
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<tr>
<th>Item</th>
<th>Scale Mean</th>
<th>Scale Variance</th>
<th>Corrected Item- Total</th>
<th>Multiple Correlation</th>
<th>Corrected Item- Total Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>if Item</td>
<td>if Item</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deleted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- R1: 126.7857, 2720.5450, .2243, .2931
- R2: 117.7857, 2792.9153, .2326, .2809
- R3R: 146.1429, 3694.4233, .1477, .0868
- R4R: 134.0714, 2495.1799, .2538, .1898
- R5R: 130.5000, 3778.7037, -.0565, .2261

**Overall Reliability Coefficient:** Alpha = .3240
## Reliability - Pilot Factor Subscales

### Factor 1 Item-total Statistics

<table>
<thead>
<tr>
<th>Scale</th>
<th>Scale</th>
<th>Corrected Item-</th>
<th>Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Variance</td>
<td>Total Correlation</td>
<td>Deleted</td>
</tr>
<tr>
<td>if Item Deleted</td>
<td>if Item Deleted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1</td>
<td>63.7143</td>
<td>965.8413</td>
<td>.5091</td>
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<td>R2</td>
<td>54.7143</td>
<td>1083.1746</td>
<td>.4793</td>
</tr>
<tr>
<td>R3R</td>
<td>83.0714</td>
<td>2223.4762</td>
<td>.1484</td>
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</table>

**Factor 1 Reliability Coefficient:**

\[ \text{Alpha} = .5470^* \]

### Factor 2 Item-Total Statistics

<table>
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<tr>
<th>Scale</th>
<th>Scale</th>
<th>Corrected Item-</th>
<th>Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Variance</td>
<td>Total Correlation</td>
<td>Deleted</td>
</tr>
<tr>
<td>if Item Deleted</td>
<td>if Item Deleted</td>
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<td></td>
</tr>
<tr>
<td>R4R</td>
<td>51.0000</td>
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<tr>
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</tbody>
</table>

**Factor 2 Reliability Coefficient:**

\[ \text{Alpha} = .5068 \]
APPENDIX D.

POST CARDS AND COVER LETTERS FOR SURVEY MAILINGS
Phase 1 Postcard

Dear Manufacturing Professional,
In today's world, many manufacturers and distributors are turning to "logistics alliances" to meet their motor-carrier needs. Questions have arisen, however, on the best way to govern these alliances. A group of researchers here at UNT is investigating these issues.

As an industry professional you are best qualified to help us answer these difficult questions. We request that you share your expertise with us in our Logistics Alliance survey. In return, you will receive a custom report of our findings.

You should receive the survey in about two weeks. Please participate!

Sincerely,

John P. Orr
Primary Researcher

Phase 3 Postcard

Dear Manufacturing Professional,

Responses to our Logistics Alliance survey are starting to arrive, so I wanted to thank members of the survey group for their participation. Only your assessments can give us the information we need to determine national trends on these manufacturer-carrier partnerships.

If you have been busy, and unable as yet to fill out the survey, please take some time today to do so. Your expertise is essential to industry understanding of these alliances! And remember, respondents are entitled to a custom survey in return.

Thanks again,

John P. Orr
Primary Researcher
Phase 1 Postcard

Dear Transportation Professional,

In today's world, many manufacturers and distributors are turning to "logistics alliances" to meet their motor-carrier needs. Questions have arisen, however, on the best way to govern these alliances. A group of researchers here at UNT is investigating these issues.

As a transportation industry professional, you are best qualified to help us answer these difficult questions. We request that you share your expertise with us in our Logistics Alliance survey. In return, you will receive a custom report of our findings.

You should receive the survey in about two weeks. Please participate!

Sincerely,

John P. Orr
Primary Researcher

Phase 3 Postcard

Dear Transportation Professional,

Responses to our Logistics Alliance survey are starting to arrive, so I wanted to thank members of the survey group for their participation. Only your assessments can give us the information we need to determine national trends on these shipper-carrier alliances.

If you have been busy, and unable as yet to fill out the survey, please take some time today to do so. Your expertise is essential to industry understanding of these alliances! And remember, respondents are entitled to a custom survey in return.

Thanks again,

John P. Orr
Primary Researcher
March 23, 1998

Dear MM LAST:

In this era of deregulated transportation, manufacturers and distributors increasingly are outsourcing their motor-carrier needs. Some shippers and carriers have responded by forming “logistics alliances” in which they jointly design systems to speed goods to the end user. Although many such alliances exist, questions have arisen about the best way to structure them. For example, how does one balance trust and legal contracting in alliances?

You, as a key manager at YOUR FIRM, can help us answer these questions. Our survey takes about 20 minutes to complete. In return for your participation, you will receive a customized report which compares your firm with other motor-carrier and logistics-management firms on key alliance relationships. Rest assured that your individual responses will be kept confidential. Results will be presented in aggregate form only.

This project has been reviewed and approved by the UNT Institutional Review Board for the Protection of Human Subjects in Research (telephone 940-565-3940). You may discontinue the survey at any time without prejudice; however, we hope you will fill out the survey in its entirety, to give the study the full benefit of your knowledge.

Could you please take a few minutes to share your expertise with us? When you are finished, please place the survey in the enclosed self-addressed, stamped envelope and return it to us. Thank you for your help.

Sincerely,

John P. Orr
Project Manager

Derrick E. D’Souza, Ph.D.
Associate Professor of Management

P.S. If you have questions about the survey, do not hesitate to phone John Orr at 940-565-3140, or e-mail him at “orr@cobaf.unt.edu”. His FAX number is 940-565-4394.

ENCL. Survey
Stamped return envelope
April 14, 1998

Dear MM LAST:

We contacted you earlier this spring about our study of logistics alliances. This is the first national-level study of its type, and the results should be quite beneficial to firms such as FIRM.

In March, we mailed you a copy of the survey with a return envelope. If you have already returned your survey, and our letters are crossing in the mail, thank you for sharing your knowledge with us. If you have not done so, we urge you to take some time to complete the survey.

Professionals such as you, MM LAST, were specially selected to provide a geographic mix of respondents who would accurately represent the U.S. transportation scene. Thus, your response is very important for us as we attempt to paint a correct picture. In case the original survey was misplaced during the end-of-quarter report crunch, we have enclosed another survey, along with a return envelope.

The survey takes about 20 minutes to complete. If you participate, you will receive a customized report which compares your firm with other motor-carrier and logistics-management firms on key alliance relationships.

If you have questions about the survey, do not hesitate to phone John Orr at 940-565-3140, or e-mail him at “orr@cobaf.unt.edu”. His FAX number is 940-565-4394. When you have completed the survey, please place it in the enclosed envelope and return it to us. Thank you for your help.

Sincerely,

John P. Orr
Project Manager

Derrick E. D'Souza
Associate Professor of Management

ENCL: Survey
   Return Envelope
March 23, 1998

FIRST LAST
TITLE
FIRM
ADDRESS
CITY, ST ZIP

Dear MM LAST:

In this era of deregulated transportation, manufacturers and distributors increasingly are outsourcing their motor-carrier needs. Some shippers and carriers have responded by forming “logistics alliances” in which they jointly design systems to speed goods to the end user. Although many such alliances exist, questions have arisen about the best way to structure them. For example, how does one balance trust and legal contracting in alliances?

You, as a key manager at MANUFACTURER, can help us answer these questions. Our survey takes about 20 minutes to complete. In return for your participation, you will receive a customized report which compares your firm with other manufacturing firms on key alliance relationships. Rest assured that your individual responses will be kept confidential. Results will be presented in aggregate form only.

This project has been reviewed and approved by the UNT Institutional Review Board for the Protection of Human Subjects in Research (telephone 940-565-3940). You may discontinue the survey at any time without prejudice; however, we hope you will fill out the survey in its entirety, to give the study the full benefit of your knowledge.

Could you please take a few minutes to share your expertise with us? When you are finished, place the survey in the enclosed self-addressed, stamped envelope and return it to us. Thank you for your help.

Sincerely,

John P. Orr
Project Manager

Derrick E. D’Souza, Ph.D.
Associate Professor of Management

P.S. If you have questions about the survey, do not hesitate to phone John Orr at 940-565-3140, or e-mail him at “orr@cobaf.unt.edu”. His FAX number is 940-565-4394.

ENCL: Survey
Stamped return envelope
April 18, 1998

FIRST LAST
TITLE
FIRM
ADDRESS
CITY, ST ZIP

Dear MM LAST:

We contacted you earlier this spring about our study of logistics alliances. This is the first national-level study of its type, and the results should be quite beneficial to firms such as FIRM.

In March, we mailed you a copy of the survey with a return envelope. If you have already returned your survey, and our letters are crossing in the mail, thank you for sharing your knowledge with us. If you have not done so, we urge you to take some time to complete the survey.

Professionals such as you, MM LAST, were specially selected to provide a geographic mix of respondents who would accurately represent the U.S. manufacturing scene. Thus, your response is very important for us as we attempt to paint a correct picture. In case the original survey was misplaced during the end-of-quarter report crunch, we have enclosed another survey, along with a response envelope.

The survey takes about 20 minutes to complete. If you participate, you will receive a customized report which compares your firm with other manufacturers on key alliance relationships.

If you have questions about the survey, do not hesitate to phone John Orr at 940-565-3140, or e-mail him at “orr@cobaf.unt.edu”. His FAX number is 940-565-4394. When you have completed the survey, please place it in the enclosed envelope and return it to us. Thank you for your help.

Sincerely,

John P. Orr
Project Manager

Derrick E. D'Souza
Associate Professor of Management

ENCL: Survey
Return Envelope
APPENDIX E.

1998 LOGISTICS ALLIANCE SURVEY:
CARRIER AND SHIPPER VERSIONS
Thank you for helping us on this study. Please mail the survey back to us in the envelope provided. To receive a custom report, please enclose a business card.

- Your name.
- Your job title.
- How long have you been with this firm? Years

Please answer these questions about your firm.

- Your firm’s primary business (check one).
  - Truckload Carrier (TL)
  - Less-Than-Truckload Carrier (LTL)
  - Package Delivery Carrier
  - Transportation/Logistics Coordination

- Please circle the relative position of your firm’s capital structure for trucks and trucking equipment.
  1 Non-Asset Based
  2 Mixed
  3 Asset Based

- Motor-carrier license of your primary business (check one).
  - Class I License (Greater than $10 million in annual revenues)
  - Class II License ($3 million to $10 million in annual revenues)
  - Class III License (Less than $3 million in annual revenues)
  - No motor carrier license (Non-asset-based coordinator).

- Five carrier capabilities that appeal to shippers are listed below. Distribute 100 points among them to indicate the emphasis your firm places on each.
  - Carrier management’s flexibility and skill
  - Suitability of trucking equipment
  - Least cost transportation solution
  - Speed of shipment delivery
  - Consistency and quality of service
  - 100

For inquiries, contact John P. Orr, Department of Management, University of North Texas, Denton, TX 76203-5429
Phone: 940-565-3140  FAX: 940-565-4394  E-Mail: orr@cobaf.unt.edu
Please select a customer for which your firm has been shipping goods regularly for at least six months. This selected shipper will be referred to during this survey as the "referent shipper." Use your firm's relationship with this referent shipper as the basis for your responses.

- Provided below are three types of Carrier-Shipper Relationships. Check the box which best describes your relationship with the referent shipper.

  Type 1  Shipper and carrier have agreed to work together on a regular basis. The two parties coordinate existing internal systems without altering them specifically for the relationship.

  Type 2  Shipper and carrier engage in joint systems development for transportation. Each firm alters its internal systems to allow more efficient interfaces with the other party.

  Type 3  The carrier serves as a logistics utility, providing a wide range of custom transportation services. The carrier now performs the vast majority of the shipper's over-the-road transportation and planning.

- Approximate duration of your firm's relationship with this referent shipper _____ Months

- Primary industry within which this referent shipper operates ______________________

Please help us understand how you have configured your resources to satisfy the needs of this referent shipper. Circle your responses on the scale to the right of each item.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
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</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6 7</td>
</tr>
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</table>

- Our firm has hired a significant number of additional staff to support this referent shipper.

- Our firm hires individuals with specific expertise to service this referent shipper.

- Our firm has created additional capacity to service this referent shipper.

- Additional investments have been made by us to satisfy the logistics needs of this referent shipper.

- Highly specialized equipment is required to satisfy the transportation needs of this referent shipper.

- Most of the equipment needed for the activities of this referent shipper can also be used for other customers, if necessary.

- We have invested significant time in developing shipping procedures desired by this referent shipper (e.g., logistics and quality control).

- Specialized technological know-how is required to effectively support this referent shipper.

- A clear understanding of the internal organization of this referent shipper is required to effectively coordinate operations with them.

- The location of our firm plays an important role in our relationship with this referent shipper.
Please circle the number to the right of each statement that most closely describes the opinion of members of your department toward this referent shipper. If you service multiple sites for the referent shipper, base your assessment on the referent shipper’s most prominent site.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
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<td>1 2 3 4 5 6 7</td>
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</table>

- We think this referent shipper’s employees tell the truth in negotiations.
- We think that this referent shipper meets its negotiated obligations to our company.
- In our opinion, this referent shipper is a reliable partner.
- We think that this referent shipper’s management is ruthless in its pursuit of business success.
- We feel that this shipper tries to get the upper hand in everything they do.
- We think that this referent shipper takes advantage of our problems.
- We feel that this referent shipper negotiates with us honestly.
- We feel that this referent shipper’s employees will keep their word.
- We think the employees of this referent shipper do not mislead us.
- We feel that this referent shipper tries to get out of its commitments.
- We feel that this referent shipper negotiates mutual goals fairly with us.
- We feel that this referent shipper takes advantage of firms that are vulnerable.
- This referent shipper evaluates our services based primarily upon transportation prices.
- This referent shipper evaluates our performance by conducting extensive inspections of inbound shipments.
- This referent shipper evaluates our performance by monitoring our shipments while they are in progress.
- This referent shipper requires us to follow approved quality procedures.
- This referent shipper evaluates our performance by conducting extensive inspections of inbound shipments.

Indicate the extent of joint planning between your firm and this referent shipper in the following areas:

- The shipping firm’s marketing activities
- The shipping firm’s new product launches
- Forecasting shipping firm’s shipments

<table>
<thead>
<tr>
<th>Insignificant Joint Action</th>
<th>Significant Joint Action</th>
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<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
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</table>
Please give us the following information concerning your firm’s relationship with the referent shipper.

- Percentage of your firm’s annual service revenues derived from the referent shipper: %
- Percentage of transactions with this referent shipper which take place using electronic data interchange (such as on-line data exchange, remote access to each other’s computers, etc.): %
- Operations conducted for the referent shipper in a typical month:
  - Number of shipments / month
  - Total weight of shipments (in pounds) / month
- Compared to other shippers, this referent shipper’s frequency of orders is: (Please circle)

Consider your firm’s dealings with its shippers in general. Indicate how YOU would respond to the following in dealing with your firm’s clients. Mark an “x” on the line below each item indicating your response. Please DO NOT circle the words at the end of the scale.

- How cautious are you in approaching new offers for Logistics Alliances?
  - Extremely cautious
  - Not cautious at all

- How comfortable are you relying on shippers to provide you with planning information?
  - Not at all comfortable
  - Extremely comfortable

- If you accept a new shipping contract, how closely would you monitor its progress?
  - Monitor it little
  - Monitor it closely

- To avoid losing a contract, would you make a decision with key information missing?
  - Very likely
  - Not likely at all

- How often do you make a decision based primarily on gut feeling?
  - Always
  - Never

Individual Responses Will Be Kept Confidential. Thank You for Your Participation!
1998 Logistics Alliance Survey
Department of Management
University of North Texas

Thank you for helping us on this study. Please mail the survey back to us in the envelope provided. To receive a custom report, please enclose a business card.

- Your name. ____________________________
- Your job title. ____________________________
- How long have you been with this firm? ____________ Years

Please answer these questions about your firm.

- Your firm’s primary industry ____________________________ (SIC = ____________)

- Your firm primarily uses in-house motor carriers for (check one):
  ___ Truckload Shipments (TL)
  ___ Less-Than-Truckload Shipments (LTL)
  ___ Package Delivery
  ___ None of the Above.

- Your firm primarily uses third-party motor carrier service for (check one):
  ___ Truckload Shipments (TL)
  ___ Less-Than-Truckload Shipments (LTL)
  ___ Package Delivery
  ___ None of the Above.

- Five carrier capabilities that appeal to shippers are listed below. Distribute 100 points among them to indicate the emphasis your firm places on each when evaluating carriers.
  - Carrier management’s flexibility and skill ______
  - Suitability of trucking equipment ______
  - Least cost transportation solution ______
  - Speed of shipment delivery ______
  - Consistency and quality of service ______

100

For inquiries, contact John P. Orr, Department of Management, University of North Texas, Denton, TX 76203-5429.
Phone: 940-565-3140 FAX: 940-565-4394 E-Mail: orr@cobaf.unt.edu
Please select a third-party motor carrier which has been shipping goods for your firm regularly for at least six months. This carrier could be either a trucking firm or a logistics coordinator. Use your firm's relationship with this "referent carrier" as the basis for your responses.

- Provided below are three types of Shipper-Carrier Relationships. Check the box which best describes your relationship with the referent motor carrier.

| Type 1 | Shipper and carrier have agreed to work together on a regular basis. The two parties coordinate existing internal systems without altering them specifically for the relationship. |
| Type 2 | Shipper and carrier engage in joint systems development for transportation. Each firm alters its internal systems to allow more efficient interfaces with the other party. |
| Type 3 | The carrier serves as a logistics utility, providing a wide range of custom transportation services. The carrier now arranges or performs the vast majority of the shipper's over-the-road transportation. |

- Approximate duration of your firm’s relationship with this referent motor carrier ______ Months

- This referent carrier is primarily a (check):
  - [ ] direct motor-carriage transportation provider.
  - [ ] motor carriage/logistics coordinator.

Please help us understand how you have configured your resources to satisfy the needs of this referent carrier. Circle your responses on the scale to the right of each item.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
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</thead>
<tbody>
<tr>
<td>The referent carrier has hired a significant number of additional staff to support our firm.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>The referent carrier hires individuals with specific expertise to service our transportation needs.</td>
<td>1 2 3 4 5 6 7</td>
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</tr>
<tr>
<td>The referent carrier has created additional capacity to service our firm.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>The referent carrier has made additional investments to satisfy the logistics needs of our firm.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>This referent carrier acquired highly specialized equipment to satisfy our firm's transportation requirements.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Most of the equipment used for our requirements by this referent carrier can also be used for its other customers.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>The referent carrier has invested significant time in developing shipping procedures desired by our firm (e.g., logistics and quality control).</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Specialized technological know-how is needed by this referent carrier to effectively support our firm.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>The referent carrier must clearly understand our firm's internal organization in order to effectively support us.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>The location of our firm plays an important role in our relationship with this referent carrier.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
Please circle the number to the right of each statement that most closely describes the opinion of members of your department toward this referent motor carrier.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
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</tr>
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<tbody>
<tr>
<td>• We think this motor carrier's employees tell the truth in negotiations.</td>
<td>1 2 3 4 5 6 7</td>
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<td>• We think that this referent carrier meets its negotiated obligations to our company.</td>
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<td>• In our opinion, this referent carrier is a reliable partner.</td>
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<tr>
<td>• We feel that this referent carrier takes advantage of firms that are vulnerable.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>• Our firm evaluates the services of this referent carrier based primarily upon transportation prices.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>• Our firm evaluates this referent carrier's performance by conducting extensive inspections of our inbound shipments.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>• To assess this referent carrier's performance, we monitor our shipments while they are in progress.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>• This carrier is required by us to follow approved quality procedures.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

• Indicate the extent of joint planning between your firm and this referent motor carrier in the following areas:
  - Our firm's marketing activities
  - Our firm's new product launches
  - Forecasting our firm's shipments

<table>
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<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>
Please give us the following information concerning your firm's relationship with the referent carrier.

- Percentage of your firm's annual motor-carrier expenses paid to the referent carrier. ...................................................... %
- Percentage of transactions with this referent carrier which take place using electronic data interchange (such as on-line data exchange, remote access to each other's computers, etc.). ...................................................... %
- Your usage of this referent carrier in a typical month:
  - Number of shipments ................................. / month
  - Total weight of all shipments (in pounds) .... / month
- In comparison to the referent carrier's other customers, our shipping frequency of ordering is: (Please circle) .................... 1 2 3 4 5 6 ?

Consider your firm's dealings with its third-party service providers in general. Indicate how YOU would respond to the following in dealing with the service providers. Mark an “x” on the line below each item indicating your response. Please DO NOT circle the words at the end of the scale.

- How cautious are you in approaching new offers for Logistics Alliances?
  - Extremely cautious | | Not cautious at all

- How comfortable are you relying on third-party service providers to provide you with planning information?
  - Not at all comfortable | | Extremely comfortable

- If you award a new service contract, how closely would you monitor its progress?
  - Monitor it little | | Monitor it closely

- To avoid losing a service provider, would you make a contract decision with key information missing?
  - Very likely | | Not likely at all

- How often do you make a decision based primarily on gut feeling?
  - Always | | Never

Individual Responses Will Be Kept Confidential.
Thank You for Your Participation!
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