ABSTRACT

Title of Dissertation: MODELING THE DETERMINANTS OF SATISFACTION AND COMMITMENT IN BUYER-SELLER RELATIONSHIPS IN THE LESS-THAN-TRUCKLOAD SEGMENT OF THE MOTOR CARRIER INDUSTRY

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Buyer-seller relationships in the U. S. are changing with the advent of closer, longer-term alliances. In establishing and maintaining these alliances, firms need to understand those factors which determine satisfaction and commitment in relationships. Drawing on theoretical and conceptual work based on Resource Dependence Theory and Social Exchange Theory, this dissertation focused on the buyer-seller dyad in the less-than-truckload segment of the motor carrier industry. The buyer-seller dyads in this segment are particularly interesting since deregulation has necessitated dramatic changes in these relationships.

A system of structural equations modeled the determinants of shipper's satisfaction and commitment in these dyads using a correlation input matrix. The network

of influencing factors included: carrier's power, shipper's power, comparison level given an alternative and trust. The analysis allowed an in-depth discussion of the relative importance of each of these constructs and found both shipper's power and comparison level given an alternative to have a great influence on satisfaction; satisfaction and trust significantly affect commitment, with satisfaction being more important, relatively speaking.

The managerial implications of this research focused on understanding those factors which are most important in creating satisfaction and commitment in buyer-seller relationships. Carrier's need to dedicate personnel to key accounts in order to display initiative in problem solving and responsiveness to inquiries in order to enhance shipper's satisfaction and willingness to commit to a long-term relationship. Other suggested programs include offering customer-oriented programs such as 1-800 numbers, increased flexibility in pick-up and delivery times, and a willingness to forego some accessorial charges.

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Dissertation submitted to the Faculty of the Graduate School
of the University of Maryland in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
1992

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1992

DEDICATION

IN LOVING MEMORY OF MY PARENTS

CARL AND BETTY JARRELL

ACKNOWLEDGEMENT

I thank Tom Corsi from the bottom of my heart. Besides being extremely patient and supportive, Tom taught me how to enjoy research while allowing me to learn basic research skills working with him. Without too much sentimentality, I am indebted to you, Tom, and will never forget your help and friendship.

My dissertation committee - Dr. Durand, Dr. Krapfel, Dr. Wagner, and Dr. Mattingly - read my writing with care and gave me advice from the basic conceptualization of this project to my writing style. I learned a great deal from you and thank you for all the time you spent reading my research. I also appreciate the time and help offered by Dr. Richard Poist.

There are many people on the campuses of the University of Maryland, College Park and Memphis State University who have helped me learn more about computers, statistical software packages, etc. I thank each and every one of you but need to single out Jeanne Fineran as a major help throughout my dissertation and Dr. Emin Babakus for helping me understand LISREL.

My family has been extraordinarily supportive and their pride in my accomplishments never failed to touch me. My siblings (and in-laws) could be called on at all

hours to give me a word of encouragement. I love you all: Sandy and Gary, C. B., Gary, and Mark and Cindy.

Several people have marveled at the incredible group of friends with which I have been blessed. These people listened to me whine, complain, cry, laugh, moan, and groan over this dissertation - and still like me. Thanks to Andi, Brenda, Bill, the Fabian / Zysk group, Jean and Mac McCarty, Brent, and Joanne Pometto.

Last but not least, my unconditional love to my best friends Lisa McCarty and Shelly Fabian.

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CHAPTER ONE INTRODUCTION

1.1 Satisfaction and Commitment in Buyer-seller Relationships

Buyer-seller relaionships are the building blocks of industrial business. As such, the ability to establish and sustain long-term relaionships is essential to success. Identifying those factors which determine satisfaction in and commitment to a relationship is the initial step to understanding how to create long-term buyer-seller relationships. Satisfaction within a relationship is essential for a partner to want to continue doing business with a firm in the short-term. Commitment implies a long-term perspective in which a firm signals its desire for a continuing relationship and displays an attachment to the relationship which goes beyond repeat buying behavior. Although much research has focused on determining satisfaction in product-based buyer-seller relationships, very little work has been done concerning satisfaction or commitment in service relationships. The focus of this research is on the determinants of satisfaction and commitment in the transportation industry, a service industry that links product-based buyer-seller relationships.

Transportation is a unique area for investigation, offering two interesting dimensions: first, the massive

changes due to the deregulation of the industry by the Motor Carrier Act (MCA) of 1980; second, the increased importance of transportation in buyer-seller relationships, particularly those relying on Just-in-time (JIT) and Material Requirements Planning (MRP) systems. Both dimensions have drastically changed the nature of buyer-seller dyads in transportation over the last decade.

1.2 The Impact of Deregulation

Since deregulation greatly decreased the economic regulation of all transportation modes, there has evolved a new basis for dyadic relationships in the motor carrier industry. Both shippers and carriers are searching for associations that offer satisfactory relationships and possible long-term commitments. However, little research has been done to ascertain the factors that lead to satisfaction and / or commitment in service relationships in general or the transportation industry in particular.

Rarely has the business environment of an industry changed as drastically and rapidly as has that of the motor carrier industry since the passage of the MCA of 1980. Formerly, beginning in 1935, the Interstate Commerce Commission (ICC) regulated rates, entry, and mergers in the industry. This regulated environment protected carriers from competition by setting rates to ensure that carriers with 'average' levels of efficiency made adequate profits.

However, the MCA completely changed the rules by allowing carriers significantly greater freedom to enter new markets, blurring the distinctions between contract, common and private carrier segments, and sanctioning the existence of owner-operators. Many firms evolved into multi-modal companies, positioning themselves as 'full-service transportation companies' whose range of transportation alternatives offer multiple solutions to shippers with diverse products and / or needs.

Additionally, the MCA encouraged significant rate competition. Carriers had to design market and pricing strategies that resulted in profitable operations while battling the economic downturn in the early 1980s. This downturn put increasing pressures on the carriers to maintain strong partnerships to ensure a more consistent demand for service, to enable balanced market lane flows, and to improve profitability.

Regardless of whether the primary concern was sending or receiving the freight, shippers also faced new pressures in the post-MCA era. The economic downturn of the early 1980s heightened the realization of weaknesses in the U.S. economy, particularly in the manufacturing segment. Faced with increasing foreign competition, firms tried to curtail costs while improving service offerings in order to remain competitive.

1.3 Buyer-seller Relationships

As an integral component of serving customers, logistics was a natural for corporate strategic analysis leading to a need for stronger buyer-seller relationships. The oil crises of the 1970's had already focused attention on the traffic department as a cost center deserving close scrutiny. The implementation of JIT and MRP systems was seen as imperative by many firms, in order to minimize logistics costs while increasing the efficiency of finished goods and materials handling.

Therefore, when many shippers began to develop working partnerships with carriers to lessen the risk associated with JIT and MRP as well as to increase service levels, many carriers offered willing partners. In fact, many shippers decreased the number of carriers they used and generally bought the majority of needed service from their top two or three carriers (LaLonde and Cooper 1989; Wisner 1989). This 'core carrier concept' meshed well with the need to develop closer buyer-seller relationships in distribution channels in order to successfully implement JIT and MRP systems.

In sharp contrast to pre-MCA arrangements, then, both shippers and carriers attach far more importance to buyer-seller relationships in the post-MCA environment (Stock 1989; LaLonde and Cooper 1989). The lack of research on satisfaction and commitment in buyer-seller relationships

in service industries, particularly transportation, suggests a fertile area for research. Although the perceptions of both the buyer and seller are important, the proposed research focuses on understanding the determinants of satisfaction and commitment from the buyer's (shipper's) perspective.

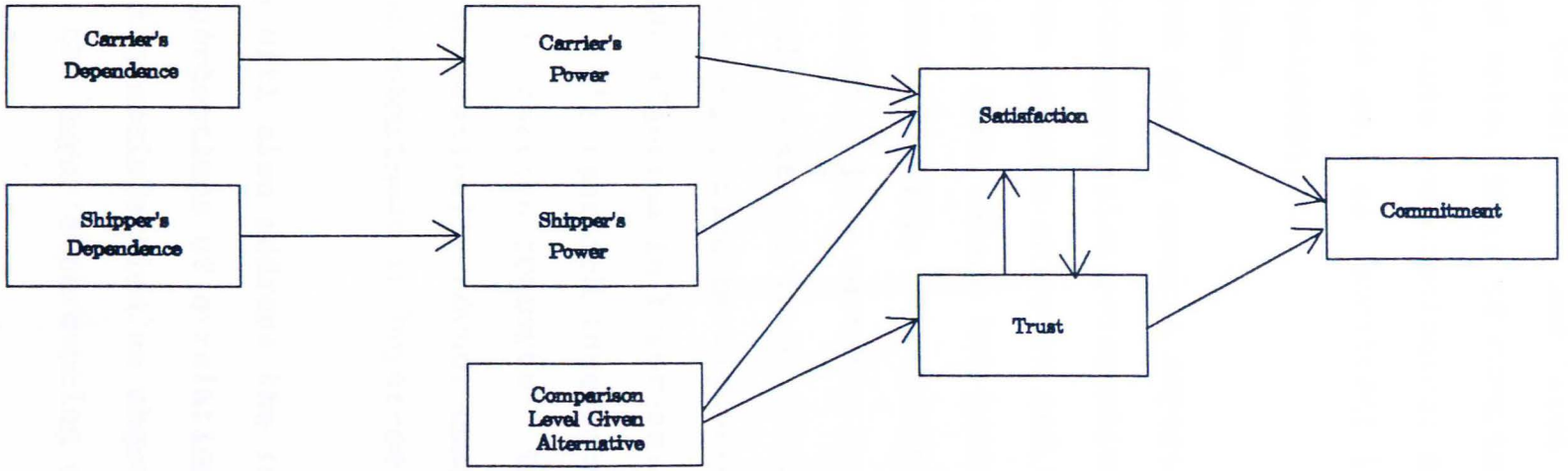
1.4 Focus of Research

The research problem consists of better understanding the determinants of satisfaction and commitment in shipper-carrier relationships. The network of constructs influencing commitment is complex, incorporating both short- and long-term constructs inherent in developing and maintaining on-going relationships. Although commitment is sought by those carriers interested in pursuing a long-term relationship, the shipper's satisfaction with the more immediate time frame of the relationship is important to every carrier. In identifying those constructs significant in determining commitment and satisfaction, much can be learned for carriers' managerial strategies.

The objectives of the research center on the proposed model and the hypothesized causal pathways (Figure 1.1). Specifically, dependence is an exogenous construct which is expected to indirectly affect satisfaction through the constructs of shipper's power and of carrier's power. Comparison levels with respect to the best alternative

Figure 1.1

COMMITMENT IN SHIPPER - CARRIER RELATIONSHIPS:
A SHIPPER'S PERSPECTIVE
(CONCEPTUAL FRAMEWORK)



carrier is hypothesized to directly influence both satisfaction and trust. Satisfaction and trust are proposed to be the direct antecedents of commitment. This model offers new insights into the nomological network determining satisfaction as well as commitment in business-to-business relationships.

1.5 Research Contributions

The proposed research offers several important contributions. From a transportation perspective, the buyer-seller relationships between shippers and carriers changed dramatically in the last decade but have not been investigated in a systematic fashion. The proposed model is broad in scope and specified in a testable form; the relative importance of each construct in determining satisfaction and commitment will also be discussed.

Although modeling satisfaction in buyer-seller relationships is not new, this research integrates a channels approach with satisfaction concepts. The proposed model offers a theoretically sound, comprehensive model of satisfaction and commitment in buyer-seller relationships.

Finally, this study will also address the issue of short- versus long-term perceptions of a relationship. By explicitly operationalizing satisfaction as short-term and commitment as long-term, the buyer's perception of the

difference in the factors which influence short-and long-term success in a relationship will offer important managerial implications.

1.6 Organization of the Dissertation

The reasons for studying satisfaction and commitment in shipper-carrier relationships have been established. Given the objectives of the dissertation, the literature review in Chapter 2 offers theory and previous research on which to build a shipper-carrier model of commitment. Chapter 3 presents the proposed model and the individual hypotheses which will be tested. The data collection and research methodology are discussed in Chapter 4 while the results are summarized in Chapter 5. In conclusion, Chapter 6 discusses the implication for theory and management practices as well as future avenues for research.

CHAPTER TWO LITERATURE REVIEW

Much of the research in the transportation literature deals with descriptive studies focusing on the presence or absence of changes since the deregulation of the transportation industry. In general, the voluminous literature concerning buyer-seller relationships has not been integrated into research concerning services. Each of the proposed constructs was chosen because of its logical contribution to the model and previous research findings.

2.1 Transportation

A significant line of inquiry in the transportation literature regarding the shipper-carrier relationship and its changing nature as a consequence of deregulation has focused on assessing differences in shippers' selection process and selection criteria during the transition to deregulation.

Some transportation literature has focused on how shippers evaluate carriers once they have selected them. Initial work in this area indicated that shippers have been quite unsophisticated in their evaluation techniques. A study by Bruning and Lynagh (1984) revealed that quantitative evaluations of carriers were used by only 25% of the manufacturing firms. The authors found the most commonly cited reason for not using quantitative methods

was "that members of the distribution department were not convinced that objective techniques were useful (p. 36). Chow and Poist (1984) also found that few firms formally recorded measurement of service performance; the criteria measured most often generally dealt with rates, claims or transit time. More recent research (LaLonde and Cooper 1989) suggests that more formal assessment is being used.

Another attempt at analyzing shippers' efforts to evaluate carriers focused on differences in shippers' perceptions of carriers rated as effective versus their perceptions of those labeled ineffective. Rhea and Shrock (1987) performed a discriminant analysis of effective / ineffective carriers as perceived by shippers in the food industry. Their findings showed that initiative in problem solving by carriers and timeliness of information were the most important factors in discriminating between effective and ineffective carriers. The finding that information-flow variables, particularly initiative and timeliness of problem solving, are better at discriminating effectiveness of carriers supports their basic tenet that some shippers are concerned with obtaining more from their carriers than the basics of product-flow performance.

Research has shown slight differences among various studies regarding selection criteria since deregulation (Table 2.1). Recent studies (Bardi, Bagchi and Ragunathan

1989; LaLonde and Cooper 1989) have found that consistency of service and transit time are constantly among the most important criteria used by shippers to select carriers in the deregulated environment. Earlier pre-deregulation studies had found the same two factors as the most important ones as well (Evans and Southard 1974).

TABLE 2.1

IMPORTANCE RANKING OF
SELECTION CRITERIA TO SHIPPERS

STUDY	TRANSIT TIME CONSISTENCY	DELIVERY CONSISTENCY	PICKUP CONSISTENCY	RATES	DEPENDABLE SERVICE
G. BAKER	2 OF 16		1 OF 16		
EVANS & SOUTHARD	1 OF 28				2 OF 28
CHOW & POIST	1 OF 22			2 OF 22	
LALONDE & COOPER	3 OF 22	1 OF 22	2 OF 22		
BARDI et. al.	1 OF 18				2 OF 18

Additionally, door-to-door transportation rates are considered important in carrier selection in the post-deregulation years (Bardi et. al., 1989; Chow and Poist 1984), although others have offered a different perspective. G. Baker (1984) states that "the most important implication of the study is that carriers should place less emphasis on pricing as a competitive weapon and focus on service differentiation (p. 28)." While these lines of research are informative and recognize changes in shipper-carrier relationships as a result of deregulation

and new technologies, they fall short of providing the type of comprehensive modeling contemplated in this project.

Recent work by Marcus (1987) and Crum and Allen (1990) (with an empirical test of Marcus' typologies) constitute a significant advancement in the transportation research. Marcus attempted to identify distinctive strategies that shippers were developing to deal with carriers in the deregulated environment. He categorized their strategies as market dominance and credible commitments. According to Crum and Allen:

> the market dominance approach attempts to attain shipper control or power over the carriers by using carriers who are especially competitive with each other and dividing purchases among them. Under this approach, shippers attempt to remain flexible by retaining the capacity to switch carriers when necessary and not to become locked into long-term relationships with a few select carriers (p. 19)

Even so, the shipper's satisfaction with the relationship would be necessary in order for the carrier to remain a viable choice for that shipper. In contrast, the credible commitments approach "entails close, long-term personal ties between the shipper and a few select carriers" (p. 19).

This view of the shipper-carrier relationship is, indeed, a significant advancement in the transportation literature. It recognizes that shippers have choices in

the type of relationships they want to have with carriers and that there are fundamentally different approaches that shippers can take. However, shipper satisfaction in a given relationship is affected by the external environment and interfirm behavior as well as carrier performance on selected criteria. The increased importance of understanding satisfaction is essential for day-to-day business; the need to analyze commitment is directly related to the implementation of JIT and MRP programs and the resulting use of fewer carriers per shipper.

2.2 Satisfaction and Commitment in Buyer-Seller Relationships

An underlying premise of the research dealing with buyers and sellers is that the relationship between the parties is dependent upon each party's level of satisfaction. Research on the buyer-seller relationship has focused on developing a better understanding of satisfaction as well as building a model of the concepts that lead to more or less satisfaction in a relationship. Implied in the model is the notion that many of the concepts are interrelated and their impact on satisfaction is indirect through other variables.

In addition, a longer-term view of the buyer-seller relationship can be found in a firm's commitment to a given dyad. According to Dwyer, Schurr and Oh (1987), commitment "represents the highest stage of relational

bonding" and is essential for long-term working partnerships. This suggests a firm's desire to create an ongoing relationship that offers future stability and continuing satisfaction.

Of extreme importance to the proposed research is the difference in time horizons between satisfaction and commitment. Satisfaction refers to a firm's affective response to the present, short-term scenario of the buyer-seller relationship. Commitment is a long-term "bonding" of a firm to a business relationship. Commitment is not necessary for a firm's satisfaction. Satisfaction is essential but not sufficient for a firm's commitment to a relationship.

2.3 Commitment

Commitment is a firm's "implicit or explicit pledge of relational continuity between exchange partners" (Dwyer, Schurr and Oh 1987). It signals a firm's on-going desire to do business with another firm and suggests a psychological as well as behavioral dimension to the continuing exchange of business (Jarvis and Wilcox 1977). This suggests a firm believes future overall outcomes will be positive and much can be gained from continuing the buyer-seller relationship (Hardwick and Ford 1986). Specifically, commitment is often seen as risk-reducing in the dynamic environment of business and allows the avoidance of switching costs (Jackson 1985).

Scanzoni (1979) suggests commitment consists of three measurable criteria: inputs, durability and consistency. Inputs mirror the investments (whether economic, communicative, or emotional) a firm gives to the relationship. Durability reflects a stability of exchange over time and suggests a firm's willingness to adjust the structure of the relationship to ensure future benefits. Consistency refers to a firm's level of inputs over time; "a key distinction of the commitment phase is that the parties purposely engage resources to maintain the relationship" (Dwyer, Schurr, and Oh 1987, p. 19). By gaining a buyer's commitment to the dyad, a seller gains stability in sales and a focus for maintenance of present accounts.

2.4 Satisfaction

Although there are many different aspects of buyer-seller relationships, "satisfaction as the key to long-run channel viability" (Dwyer 1980, p. 46) has recently received considerable attention. The continuation of channel relationships remains important as this inherently minimizes switching costs incurred by changing partners as well as decreasing exposure to risk associated with such changes (Jackson 1985). Because satisfaction or the lack thereof affects both purchase intentions and post-purchase attitude (Oliver 1980), it is essential to understand what

determines satisfaction and how this can affect the buyer-seller relationship.

The level of satisfaction a partner experiences in the relationship will influence his behavior within the dyad; a partner will display a greater attraction for the relationship as his degree of satisfaction within the dyad increases (Blau 1964). As driving forces in the long-term viability of channel relationships, own and partner satisfaction are essential as two mutually satisfied partners will behave toward the relationship in a manner conducive to continuing the partnership. When one partner is more satisfied within the dyad than the other, however, the satisfied party will be more willing than his partner to undertake actions to remain in the relationship. Continued dissatisfaction within a relationship will erode the relationship until the dissatisfied partner chooses to leave the dyad (Frazier 1983a).

For these reasons, it is extremely important for firms to understand what factors determine satisfaction in a buyer-seller relationship in order to build and maintain partnerships. Recent marketing research has focused on the importance of establishing the determinants of satisfaction in buyer-seller relationships in both conceptual and analytical pieces (Robicheaux and El-Ansary 1976; Dwyer, Schurr, and Oh 1987; Anderson and Narus 1984, 1990). These works support the importance of satisfaction

in establishing and maintaining long-term relationships as well as discuss multiple factors which may affect satisfaction. This multidimensional view of satisfaction (Westbrook 1981; Cadotte, Woodruff and Jenkins 1987) is considered to reflect the sum of satisfactions and dissatisfactions of the entire phenomenon under consideration. The complexity of these factors require a modeling approach to completely account for the direct and indirect influence the factors will have upon satisfaction. Successfully modeling these determinants will be a blueprint for designing strategies focused on heightening partner satisfaction.

In determining those aspects most likely to affect satisfaction and, therefore, commitment in a buyer-seller dyad, a large body of literature details various aspects of the relationship. In the proposed research, the literature review focused on variables previously used in conjunction with satisfaction and conceptually congruent with the research objective of a broad, generalizable model. Specifically, the model (Figure 1.1) proposes that satisfaction is determined by:

1) comparison level given alternative
2) trust
3) shipper's power
4) carrier's power
5) shipper's dependence
6) carrier's dependence

It is important to note in the following discussion that each construct indirectly affects commitment to the on-going buyer-seller relationship.

2.5 Comparison Level Given an Alternative

Any discussion of satisfaction should include a comparison of performance evaluation to a specified standard. This is necessary in order for a firm to objectively analyze each relationship in which it is involved to determine if the relationship adequately serves the firm's needs. Social Exchange Theory (Thibaut and Kelley 1959) suggests using a comparison of alternatives as one method of evaluating the adequacy of the relationship.

Specifically, comparing the performance of the partner firm to the performance of the best alternative firm will be labeled comparison level given an alternative. This construct will be a direct subtractive comparison between a given firm's performance vis a vis the best alternative firm's performance on a variety of criteria. In this manner, a higher value for the construct would mean the partner firm is perceived as better than the alternative firm on that criterion. The scores will therefore "depend mainly on the quality of the best of the member's available alternatives, that is, the reward-cost positions experienced or believed to exist in the most satisfactory of the other available

relationships" (Thibaut and Kelley 1959 p. 22). By directly comparing competing firms, the shipper's satisfaction with a firm will be affected by the outcome of the comparison; the better a firm performs in contrast to the alternative partners, the more satisfied a shipper will be. The comparison will be specified as a named carrier and the shipper's best alternative partner.

After considering several alternatives, the subtractive approach was chosen as the best match with the theoretical approach of the model and the research findings in the transportation and channels literature. LaTour and Peat (1979) modified the concepts of Social Exchange Theory to focus on the use of objective attributes. This approach is supported in several marketing research pieces (Anderson and Narus 1984, 1990; Frazier, Spekman, and O'Neal 1988; Dwyer, Schurr, and Oh 1987) while descriptive research in transportation (see Table 1.1) focuses on determining the relative importance of the attributes.

2.6 Trust

One of the major weaknesses of social exchange theory is its failure to explicitly recognize the influence of the macro-environment on each partner. It also fails to consider the interpersonal, subjective analysis of trust (or other interpersonal relational factors) as a driving component of satisfaction.

Trust is the cornerstone of the subjective aspect of interpersonal and interfirm relationships. Trust is "the belief that a party's word or promise is reliable and a party will fulfill his/her obligations in an exchange relationship" (Schurr and Ozanne 1985, p. 940). The implication of this concept is that a partner will forego opportunism in the short-term in order to increase the probability of a commitment to a long-term relationship. A firm will not continue to do business with a partner who does not attempt to meet the implicit as well as explicit obligations in a relationship.

The importance of trust to business lies in its ability to greatly facilitate the exchange process, since "a fundamental premise is that risk is the factor that creates a need for trust as a precondition for exchange" (Swan, Trawick, Rink and Roberts 1988, p. 2). The ability of trust to lessen perceived risk allows firms to continue doing business without constantly checking to see that the partner is fulfilling his obligations. Another interesting aspect is the reciprocity of trust: "a seller and buyer must trust each other in order for effective exchange to occur. Usually, however, the burden of trust is placed on the salesperson" (Hawes, Mast and Swan 1989, p. 1). This supports the claim that both buyers and sellers consider trust important in creating satisfaction. It also contains the element of differential relative

importance; the seller has the greater responsibility to inspire trust in the relationship.

Although mentioned in many conceptual pieces (Dwyer, Schurr and Oh 1987; Pfeffer and Salancik 1978; Frazier, Spekman and O'Neal 1988), quantitative analysis of trust in industrial marketing has only recently been approached. This is partially due to difficulty in measuring the construct, though the 1980's saw the emergence of trust as an important factor in buyer-seller relationships in the marketing literature. One study found that a low level of trust negatively affects perceptions of the partner firm (Schurr and Ozanne 1985). This contamination of perception would decrease the long-run viability of the relationship. Robicheaux and El Ansary (1975) hypothesized that a satisfied firm would be expected to maintain or increase its own performance in order to retain the relationship with the partner. Instilling trust in the shipper is important in influencing satisfaction and commitment in relationships. Prus (1987) suggests trust is an essential component in developing buyer commitment to a salesperson. Research on the salesperson's development of customer trust suggests that direct experience is the primary criterion for developing trust (Swan and Nolan 1985).

It is intuitively clear that comparison level given alternatives is expected to influence the level of trust.

An evaluation of a firm's past performance influences the belief that a firm is not trying to hinder the evaluator firm's performance. Trust has been found to develop over time which has resulted in the description of "building trust" to establish a long-term relationship (Swan, Trawick and Silva 1985).

It is also intuitively clear, although no studies were found to support this, that trust would influence satisfaction. As a firm develops a feeling of trust in a partner, the firm should also have a higher sense of satisfaction. Therefore, trust and satisfaction are expected to be highly correlated.

2.7 Power

The concept of power is also necessary when discussing satisfaction in relationships. A firm's power is:

> its ability to control the decision variables in the marketing strategy of another member in a given channel at a different level of distribution. For this control to qualify as power, it should be different from the influenced member's original level of control over his own marketing strategy (El-Ansary and Stern 1972, p. 47).

Because it will be able to gain more favorable terms, a firm with the ability to influence a partner's decisions will be happier in this relationship than if it did not have this influence (Hunt and Nevin 1974). The more influence a firm has, the higher its level of

satisfaction. Conversely, the more power a partner has, the less satisfied a firm will be (Lusch 1977; Brown and Frazier 1978).

Basic to a discussion of power is the nature of the power source. Although power can be categorized in many ways (e.g. French and Raven's (1959) five sources of power; exercised vs. nonexercised; coercive vs. noncoercive; etc.), the operational situation of the sample suggests the use of reward (noncoercive power). Reward power will be defined as the ability to improve the value of the firm's position relative to a standard of expectations (Gaski 1984). Support for reward as significantly positive in its effect on satisfaction can be found (Hunt and Nevin 1974; Gaski and Nevin 1985).

Critical to this interpretation of power is measuring a firm's perception of power. Each firm's view of its own as well as its partner's power is widely supported as being more relevant in determining the level of satisfaction than a measure of absolute power (El-Ansary and Stern 1972; Frazier 1983b; Cadotte and Stern 1979; Frazier and Summers 1984).

2.8 Dependence

In his seminal work on power and dependence, Emerson (1962) claimed power was a function of dependence. This relationship is fundamental to buyer-seller associations. Since firms are not completely self-sufficient in that

they must have suppliers (in all but rare cases) and consumers of its good or service, interdependence is created. It has been argued that the dependence of one organization on another is determined by three factors:

> First, there is the importance of the resource, the extent to which the organization requires it for continued operation and survival. The second is the extent to which the interest group has discretion over the resource allocation and use. And, third, the extent to which there are few alternatives, or the extent of control over the resource by the interest group . . . (Pfeffer and Salancik 1978, p.45).

In order for one firm to have power over another, there must be an asymmetric interdependence such that an organization will tend to have greater relative power the more important it is to the partner firm's effective functioning (Pfeffer and Salancik, 1978). When one firm has several viable alternative partners while the other firm does not, the first firm will have more relative power than the other. With respect to transportation for example, a shipper that can use another mode or segment (i.e. rail vs. truck; truckload vs. less-than-truckload) will have more influence with a carrier than if there were no conceivable alternatives. The number of alternatives within the segment is equally important since the more alternative partners a firm has, the less dependent on any one carrier it will be. This explicit analysis of external market factors is the basis for Pfeffer and Salancik's Resource Dependence Theory.

The primary weakness in this approach is that it is completely driven by the control of the resources required. Although it considers trust and alternative relationships, they are considered peripheral to the body of the theory. It is incomplete in its approach to considering all the determinants of satisfaction.

As suggested by the literature review, each theory or concept by itself does not do justice to the complexities inherent in satisfaction and commitment. The proposed research suggests an alternative approach to buyer-seller relationships. The following chapter presents the overall model which was developed from the literature review as well as the individual hypotheses to be tested.

CHAPTER THREE PROPOSED MODEL AND HYPOTHESES

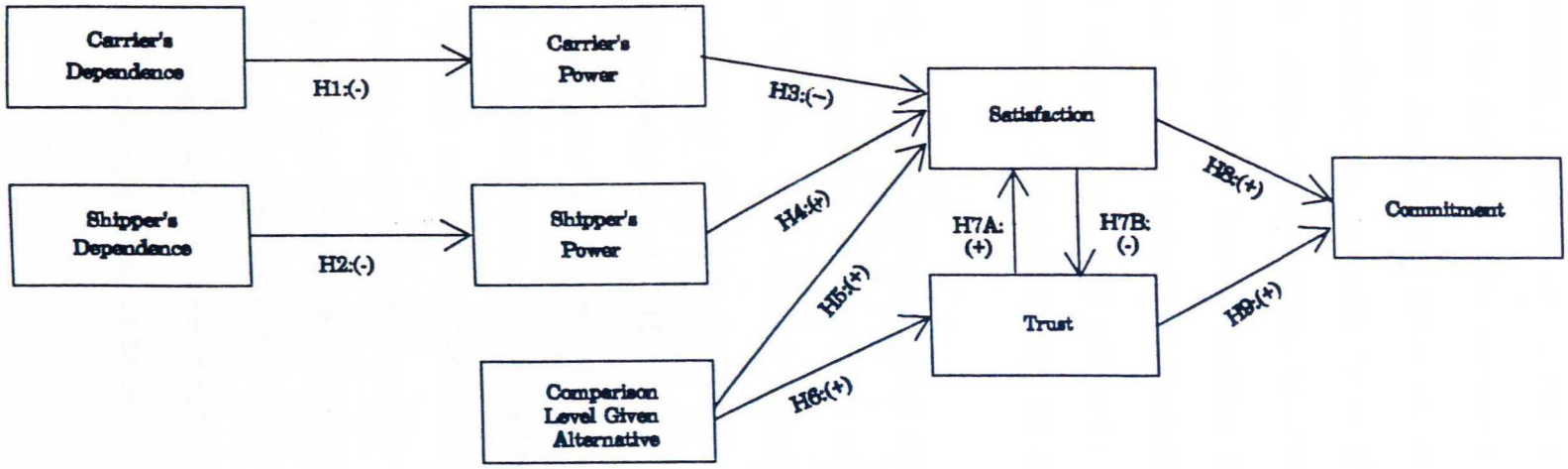
3.1 Proposed Model

The synthesis of the respective theories discussed will add to a greater understanding of satisfaction in buyer-seller relationships than one alone has yet provided. This synergistic effect springs from meshing the strengths of each theory while many of the weaknesses will be overcome by the combination. Particularly of interest is the measurement of the effect of disconfirmation on satisfaction in a model replete with constructs from channels literature. This provides a bridge to the gap between the two bodies of literature as well as the introduction of modeling these constructs in a transportation scenario. (Figure 3.1)

Although buyer's satisfaction is itself important, it does not necessarily translate into repurchase or continuation of a relationship, specifically in the event of a higher level of satisfaction or a long-term commitment with another firm. The inclusion of commitment into the model introduces a longer time horizon and the issue of true vendor loyalty (Jarvis and Wilcox 1977) into the study of buyer-seller relationships.

Figure 3.1

COMMITMENT IN SHIPPER - CARRIER RELATIONSHIPS:
A SHIPPER'S PERSPECTIVE
(HYPOTHESIZED MODEL)



3.2 Hypothesized Pathways

The proposed model focuses on three sets of constructs expected to reflect the various factors which influence satisfaction and commitment in buyer-seller relationships: satisfaction viewed from the perspective of performance with respect to expectations (comparison level given an alternative); buyer-seller relationships from the perspective of the industry environment and the nature of the dyad (dependence and power); and the interpersonal / interfirm relationship of a given dyad (trust).

The nomological network determining satisfaction and commitment takes into account the nature of a firm's dependence on other firms. All firms require other firms to do business; those that display a great need for a specific partner will wield less influence in the relationship if the partner firm recognizes this. The stronger a shipper's position in the external market, due either to shipping volume or favorable market lane imbalances, the less its dependence on the dyad will be. The less the shipper is dependent on the dyad, the greater his power within the dyad is likely to be. The less the carrier is dependent on the dyad, the greater his relative power within the dyad is likely to be.

H1: ($\lambda 11 < 0$). There should be a negative relationship between carrier dependence and carrier's power.

H2: ($\lambda 22 < 0$). There should be a negative relationship between shipper dependence and shipper's power.

The perceived power a shipper possesses directly influences the level of satisfaction. The influence of each firm within the relationship is measured by the shipper's perceptions of one firm's ability to influence the partner's behavior (El-Ansary and Stern 1972). If a shipper is importantt to a carrier, the shipper has the ability to expect more rewards. This will create a satisfied shipper who will probably be interested in continuing the relationship and possibly make a commitment to the dyad.

H3: ($ß31 < 0$). There should be a negative relationship between carrier's power and shipper's satisfaction.

H4: ($ß32 > 0$). There should be a positive relationship between shipper's power and shipper's satisfaction.

It is hypothesized that comparison level given an alternative directly affects satisfaction. As the difference between a carrier's performance and the performance of the best alternative carrier for that shipper, comparison level given an alternative measures the shipper's perception of how well a carrier serves the shipper with respect to the carrier's competition. A

shipper searches for the best possible carrier and often uses this carrier's performance as the standard by which others are assessed. (LaLonde and Cooper 1989) If comparison level given an alternative is positive, it will positively affect satisfaction and the size of the effect on satisfaction is directly related to the degree of difference between the two carriers' performances.

H5: (λ 33 > 0). There should be a positive relationship between comparison level given an alternative and satisfaction.

Comparison level given an alternative also influences a shipper's level of trust. If a carrier performs better than the best alternative, a shipper will probably conclude that the carrier is acting in a reasonably trustworthy manner. If a carrier does not measure up, however, a shipper may feel the carrier is not providing the service of which he should be capable.

H6: (λ 43 > 0). There should be a positive relationship between comparison level given an alternative and trust.

It is intuitively clear that satisfaction influences trust. Operationalized as a short-term construct, shipper's satisfaction assumes a carrier is adequately performing its duties with regard to specified performance criteria in the short-term. Therefore, satisfaction with a carrier suggests that the carrier has demonstrated the

desire or ability to forego opportunistic behavior. Over time, continued satisfaction will result in building trust, a long-term construct.

Trust allows buyers and sellers to expect a satisfactory outcome instead of constantly assuming opportunism; the belief that a firm will reliably perform according to the obligations of the relationship is essential in doing business. A shipper who hires a carrier to deliver freight on time and in good condition is basing this on the belief that the carrier will fulfill his obligations. More importantly, the shipper's belief in the carrier extends beyond simply filling the obligation to the feeling that the carrier will perform as well as possible. Without trust, he would not let his freight off of his dock.

H7a: (ß43 > 0). There should be a positive relationship between satisfaction and trust; the greater the shipper's satisfaction, the greater the shipper's trust.

H7b: (ß34 > 0). There should be a positive relationship between satisfaction and trust; the greater the shipper's trust, the greater the shipper's satisfaction.

Low levels of trust leads to unfavorable attitudes toward the partner (Schurr and Ozanne 1985); with trust, a firm can rely on the partner, which diminishes uncertainty. The existence of trust in a buyer-seller

relationship takes time to build and suggests a desire to make a commitment to the dyad (Dwyer, Schurr and Oh 1987; Krapfel's review paper 1991).

H8: (ß54 > 0). There should be a positive relationship between trust and commitment.

Satisfaction is extremely important within the framework of a shipper-carrier relationship and essential for commitment. As with any exchange in the market economy, a satisfied customer is expected to buy again from a firm and to possibly spread positive word-of-mouth information. As an essential component influencing commitment, satisfaction is necessary in the short-run in order to facilitate a shipper's desire to lengthen the relationship's time horizon into one of commitment (Dwyer 1980).

H9: (ß53 > 0). There should be a positive relationship between satisfaction and commitment.

A shipper's commitment is directly influenced by the shipper's satisfaction with the overall relationship and the level of trust in the carrier. The importance of shipper's commitment is that the shipper signals its desire to create a long-term relationship. This translates into continued sales for the carrier and a partner who is willing to make investments and adjustments in the relationship. Given a committed relationship, a

shipper may prefer to modify rather than dissolve a relationship that is not presently the best alternative because of the inherent benefits of the commitment -- specifically "the certainty of mutually anticipated roles and goals . . . and the confidence in exchange effectiveness that comes from trust" (Dwyer, Schurr, and Oh 1987). A shipper who has committed to the carrier should be easier to serve in many respects because of the communication flowing between the partners and the desire for an equitable relationship that is mutually rewarding in order to remain on-going.

The overall model proposes that commitment is directly affected by satisfaction in a relationship and the level of trust. The shipper's power and the carrier's power directly influence satisfaction. Comparison level given an alternative directly affects both satisfaction and trust, suggesting the short- and long-term effects of perceived performance.

The model is an intuitively clear representation of the determinants of satisfaction and commitment in buyer-seller relationships. In order to test the model and the hypotheses, timely and relevant data from the transportation industry had to be collected. Chapter 4 discusses the development of the questionnaire, the sampling procedure, and the analysis techniques.

CHAPTER FOUR RESEARCH METHOD

4.1 Research Design Overview

The literature review led to a theory based model which is the basis for the proposed research; this chapter discusses the process by which the measurement instrument was developed based on the proposed model with a brief discussion of the sample and the quantitative methods used to analyze the data. Initially, the latent constructs were operationalized based on the literature review and the researcher's industry experience. The questionnaire was designed to measure each construct with multiple questions. After being pretested, the questionnaire was mailed to a sample of 2335 shippers of one large LTL trucking firm. The first and second waves of responses were analyzed to determine if any non-response bias was present. In conclusion, the quantitative techniques used to arrive at the results presented in Chapter 5 are briefly discussed.

The research design was immediately dictated by two major problems which faced the proposed research: time constraints and the large number of observations needed in order to calculate as many as 121 free parameters with structural equations modeling. It was necessary to employ a mailed cross-sectional survey design in order to have over 500 observations in a matter of months. The process

by which the questionnaire was developed and mailed to an appropriate sample is detailed below.

4.2 Operationalization of the Constructs

Although shippers who use LTL service differ across operating characteristics including size, industry, geographic dispersity, and demand for service, the proposed model of satisfaction and commitment needed to be general enough to capture the broad concepts faced by these shippers. Many of the constructs have already been operationalized in the context of a buyer-seller relationship. Therefore the type of measures and the best methods to operationalized each construct (Table 4.1) were guided by previous research discussed in the literature, where possible.

Commitment will be operationalized by studying a mixture of criteria discussed earlier: inputs, durability, and signaling a desire to commit. Inputs consist of the economic and / or emotional investment a shipper makes in a relationship and is represented here by the willingness of the shipper to modify its behavior for the carrier. Durability addresses the issue of the long-term time horizon, specifically the shipper's desire to continue the relationship. Lastly, signaling the desire to commit to the relationship is measured by planning to increase the percentage of business to be given to the carrier.

TABLE 4.1

OPERATIONALIZATION OF THE CONSTRUCTS

CONSTRUCT	SUGGESTED MEASURES
COMMITMENT	EXTENT S/ HAS SIGNALED INTEREST IN DYAD DEGREE OF S/ DESIRE TO CONTINUE RELATIONSHIP WILLINGNESS OF S/ TO MODIFY BEHAVIOR FOR C/ S/ PLANS TO INCREASE BUSINESS OFFERED TO C/
SATISFACTION	S/ PERCEPTION OF PRESENT DEALINGS WITH C/ S/ WILLINGNESS TO RECOMMEND C/ TO OTHERS EXTENT S/ BELIEVES C/ IS GOOD COMPANY
TRUST	DEPENDABILITY COMPETENCY LIKABILITY HONESTY
COMPARISON	COMPARISON OF C/ PERFORMANCE WITH THE BEST ALTERNATIVE CARRIER'S PERFORMANCE ON EACH OF THE FOLLOWING (EACH CRITERIA IS A SEPARATE INDICATOR): CONSISTENCY OF TRANSIT TIME CONSISTENCY OF PICK-UP AND DELIVERY RATES CLAIMS RATIO INITIATIVE IN PROBLEM SOLVING RESPONSIVENESS TO INQUIRIES EQUIPMENT AVAILABILITY BILLING ACCURACY ANCILLARY / ACCESSORIAL CHARGES COMPUTER LINKAGE / EDI
SHIPPER'S POWER	DEGREE TO WHICH C/ WOULD CHANGE ITS BEHAVIOR TO FAVOR THE S/ IF THE S/ ASKED ON EACH OF THE 10 CRITERIA DISCUSSED IN COMPARISON LEVEL
CARRIER'S POWER	DEGREE TO WHICH S/ WOULD CHANGE ITS BEHAVIOR TO FAVOR THE C/ IF THE C/ ASKED ON EACH OF THE 10 CRITERIA DISCUSSED IN COMPARISON LEVEL
SHIPPER'S DEPENDENCE	IMPORTANCE OF C/ TO S/ IN % OF SHIPPING COSTS S/ EASE IN DISCONTINUING SERVICE S/ PERCEPTION OF OWN DEPENDENCE
CARRIER'S DEPENDENCE	IMPORTANCE OF S/ TO C/ IN % OF REVENUES SIZE OF S/ ACCOUNT RELATIVE TO OTHERS S/ PERCEPTION OF C/ DEPENDENCE

Satisfaction will be measured by several items designed to capture the shipper's present perception of the carrier overall. The shipper's belief in the general quality of the carrier and a willingness to recommend the carrier to others were two indicators of satisfaction in the relationship.

Trust has rarely been operationalized although it is often discussed in conceptual pieces (Macneil 1980; Dwyer, Schurr and Oh 1987). The basis for trust in interpersonal exchanges is comprised of subjective characteristics which reduce the fear of opportunism in a relationship. Recent research found the following characteristics had construct validity for the concept of trust: dependable, competent, honest, and likable (Swan et. al. 1988). Each factor of trust was measured by three separate questions in order to more completely grasp the nuances of the distinct underlying factors.

A series of performance-based criteria (Table 4.1) were used to help measure comparison level. Comparison level given an alternative has 10 indicators which will be calculated by subtracting the best alternative carrier's score on each criterion from the score of the carrier which allowed the researchers access to its mailing list. The alternative carrier to assess was described as the best possible alternative carrier and was to be

determined, but not identified, by the questionnaire respondent.

Both shipper's and carrier's power were measured with respect to the same 10 criteria used for comparison level. The phrasing of the questions was dependent on whether the shipper or the carrier was asked to modify its behavior by its partner; shipper's power required the shipper to modify its demands / behavior because of the carrier's request and vice versa.

Shipper's dependence and carrier's dependence were measured by shipper's perception of the dependence of each within the dyad. Also of interest in determining dependence was the importance of the partner with respect to total LTL freight charges (shipper's dependence) or with respect to total revenues (carrier's dependence)

4.3 Questionnaire

Having determined how to operationalize the constructs, the construction of the measurement instrument was next. The design of the questionnaire followed guidelines from a marketing research textbook (Churchill 1987). A five-point Likert scale was used to measure all the indicators for the latent constructs. The questions focused on the nature of that specific relationship, not shipper-carrier relationships in general. The questionnaire contained questions not intended for analysis in this research but were included for future

research purposes. The questions operationalizing the constructs, although not sensitive in and of themselves, were expected to cause some hesitation from respondents. The cover letter of the questionnaire promised individual anonymity in discussing the findings in any form to anyone (Appendix I).

4.4 Pretest of the Questionnaire

The questionnaire was pretested with a convenience sample of 6 shippers of the specific LTL carrier. The market research department of the LTL carrier also offered suggestions after perusing the questionnaire used in the pretest.

The local terminal (Hyattsville, MD) provided a convenience sample of six customers who were willing to participate in the pretest. Although a convenience sample, the shippers ranged in size of shipping budget from approximately $25,000 to over $1,000,000 a year. Several different industries (retail, light manufacturing, transportation equipment, and printing) were included as well as various employee perspectives which is representative of the fact that shipper-carrier relations are handled by people ranging from shipping clerks to CEOs in various company structures.

The pretest process consisted of mailing the questionnaire to each shipper followed by a telephone conversation thanking the respondents and asking for

constructive criticism. There were no significant differences in the comments made by the respondents. Several suggestions were made concerning the clarity of a few questions and two criteria used in measuring comparison level, shipper's power, and carrier's power were added based on pretest suggestions. Two respondents questioned whether most shippers would be able to answer the questions on carrier's dependence with any reasonable amount of knowledge. Every respondent scored the relationship higher than would be expected by the average customer but the sample consisted of shippers that the LTL carrier sales representative had chosen and asked to participate.

The market research department for the LTL carrier also offered some suggestions. The pretest questionnaire only used seven criteria for the comparison level, shipper's power, and carrier's power; two additional criteria were suggested, one of which was also mentioned by the pretest respondents. Other suggestions related to questions not analyzed in this research.

The questionnaire was only slightly modified by these suggestions and a second pretest was not deemed necessary. The final version of the questionnaire is in Appendix I and those questions used in this research have an asterisk (*) placed in front of the question number.

4.5 Sample

The sampling frame for this research consisted of the shippers which had conducted business with the LTL carrier in the first six months of 1991. Restricting the sampling frame to more frequent usage would ignore those small shippers and shippers which used this LTL carrier very rarely; shippers which had used this LTL carrier before but not in the last six months were considered less likely to be able to provide relevant information.

Because of the sensitivity of customer information bases, the sampling procedure was conducted by the market research department of the LTL carrier. Sample stratification was based on three criteria: business level, industry, and account size by revenue. The overwhelming majority of this carrier's business comes from 21 two digit SIC categories. Eight of these 21 categories were labeled "key industries" which accounted for 35,250. The remaining 13 categories accounted for 11,375 shippers and were labeled "others". This distinction composed the first level of stratification. The percentage of revenue generated by each category (given the sum generated by these 21 industries) was used as the second level of sample stratification. The third level of stratification was determined by a shipper's account size by revenue.

The basic proportional sample formula was used with the following parameter values: a confidence level of 85%; an error rate of 50%; and a precision of 10%. The sample size was determined in a slightly different way when discussing the "key industries" as opposed to the "others". The sample size for "key industries" was calculated based on each "key industry" using the basic sample formula and then multiplied by a factor of four to include three more observation possibilities to every one statistically required. The sample size for the "others" was calculated with the same formula but using the total sampling frame of the "others" as opposed to an industry-by-industry calculation. The total sample size for the "others" was then prorated among those industries comprising the "others" and each was multiplied by a factor of four as explained above. The third level of stratification using account size by revenue was then used to prorate the sample selection given each industry's account size distribution. Finally, a sample of 2335 shippers was selected randomly given the stratification scheme.

The response rate (Table 4.2) was 22.4%, in spite of the length of the questionniare (100 questions) and the timing of the mailing (Thanksgiving and Christmas holidays).

TABLE 4.2
Response Rates

Total number of questionnaires mailed:	2335
Bad addresses or returns:	119
Returned questionnaires:	553
Usable questionnaires:	523
Response rate:	22.4%

4.6 Non-response Bias

Of the 2335 questionnaires mailed, 553 were returned. Upon further evaluation, it became obvious that the 12 questions concerning trust were sometimes not answered at all or only a fraction of them were answered. Because of this, it was decided that only those questionnaires which had answered at least 10 of the 12 questions concerning trust would be used for further analysis. This constraint left 523 usable questionnaires. The demographics of the respondents show a variety of industries and firm sizes (Appendix II).

Of these, 392 questionnaires were from the first mailing which took place in mid-November of 1991. The remaining 131 questionnaires were received from the second mailing in January of 1992. Analysis of variance (ANOVA) was used to test for wave response differences. The scores for each construct were summed and tested between the two groups. No statistically significant differences were found which suggests the absence of non-response bias.

4.7 Further Data Considerations

It was not unusual to have an occasional unanswered question. The mean value of each question was determined using only those questions which had been answered by the respondents. Any missing value was replaced by the mean value of a specific question. The questions referring to Electronic Data Interchange (EDI) were unanswered so frequently (> 25%) that this issue was dropped from further analysis.

Comparison level was calculated as the value assigned to Roadway's performance on various criteria minus the value given to the best alternative carrier's performance on the same criteria. The mean values replaced the missing values before the comparison level was calculated.

4.8 Research Methods

Preliminary data analysis used reliability analysis and factor analysis to initially screen the data. Reliability analysis determines how consistently a set of indicators measures a given construct. Factor analysis determines the number of distinct underlying dimensions for a given set of questions. This is very important in determining construct validity.

Structural equation modeling is a statistical analysis of a series of dependence relationships. These dependence relationships are often interrelated in a complex path analysis. The need to consider these

relationships simultaneously while measuring validity and reliability of the latent constructs has led to more sophisticated approaches. The best known of these is the Joreskog and Sorbom LISREL model, which enables the researcher to use both a confirmatory measurement approach along with the analysis of the proposed structural model. The measurement model specifies the indicators' relationships to the latent constructs while the structural model stipulates the causal interrelationships of the constructs. Joreskog and Sorbom's model was incorporated into a widely used structural equation modeling software package. LISREL 7 was the software package version used in the following analysis of the proposed model.

CHAPTER FIVE RESULTS

The discussion in this chapter focuses on the quantitative analysis of the data with respect to the model and the hypotheses. Preliminary tests, specifically reliability and factor analysis, were performed in order to assess the latent constructs and to discover indicators which needed to be eliminated in order to strengthen the research. Once the number of parameters to be estimated was decreased, LISREL was used to assess the model. Confirmatory factor analysis offered a more stringent view of the indicators with respect to the latent constructs. Once the structural model was identified, the model fit was analyzed on the basis of three broad areas: preliminary fit criteria, overall model fit, and fit of internal structure of the model. In conclusion, the results of the hypotheses tests are discussed individually.

5.1 Preliminary Tests

A total of 59 indicators measuring 8 separate constructs in a structural equation model presents even a sophisticated software program with a sizable problem. Before LISREL was used to analyze the data, preliminary reliability and factor analysis tests were run on each of the eight latent constructs in order to determine if any indicators should be dropped from further analysis.

Reliability does not measure validity or the presence of multiple factors, but analyzes the consistency among the indicators' measurements of a latent construct. Reliability tests analyze how closely a set of indicators correlate in their measurement of a construct; high Cronbach alpha values evaluate how closely the indicators are measuring the same construct. Using Nunnally's (1978) guideline, a reliability score with an alpha greater than .70 was considered acceptable.

Each latent construct was tested for reliability before any further analysis. The alpha results for each construct were greater than .70 (Table 5.1) showing highly intercorrelated indicators and reliable scale measurement.

TABLE 5.1 RELIABILITY RESULTS

CONSTRUCT	NUMBER OF ITEMS	ALPHA
Commitment	6	0.8207
Trust	12	0.9341
Satisfaction	5	0.9553
Shipper's power	9	0.8868
Carrier's power	9	0.8406
Shipper's dependence	4	0.7657
Carrier's dependence	5	0.8464
Comparison level	9	0.8923

Factor analysis examines the interrelationships among the indicators of a construct in order to determine if the construct is unidimensional, which is essential for construct validity, or whether there exists more than one underlying dimension or factor. The number of factors for

a given construct is determined by the amount of variance explained (eigenvalue) by a given factor when a subsequent factor does not explain a large amount of the remaining variance. Convention generally dictates keeping factors with eigenvalues greater than 1.0 (Hair, Anderson, Tatham and Black 1992). The indicators' factor loadings on each factor for a construct are very important because it suggests how strongly an indicator correlates with the factor in question. The criteria used in this research was a loading value greater than .50, which Hair, et. al. (1992) consider "quite rigorous and acceptable" (p. 239).

In analyzing several indicators of a construct, it was expected that seven of the constructs would extract only one factor: commitment, satisfaction, comparison level given an alternative, shipper's power, carrier's power, shipper's dependence, and carrier's dependence. The eighth construct, trust, was expected to factor into four dimensions based on the literature reviewed in chapter two. Factor analysis using a varimax rotation was used as an empirical test to determine the number of underlying dimensions for each construct.

Five of the eight constructs had only one factor extracted: commitment, satisfaction, comparison level given an alternative, shipper's power and carrier's dependence. Commitment showed two questions that did not load at an acceptable level although the other four

questions did; these four questions were retained for further analysis. Shipper's power and comparison level given an alternative had similar problems with two of nine questions. Those questions retained for further analysis are listed and discussed later in Table 5.4. Satisfaction and carrier's dependence showed no weak loadings, therefore all questions were kept. The number of retained indicators for these five constructs after the factor analysis was completed are shown in the last column of Table 5.2.

TABLE 5.2
FACTOR ANALYSIS RESULTS FOR CONSTRUCTS
WITH SINGLE FACTOR EXTRACTION

CONSTRUCT	EIGENVALUE	PERCENTAGE OF VARIANCE	# OF RETAINED ITEMS
Commitment	3.2195	53.7	4
Satisfaction	4.2503	85.0	5
Shipper's power	4.7957	53.3	7
Carrier's dependence	3.1940	63.9	6
Comparison level	4.9314	54.8	7

Although trust was expected to have 4 distinct factors as suggested by previous works discussed in the literature review, only two factors were extracted. Nine of twelve questions loaded cleanly onto Factor 1 which had an eigenvalue of 7.4133, accounting for 61.8% of the variation in the construct trust. Factor 2 had three questions loading cleanly onto it with an eigenvalue of 1.050, accounting for 8.7% of the variation. Although the 12 trust questions factored into two factors, the only

distinction between the two groups is that the three questions worded in a negative manner loaded together on the second factor. An oblique rotation was considered but the results did not change measurably. Forcing a four factor solution was also unsuccessful. Because of what is considered to be a failure of the extreme phrasing of the questionnaire, the construct trust was comprised of the remaining nine variables which all loaded onto the first factor.

Carrier's power factored into two distinct factors rather than one as expected. Six of the nine questions loaded cleanly onto the first factor which had an eigenvalue of 4.0764, accounting for 45.3% of the variation in the construct. The second factor consisted of two questions loading onto it with an eigenvalue of 1.0150. Further analysis with LISREL using eight of the nine questions for carrier's power led to unacceptable variance extracted factor and composite reliability score. Considering these problems and the truly marginal nature of the second factor, the rest of the analysis used only six questions for carrier's power. The remaining indicators still retained theoretical support for adequately representing carrier's power.

Shipper's dependence also factored into two factors rather than one. Two questions loaded onto the first factor which accounted for 60% with an eigenvalue of

2.3995. The second factor consisted of the remaining two questions and had an eigenvalue of 1.0118 with the percentage of variance of 25.3. Each of the factors extracted by this analysis consisted of only two questions and emphasized a possible problem in the measurement of shipper's dependence. The possibility of an ambiguous measurement left doubt as to what was actually measured vis a vis what the research proposed to measure. Therefore, a review of the construct shipper's dependence was considered.

5.2 Exclusion of Shipper's Dependence and Carrier's Dependence

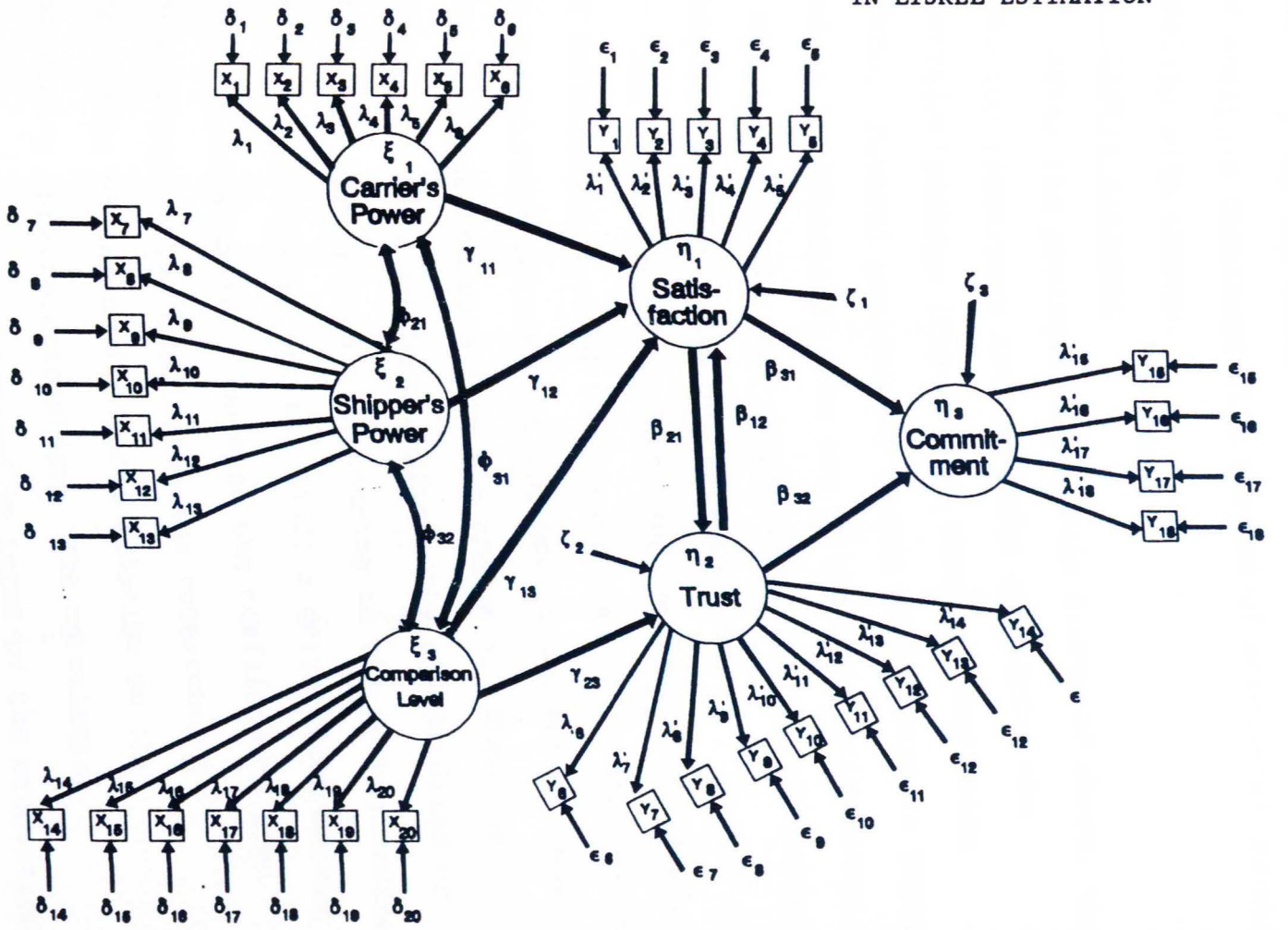
Since the results did not clearly suggest the construct shipper's dependence had been measured, further consideration of the measurement items was necessary. It is unclear whether the questions actually measure the construct. The questionnaire pretest results had suggested that shippers might not have enough data or knowledge to make a relevant judgement on issues of dependence. Because this research does not have strong theoretical defense for the validity of this construct, shipper's dependence was dropped from further analysis.

Since shipper's dependence was dropped from the model, the complementary construct carrier's dependence was reevaluated from a theoretical viewpoint. Since the shipper's perception of his / her own dependence was not

considered valid, it is questionable whether the shipper's assessment of the carrier's dependence would be considered to be a strong construct in this research. Inclusion and discussion of carrier's dependence on the relationship as perceived by the shipper was considered to be of little meaning. Carrier's dependence was also dropped from further consideration in the model. The decision to drop these constructs was based on the belief that the theoretical underpinnings for this constructs may have been violated. Therefore further analysis of the model with these constructs included would greatly weaken any of the research findings.

Although these two exogenous variables were dropped, the smaller model (Figure 5.1) still retains theoretical support for all the interrelationships that were kept. It is not unusual for a respecification of constructs or of hypothesized pathways to take place during the analysis phase but any modifications should be based on theory (Hair et. al. 1992). There are many different points in the analysis process where indicators, pathways, or even constructs need to be deleted or added because new quantitative evidence suggests doing so. However, it is necessary to make these modifications in view of the

FIGURE 5.1 SIX CONSTRUCT HYPOTHESIZED MODEL USED IN LISREL ESTIMATION



theory on which the research is based (Bagozzi and Yi 1988). Given the theoretically sound six construct model, the analysis continued with the use of structural equation modeling with LISREL.

5.3 LISREL Analysis

After the preliminary analysis discussed above, the remaining constructs and the model specifying the interrelationships (Figure 5.1) were analyzed using LISREL. Several preliminary issues with regard to LISREL need to be discussed: the use of the correlation matrix as the input matrix, the sample size, and the reciprocal causation between trust and satisfaction.

The objective of the proposed research is to study the relationships among the constructs. For this reason, the correlation matrix, not the covariance matrix, was used to input the data into the analysis. When the "constructs have not been sufficiently standardized or refined to give substantive meaning to the unstandardized coefficients" (Hair, et. al. 1992) a correlation matrix should be more useful. Because the coefficients are standardized, this facilitates the researcher's comparisons of the coefficients relative to the construct's interrelationships. The correlation coefficients can be discussed in terms of the proportion of explained variance. Since the correlation matrix is

used, the researcher is wary of generalizing these results to a wide range of situations.

Another important issue in analyzing the results dealt with the sample size. When using maximum likelihood estimation, a sample size of 100 to 200 will give results which have valid goodness-of-fit measures. As the sample size increases, the goodness-of-fit measures become very sensitive to differences in the data. The chi-square test becomes much more likely to reject the hypothesized model (Bagozzi and Yi 1988). The use of 523 observations definitely suggests that the goodness-of-fit measures will be conservative. For this reason, alternative measures of fit designed to account for the degrees of freedom and the number of parameters to be estimated will be given more importance than the standard absolute fit measures.

The original six construct model hypothesized a reciprocal causation between satisfaction and trust. In analyzing the structural equation model hypothesized by this research, LISREL was unable to offer an identifiable solution in the number of iterations performed by the statistical package. The LISREL output presented illogical results, including two parameters with values over 400. In order to have a logically identified solution, one of the pathways had to be deleted (Joreskog and Sorbom 1989). Relying on theory, satisfaction was

originally defined as a short-term construct which affected the long-term construct trust. Therefore, the hypothesis H7a concerning satisfaction leading to trust was kept in the model while its corollary, H7b, was dropped.

5.4 Confirmatory Factor Analysis

The six construct model with 38 indicators was assessed using LISREL's confirmatory factor analysis. Although Fornell and Larker (1981) suggest dropping indicators whose factor loadings were < .70, Anderson and Gerbing (1988) support keeping any indicator whose factor loading is statistically significant. All the indicators had statistically significant factor loadings of $\geq$ .643 (Table 5.4); all 38 indicators were kept for further analysis. Those indicators which also loaded significantly onto other factors were analyzed but were kept due to the lack of a theoretical reason for dropping them from the analysis. As stated by Bagozzi and Yi (1988), "Changing a model by indiscriminantly freeing parameters suggested by modification indices is of course an example of capitalizing on chance. One should avoid relying on such a practice except perhaps in the most exploratory of studies" (p. 81). Estimating a model with 84 free parameters requires a sample size of at least 420 observations, based on the >5:1 ratio for observations to

free parameters (Bentler 1985); the analysis was conducted with 523 observations.

5.5 Structural Equations Model

Consideration of the measurement model is categorized in three areas: preliminary model fit, overall model fit, and internal structure model fit (Bagozzi and Yi 1988). The preliminary fit criteria suggested further analysis of the six construct model (Figure 5.1) was warranted. Correlations were less than one (Appendix II), all error variances were positive and significant, and all factor loadings were greater than .5 (all were greater than .60) and statistically significant (Anderson and Gerbing 1988).

5.6 Overall model fit. As expected, the overall fit indices for the model in Figure 3 did not support the hypothesized model (x^2 =2019.31, p<.001, df=658). The absolute fit measures evaluate the degree to which the overall model predicts the original correlation matrix. Although the chi-square figure suggests rejecting the model (Table 5.3), the use of 523 observations in a maximum likelihood analysis is expected to distort these figures. The goodness-of-fit index (GFI=.825) is not significant but has not been adjusted for the degrees of freedom.

Since it is not unusual for the absolute fit measures to suggest the model is not a good fit, other fit measures

have been developed to take into account large sample sizes as well as the impact of degrees of freedom on the fit measures. Both incremental fit measures and parsimonious fit measures will be discussed.

Incremental fit measures compare the chosen structural model against a baseline model, generally the null model. It is necessary to use the absolute fit measures and degrees of freedom of the null model (Table 5.3) in order to calculate relative fit measures. The normed fit index (NFI) as developed by Bentler and Bonett (1980) is one of the most widely accepted measures presently used. An index of .875 does not meet the established threshold of .9 but the normed fit index - 2 (NFI-2), which also considers the degrees of freedom, is acceptable at .912. The Tucker-Lewis index (TLI), also considered very powerful, suggests an acceptable model fit with a value of .906.

Parsimonious fit measures consider the number of estimated coefficients used to achieve this level of fit. The normed chi-square index of 3.070 barely oversteps the 3.0 threshold of significance suggested by Carmines and McIver (1981). Because this index uses the chi-square statistic which has already been suggested as being unstable with such a large sample size, the threshold of 5.0 (Wheaton, Muthen, Alwin and Summers 1977) will be

used. Therefore, the normed chi-square index also supports the statistical significance of this model.

TABLE 5.3
OVERALL MODEL FIT

	6-CONSTRUCT MODEL	NULL MODEL
Degrees of freedom	658	703
Chi-square (x^2)	2019.31	16125.70
Significance level	0.000	0.000
Sample size: 523		
Goodness-of-fit index	0.825	0.144
Adjusted GFI	0.803	0.097
Root mean square residual	0.058	0.391
INCREMENTAL FIT MEASURES		
Normed fit index	0.875	
Normed fit index - 2	0.912	
Tucker-Lewis index	0.906	
PARSIMONIOUS FIT MEASURE		
Normed Chi-square index	3.070	

5.7 Internal structural model fit. Since moderate support was found for the overall goodness-of-fit of the model, the internal fit of the structural model was analyzed in more detail (Table 5.4). The individual loadings of indicators on the latent constructs were greater than .60 and all were statistically significant, adequate by the standards set forth in Anderson and Gerbing (1988).

The variance extracted figures [(sum of squared standardized loadings) / (sum of squared standardized loadings + sum of indicator measurement error)] for all the constructs were greater than the .50 threshold. These figures state that each construct accounts for more than half of the variance in the specified indicators, a necessary condition for good research.

TABLE 5.4
MEASUREMENT MODEL ML ESTIMATES

Constructs Indicators	Factor Loading	Variance Extracted	Composite Reliabil.	α	#
Carrier's Power (ξ_1)		.504	.501	.850	6
If Q wanted your firm to lower expectations of claims ratio ...	.700				
If Q wanted your firm to relax requirements of initiative in problem solving ...	.751				
If Q wanted your firm to relax requirements of responsiveness to your inquiries ...	.834				
If Q wanted your firm to lower requirements for equipment availability ...	.687				
If Q wanted your firm to lower requirements of their billing accuracy ...	.731				
If Q wanted your firm to lower requirements of ancillary/ accessorial charges ...	.679				
Shipper's Power (ξ_2)		.614	.608	.892	7
If your firm wanted Q to become more consistent with its transit time ...	.810				
If your firm wanted Q to become more flexible in its pick-up and delivery ...	.745				
If your firm wanted Q to improve its claims ratio ...	.654				
If your firm wanted Q to increase its initiative in problem solving ...	.852				
If your firm wanted Q to become more responsive to your inquiries ...	.879				
If your firm wanted Q to improve on its equipment availability ...	.706				
If your firm wanted Q to improve its billing accuracy ...	.716				
Comparison Level (ξ_3)		.601	.670	.891	7
Consistency of transit time	.756				
Flexibility of pick-up and delivery	.756				
Claims ratio	.713				
Initiative in problem solving	.894				
Responsiveness to inquiries	.862				
Equipment availability	.730				
Billing accuracy	.643				

TABLE 5.4 continued
MEASUREMENT MODEL ML ESTIMATES

Constructs Indicators	Factor Loading	Variance Extracted	Composite Reliabil.	α	#
Satisfaction (η_1)		.948	.950	.955	5
Overall, my firm is satisfied with its dealings with Q.	.970				
My firm would recommend Q to others.	.983				
My firm expects to continue doing business with Q in future.	.929				
Q provides satisfactory service in handling my firm's freight.	.945				
Q is a good company with which to do business.	**				
Trust (η_2)		.884	.888	.961	9
The salesperson is honest.	.912				
The salesperson is enjoyable.	.879				
The salesperson is conscientious.	.949				
The salesperson is competent.	.976				
The salesperson has a good personality.	.974				
The salesperson is ethical.	.957				
The salesperson is reliable.	.989				
The salesperson is knowledgeable.	.967				
The salesperson is likable.	**				
Commitment (η_3)		.590	.596	.821	4
My firm is committed to continuing this relationship.	**				
My firm has a vested interest in continuing this relationship.	.843				
My firm has let Q know that we desire to continue this relationship.	.997				
My firm plans to increase Q's % of our LTL freight business	.741				

** denotes the indicator value set at 1.0 for that endogenous construct

Cronbach alpha figures were again calculated to assess reliability, using only those indicators still used in the model, and all the constructs had values greater

than the conventional .70 standard for acceptability. The reliability for the composite measures of each construct were also calculated [(sum of standardized loadings squared) / (sum of standardized loadings squared + sum of indicator measurement error)] using the LISREL values in what is considered a more stringent test of construct reliability; all but carrier's power (.50) surpassed the .60 cutoff. The conflicting results concerning carrier's power and its reliability left doubt as to the strength of statements to be made concerning carrier's power but does not undermine the overall model.

The squared multiple correlations assess the power of a linear relationship by showing the strength of the relationship between an x or y variable to the latent construct ksi or eta. Although there are no guidelines, the model has reasonable measures with 28 of 38 correlations greater than 0.500.

The squared multiple correlations for the structural equations were as follows: satisfaction 0.667; trust 0.446; commitment 0.531. These figures show that the indicators of the endogenous variables measure reasonably well these latent constructs.

All but one (carrier's power to satisfaction) of the parameter estimates were statistically significant and displayed the expected sign as shown in Table 5.5.

TABLE 5.5
BETA AND GAMMA COEFFICIENTS AND T-VALUES

	COEFFICIENT	T-VALUE
Satisfaction to Trust	0.518	9.423
Satisfaction to Commitment	0.529	11.452
Trust to Commitment	0.149	3.268
Carrier's Power to Satisfaction	-0.035	-1.217
Shipper's Power to Satisfaction	0.436	10.105
Comparison Level to Satisfaction	0.419	9.644
Comparison Level to Trust	0.140	2.667

The correlations of the latent constructs should also be scrutinized. The exogenous constructs shipper's power and comparison level have a statistically significant correlation which suggests the two factors have an interactive effect on the model as a whole. The two constructs are distinct latent constructs as supported by the discriminant validity findings discussed below but this suggestion of multicollinearity is noted and should be considered in future research.

Discriminant validity of the constructs was determined by a comparison of the individual variance extracted figures and the shared variance figures (the squared standardized correlation values for eta and ksi in Table 5.6). All of the individual variance extracted values were greater than the respective shared variance values, supporting the claim of discriminant validity.

TABLE 5.6
CORRELATION MATRIX OF ETA AND KSI

	Endogenous			Exogenous		
	Satisfaction	Trust	Commitment	Carr Power	Ship Power	Comparison Level
Endogenous						
Satisfaction	1.000					
Trust	0.660	1.000				
Commitment	0.718	0.566	1.000			
Exogenous						
Carrier's Power	0.054	0.050	0.041	1.000		
Shipper's Power	0.754	0.517	0.545	0.073	1.000	
Comparison Level	0.746	0.561	0.547	0.132	0.690	1.000

In conclusion, the overall structural model sufficiently explains the suggested theoretical network determining commitment. Although the construct carrier's power adds little to the model, there remains no theoretical reason to exclude it from the network. Further discussion of carrier's power and the rest of the model follows.

5.8 Tests of Hypotheses

Having passed all the preliminary tests and overall fit tests, the model is accepted as statistically significant. Now the individual pathways will be discussed as to each parameter's statistical significance. The hypothesized pathways which are significant (Figure 5.2) will be discussed in detail with respect to the theoretical and managerial implications of each in the last chapter. The earlier decision to exclude shipper's dependence and carrier's dependence precluded testing the

first two hypotheses. Future research may include studying dependence based on a better measurement tool.

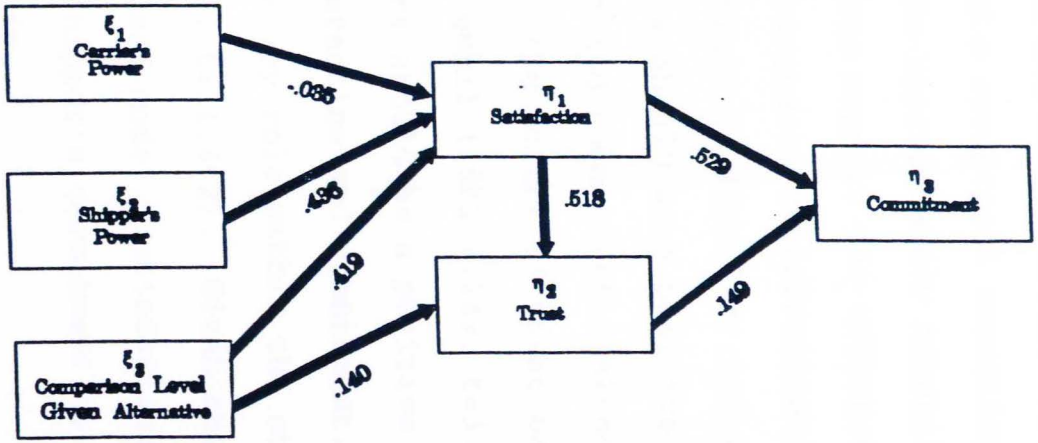
H3: (λ 11 < 0). There should be a negative relationship between carrier's power and shipper's satisfaction. This was the only hypothesis to be rejected (λ11 =-.035, t=-1.217). The data does not support the significance of this relationship within the overall model.

H4: (λ 12 > 0). There should be a positive relationship between shipper's power and shipper's satisfaction. The analysis supported this statement (λ 12 =.436, t=10.105) as had previous research. Since a correlation matrix was used to input the raw data, it is possible to discuss the relative effect of the causal pathways. Obviously, shipper's power has a sizable effect on satisfaction.

H5: (λ 13 > 0). There should be a positive relationship between comparison level given an alternative and shipper's satisfaction. Comparison level given an alternative (λ 13 =.419, t=9.644) exerts considerable influence on satisfaction although the caveat discussed in H4 should not be ignored.

H6: (λ 23 > 0). There should be a positive relationship between comparison level given an alternative and trust. Comparison level given an alternative is

Figure 5.2
COMMITMENT IN SHIPPER - CARRIER RELATIONSHIPS:
(Final Model's Parameter Estimates)



significant in affecting trust (λ 23 =.140, t=2.667), although the parameter value suggests comparison level given an alternative does not affect trust as much as it affects satisfaction.

H7A: (ß21 > 0). There should be a positive relationship between trust and satisfaction. Although originally hypothesized as a reciprocal causation (H7B), this analysis was unable to appropriately identify both pathways. The analysis does support the effect of satisfaction on trust and suggests satisfaction is very important in determining trust (ß21 =.518, t=9.423).

H8: (ß32 > 0). There should be a positive relationship between trust and commitment. Although statistically significant, the effect of trust on commitment was relatively small (ß32 =.149, t=3.268).

H9: (ß31 > 0). There should be a positive relationship between satisfaction and commitment. Satisfaction again plays a key role within the structural equation model (ß31 =.529, t=11.452). Given the network of constructs in the proposed model, satisfaction is very important in determining shipper's commitment to a shipper-carrier relationship.

The data provide support of adequate fit of the proposed model. The six construct model is theoretically defensible and the data provide support of adequate fit given generally accepted evaluation criteria (Bagozzi and

Yi 1988). The statistical significance of most of the hypothesized pathways and the parameter values as calculated from a correlation input matrix offer many ideas for managerial implications and future research possibilities.

Before continuing with the implications of this research, a final discussion concerning the construct carrier's power is warranted. Carrier's power was kept in the model because there was no theoretical support for excluding it, particularly given the inclusion of shipper's power. Although its reliability and variance extracted values were marginal at best, the insignificance of the pathway of carrier's power to satisfaction and the very small value of the parameter (even if it had been significant) emphasize the unimportance of carrier's power to this model.

CHAPTER SIX IMPLICATIONS AND CONCLUSIONS

The final chapter discusses the contributions of this research in general and the importance of the findings to the transportation industry in particular. The analytical results are compared to those found in published marketing and transportation academic research. Managerial implications are presented with several specific suggestions designed to increase the probability of a shipper committing to a relationship. The limitations of the research are discussed in addition to recommendations for improving follow-up research and future avenues for research. In conclusion, a brief summary of the importance of modeling satisfaction and commitment in shipper-carrier relationships is presented.

6.1 Importance of Research

This research is important for a variety of reasons. Buyer-seller relationships are considered important for any firm, regardless of the firm's perspective in the dyad. Shipper-carrier relations have not been studied in an in-depth manner in spite of the growing importance of logistics in the world, as well as in the national, business economy. Finally, a model of shipper-carrier relationships offers many important insights into managing these relationships. The following is a more detailed

discussion of the importance of this research to each of these areas.

6.1.1 Importance of Buyer-seller Relationships. Buyer-seller relationships are the core of an exchange system; as such, they are of paramount importance in the study of a free market economy. It is essential to understand how buyers and sellers relate within a dyad in order to approach these relationships with intelligence. Strategies based on intuition or experience alone are not enough to enable a firm to excel in today's economy; research into the realities of buyer-seller relationships form the basis for sound, informed judgments. As the business environment facing U. S. firms becomes more dynamic, managers are increasingly relying on research in order to grasp the complexities of the buyer-seller dyad.

Because of the extremely complex nature of buyer-seller relationships, it is impossible to account for everything that influences the dyad in one empirical study. There are many different aspects of buyer-seller relationships which are important, but this research chose to focus on satisfaction and commitment to a relationship from a buyer's perspective. Satisfaction in the short-term is critical in any type of relationship in order for smooth negotiations and the probability of a re-buy or ongoing purchase situation. Commitment to a long-term relationship presupposes a desire for a mutually

beneficial situation where both parties expect a risk-reducing environment in which to transact business. Both are crucial to firms interested in establishing a working partnership with another firm. At a minimum, creating buyer satisfaction is essential for any firm expecting to stay in business over a long-term time horizon.

As obvious as the importance of both satisfaction and commitment are in business relationships, many managers fail to recognize the multitude of factors which account for these aspects in a relationship. It is naive to view one factor of a relationship, such as market share, salesforce behavior, etc., while ignoring other factors which influence that component or the relationship as a whole. This research maintains that several factors combine together to be represented by latent constructs such as power, trust, satisfaction et. al. The latent constructs used in this research comprise a theoretically based model of the determinants of satisfaction and commitment. Although theoretical in presentation and highly sophisticated in the technique used for analysis, many practical suggestions can be derived from the research findings.

Every buyer-seller relationship can be depicted as a network of such latent constructs which influence each other simultaneously. Managers need to understand the importance of viewing the dyad as a network of latent

constructs which affect each other and must be considered as a whole when interpreting the research findings; the relative importance of each construct in influencing satisfaction and commitment has managerial implications which are discussed later. Many of these suggestions can be used as strategic weapons in establishing and maintaining advantageous buyer-seller relationships.

6.1.2 Importance of Shipper-carrier Relationships. The purpose of this research was to model the determinants of satisfaction and commitment in a buyer-seller relationship within the domain of the less-than-truckload motor carrier industry. After a decade of deregulation, the LTL industry offered an intriguing scenario: a mature industry with established performance criteria but dramatically changing roles within the shipper-carrier dyad. Although the LTL industry segment has special operating characteristics, the six construct model is a broad approach to shipper-carrier relationships and can be used as a starting point for an in-depth look at other segments in the motor carrier industry as well as the transportation industry in general.

Many managers involved in shipper-carrier relations have never considered the shipper's perspective of a relationship in the manner presented in this research. Although further research is needed to refine different aspects of the model, viewing the shipper-carrier

relationship as a complex network of latent constructs comprised of factors they intuitively use daily should offer new insights into these relationships. Shipper's gain from the knowledge that satisfaction and commitment are influenced by the system as a whole and not by a unidimensional aspect such as responsiveness to inquiries or consistency of transit time; carriers could incorporate some of these research findings into their strategic and tactical plans.

6.1.3 The Shipper-carrier model. Several aspects of the shipper-carrier model were emphasized in the course of this research. The network of constructs which determine satisfaction and commitment and the relative importance of each construct was of primary concern from a theoretical as well as a managerial perspective. Managers often understand which components have an impact in a relationship; this analysis provides empirical evidence of constructs which wield more influence than other constructs in determining commitment. The operationalization of satisfaction as short-term as distinguished from commitment as a long-term latent construct was also key in the analysis. By specifying a difference in time horizon, the two constructs were clearly differentiated. In this manner, the findings offer support for the issue that short-term satisfaction heavily influences commitment. However, satisfaction is

clearly viewed differently than commitment; a satisfied customer does not always result in a committed customer.

Finally, the conceptual base of this research employed views found in channels research and the satisfaction literature in conjunction with industry experience offered by the researcher and the cooperating LTL company. Since shipper-carrier relations are so important to channels of distribution, transportation research needs to incorporate more of the extensive research that has focused on buyers and sellers but rarely on transportation services offered to shippers. There exists a wealth of information waiting to be used by transportation researchers in their struggle to understand more completely shipper-carrier relationships.

6.2 Theoretical Implications

This section deals with the theoretical implications of the research. First, the combination of different areas of research in order to strengthen the research is discussed. The importance of a statistically significant model is reiterated with more specific comments about the overall model. The hypothesized pathways between the constructs are individually discussed in terms of their significance, relative importance, and contributions to the literature beginning with the pathways from the exogenous constructs and followed by a discussion of the pathways from the endogenous constructs.

6.2.1 Combining Areas of Research. This research attempted to bridge the gap between the channels and satisfaction literature and the transportation literature. Building upon the previous literature of various fields strengthened the conceptualization of shipper-carrier relationships. By basing the construct interrelationships upon previous marketing research, a model of commitment for any buyer-seller relationship was suggested; however, the analysis used a correlation input matrix which constrained the generalizability of the findings. The operationalization of the constructs consisted of using factors culled from the voluminous work on performance criteria in the transportation literature. This gave the model a 'real-world' substance which is crucial in attempting to reach both transportation researchers and practitioners in logistics. This connection is of paramount importance in order for the research to have accomplished the goal of bridging the gap between the streams of literature, one of the primary objectives of this research.

6.2.2 Overall Mode. The importance of this analysis rests in LISREL's ability to simultaneously consider all the hypothesized pathways in the model. As a set of dependent relationships, the model explicitly acknowledges the existence of some constructs being dependent variables in some relationships (e.g. shipper's power influencing

satisfaction) while being independent variables in others (e.g. satisfaction influencing commitment). This mirrors the reality of the business world; different aspects of business are important in and of themselves, while simply being a moderator for a more vital aspect given another perspective. In simpler terms, satisfaction is important in and of itself, but it is only one construct influencing commitment, a more crucial concern to firms concentrating on developing long-term working partnerships.

In order for any of the hypothesized pathways to be discussed, the overall model had to be statistically significant. Overall model significance means the hypothesized model fit the data reasonably well and allows further consideration of the pathway parameters. Statistical support for the overall model also confirms the complexity in shipper-carrier relationships previously unstudied in the transportation industry, but suggested by conceptual and analytical pieces in the marketing literature (Dwyer, Schurr, and Oh 1987; Anderson and Narus 1984, 1990; Robicheaux and El-Ansary 1976).

This confirmation is important for two major reasons. The research supports the suggestion that shipper-carrier relations are not unidimensional affairs, driven solely by one factor such as rates or consistency of transit time. Shipper-carrier dyads are comprised of an interdependent set of latent constructs; several elements directly or

indirectly influence commitment to a relationship. The complexities inherent in these dyads need to be clearly understood in order for academic researchers to offer practical advice to practitioners. Secondly, the successful modeling of shipper-carrier relationships confirms a conceptual similarity to buyer-seller relationships (Anderson and Narus 1990; Dwyer, Schurr, and Oh 1987). The significance of the overall model supports the attempt to help bridge the gap between marketing and transportation literature. Analyzing the multitude of elements important in influencing shipper-carrier relationships may seem inscrutable at times but continued research based on channels and satisfaction literature will clarify many of the issues and will lead to strategic and tactical suggestions for managers.

6.2.3 Pathways. Given the statistical significance of the overall model, the analysis also allowed a direct comparison of the relative importance of the latent constructs in determining satisfaction and commitment. The use of the correlation matrix to input data into LISREL allows the direct comparison of individual paths, but constrains the generalizability of the results. Each hypothesized pathway will be discussed individually beginning with the pathways from the exogenous constructs: carrier's power, shipper's power, and comparison level.

6.2.4 Carrier's power to satisfaction. Carrier's power is the carrier's ability to convince the shipper to behave in a manner advantageous to the carrier which would be beyond the shipper's normal behavior. In spite of the acceptable Cronbach alpha, the unacceptable score on the composite reliability left doubt as to the reliability of this construct. The hypothesized pathway from carrier's power to satisfaction, however, was insignificant although the sign showing an inverse relationship was as expected. This means that there is no support for the proposition that carrier's power significantly influences shipper's satisfaction.

In spite of the expected sign, the insignificance of this pathway fails to support the findings in the channels literature which state that the amount of power a partner has inversely affects a firm's satisfaction (Lusch 1977; Brown and Frazier 1978). While it is quite typical to make inferences from insignificant results as well as those that are significant, the problems with the measurement of this construct, as detailed earlier, lead the researcher to suggest caution when drawing conclusions based on this construct or its pathway.

6.2.5 Shipper's power to satisfaction. Shipper's power measures the shipper's ability to convince the carrier to behave in a manner advantageous to the shipper which would be beyond the carrier's normal behavior. It had high

reliability scores which confirmed the close correlation of it's indicators. As an exogenous construct, shipper's power had considerable impact on the model through it's statistically significant pathway to satisfaction. The parameter value (λ 12 =.436) suggests shipper's power strongly influences the level of satisfaction felt by the shipper.

This finding lends support to marketing research which claims that the more power a buyer perceives himself to have, the more satisfied the buyer will be (Hunt and Nevin 1974; Gaski and Nevin 1985). By substantiating this claim in shipper-carrier relationships, the marketing literature gains support for this tenet of power with regards to a service, specifically the service of LTL transportation.

The importance of shipper's power in shipper-carrier relationships has generally been overlooked in the transportation literature. By operationalizing this latent construct with regard to performance criteria accepted by researchers in the field of transportation, shipper's power was given practical meaning. Specifically, the indicators concerning consistency of transit time, initiative in problem solving, and responsiveness to inquiries had the strongest factor loadings for the latent construct shipper's power. This

is supported by research by Rhea and Shrock (1987), Bardi, et. al. (1989), and Chow and Poist (1984).

The results of this research also suggest the impact of shipper's power on shipper's satisfaction is as important as comparison level given an alternative (λ 13 =.419) on satisfaction. Given transportation research's neglect of shipper's power as an important aspect of shipper-carrier relationships, the comparable strength of shipper's power and comparison level given an alternative was unexpected. This area needs to be researched further although several managerial implications are already obvious and are discussed later.

6.2.6 Comparison level given an alternative to satisfaction. Comparison level given an alternative is often used as a latent construct in marketing and satisfaction literature. It represents the direct comparison of a shipper's perceptions of a specified carrier's performance on a set of criteria against the performance of the shipper's choice of best alternative carrier. As a latent construct, comparison level given an alternative had acceptable reliability scores and particularly strong factor loadings with indicators measuring initiative in problem solving and responsiveness to inquiries. The pathway from comparison level given an alternative to satisfaction was statistically significant. Since performance is generally considered crucial in

determining satisfaction, the effect on satisfaction (λ 13 =.419) was expected to be relatively large. Although much of the satisfaction literature focuses on disconfirmation, the comparison of expectations and performance, some recent works contend that comparison level given an alternative may be more realistic. A shipper's comparison of a specified relationship with the best alternative to that relationship, attribute by attribute, has a direct relationship with a shipper's satisfaction (Anderson and Narus 1984, 1990; Frazier, Spekman, and O'Neal 1988). This confirmation of marketing research again suggests that transportation researchers should apply buyer-seller concepts to shipper-carrier relationships.

Satisfaction has been crucial to understanding buyer-seller relations and these research findings confirm this. Given the statistically significant correlation between shipper's power and comparison level given an alternative (t=26.693), it is impossible to determine the relative amount of the variance of satisfaction for which each exogenous variable is responsible. However, the structural equations explain 66.7% of the variance in satisfaction and, in turn, satisfaction is crucial in explaining the variance found in both trust and commitment.

6.2.7 Comparison level given an alternative to trust.

As a measure of direct comparison on specified performance criteria, comparison level given an alternative suggests how well a carrier executes the business transaction. It was assumed in the research that carriers' generally claim to be very effective at each criterion measured; therefore, a high score on comparison level given an alternative could be broadly interpreted as a measure of fulfilling the business transaction. In turn, this would help create trust. Comparison level given an alternative was the only exogenous variable hypothesized to influence trust and the pathway was found to be statistically significant. However, the analysis (β 23 =.140) shows this construct to be a weak influence on trust.

The analysis supports previous research that suggests that trust is based on direct experience (Swan and Nolan 1985). Since trust is the belief that a firm is not behaving in an opportunistic manner, comparison level given an alternative is an evaluation as to whether a carrier is fulfilling its business obligations at a level which would be deemed acceptable. Unacceptable evaluation would suggest one of two likely situations: 1) an inability on the carrier's part to perform the operations at an acceptable level in spite of suggestions to the contrary by the carrier and / or carrier's salespeople or 2) explicitly opportunistic behavior on behave of the

carrier. In either case, the shipper's trust would be violated.

The transportation literature has rarely addressed the importance of trust in shipper-carrier relationships. Although previous research clearly suggests which criteria are most important to shippers, the importance of influencing trust through performance comparison needs to be substantiated by additional research.

6.2.8 Satisfaction to trust. Satisfaction was operationalized as a shipper's affective response to the present, short-term shipper-carrier relationship. In general terms, satisfaction is a belief that the carrier's performance is competent and that the carrier is a good company with which to do business; trust is the belief that a carrier will not act opportunistically. As a latent construct, satisfaction had strong reliability scores and high factor loadings for all the indicators. Although no support was found for reciprocal causation, the pathway from satisfaction to trust was statistically significant. Satisfaction does strongly influence trust (ß21 =.518), much more than comparison level given an alternative (λ 23 =.140).

The channels literature suggests that trust stems from a partner firm's consistent attempts to fulfill all of its obligations, both implicit and explicit, in the business relationship. As the subjective measure of the

interpersonal / interfirm relationship, trust is the belief of a decreased risk in a relationship because of repeated satisfactory transactions. Therefore, a shipper satisfied with a relationship generally trusts the carrier. The analysis strongly supports the proposal that satisfaction, a short-term construct, is a very important antecedent of trust, a long-term construct. This logically springs from the supposition that trust is built over a period of time (Swan, Trawick and Silva 1985).

6.2.9 Satisfaction to commitment. Satisfaction as a short-term response to a relationship was hypothesized to lead to commitment for the long-run in shipper-carrier relationships. Since commitment is viewed as a shipper's desire for an ongoing, stable relationship, satisfaction is considered crucial in its influence on commitment. The hypothesized pathway was statistically significant and the analysis supported the claim that satisfaction is strongly influential (ß31 =.529) in determining commitment.

Channels literature offers many conceptual pieces which discuss the importance of satisfaction in affecting commitment (Frazier 1983a; Dwyer, Schurr, and Oh 1987; Blau 1964) with Dwyer (1980) suggesting that satisfaction is the "key to long-run channel viability" (p. 46). The research findings support the suggestion that repeated satisfactory transactions influences a shipper's desire to commit to the relationship in order to reduce the risk

inherent in switching business partners (Jackson 1985). A logical extension of repeated satisfactory transactions is the belief in future positive outcomes from continuing this relationship (Hardwick and Ford 1986). Previous satisfaction research has found that satisfaction affects purchase intentions and post-purchase attitude (Oliver 1980), both crucial elements in determining a mutually beneficial on-going relationship. The large beta value arguably supports the idea of satisfaction as the key to commitment in shipper-carrier relationships.

The works of Marcus (1987) and Crum and Allen (1990) discussed commitment in relationships, but more research is required to understand committed relationships and which constructs determine commitment. Transportation research needs to look to other disciplines for significant findings concerning commitment in order to offer practical suggestions to logistic managers on the importance of commitment and how to gain it from their business associates.

6.2.10 Trust to commitment. As the belief in the absence of opportunistic behavior, trust was hypothesized to influence commitment; trust is the belief that a firm will fulfill its obligations and is a necessary condition for a firm's desire to commit itself to a relationship. As a latent construct, it had high reliability score which confirmed the close correlation of its indicators. All

the indicators had factor loadings greater than .87. The hypothesized pathway from trust to commitment was statistically significant with a parameter value of .149 which is relatively weak.

Marketing literature often mentions trust in conceptual pieces on commitment and relationships (Dwyer, Schurr, and Oh 1987; Frazier, Spekman, and O'Neal 1988). Research has suggested that a firm is willing to adjust the structure of the relationship in order to reap future benefits from a durable relationship (Scanzoni 1979); it is essential to trust another firm, before basing present operational and strategic decisions which are expected to be rewarded in the future. With specific reference to salespeople, trust is considered a necessary component in developing buyer commitment (Prus 1987).

6.2.11 Commitment. Commitment is an implicit or explicit pledge of continuation in a relationship; it adds a psychological dimension to the behavior involved in the dyad (Jarvis and Wilcox 1977). At this stage of bonding, there is an active participation by both parties which is designed to maintain the relationship (Dwyer, Schurr, and Oh 1987). As a latent construct, commitment had an acceptable reliability score and all the indicators factor loaded at a level of .74 or greater.

As hypothesized in the model, the direct antecedents of commitment are trust and satisfaction. Although

statistically significant, trust's impact (ß32 =.149) on commitment was relatively weak. As the representative construct for interpersonal / interfirm relations, trust is important in determining commitment, but would not be sufficient on its own. Satisfaction had a much stronger influence (ß31 =.529) on commitment. This analysis suggests satisfaction would probably be necessary and may be sufficient on its own to garner commitment from a shipper. This research finds that satisfaction has a much stronger influence on commitment to a relationship than does trust.

The theoretical support found for the hypothesized relationships adds to the growing research on buyer-seller relationships in the channels and satisfaction literature. By modeling the complexities of buyer-seller relationships, many new findings were added to the transportation literature. In addition to these theoretical contributions, these research findings translate into managerial implications as discussed in the following section.

6.3 Managerial Implications

Academic research needs to offer practical suggestions that managers can apply in their strategic and tactical plans. This section looks at the managerial implications of each of the statistically significant pathways with several specifics policies or strategies

worthy of consideration when attempting to create satisfaction or influence commitment in shipper-carrier relationships.

6.3.1 Shipper's power to satisfaction. A shipper's perception of his power in the relationship is very important in affecting his level of satisfaction. The construct was measured as a series of questions concerning the degree the shipper believed the carrier was willing to change in order to meet the shipper's requirements on a set of criteria chosen from published research. In essence, the shippers were saying the more they felt the carrier was willing to change to meet their requests, the more satisfied the shipper was in the relationship. Therefore, the primary concern is to get the shipper to perceive they have power over the carrier.

In order to do this, carriers should devise multiple programs geared to highlight the importance of the shipper to the carrier and to maintain maximum flexibility in dealing with customers. Suggested programs may include key personnel assigned to handle all inquiries and problems for specific shippers in order to give personalized attention; quality teams comprised of members of both the shipper and the carrier to directly address the issues relevant to a long-term working relationship; and establishing guidelines for increasing the speed with which inquiries are handled. Flexibility in operations

should be focused on modifying pick-up and delivery times, equipment availability, and waving accessorial charges except in extreme cases. Consistency of transit time should remain a top priority; in the rare case where the delivery will not be made in time, the shipper should be notified with alternate suggestions in mind. In all cases, shippers should be made to feel that they are the number one priority. Carriers might borrow from the success of the software computer firms who have found that 1-800 lines and other forms of technical assistance are great ways to improve customer relations.

6.3.2 Comparison level given an alternative to satisfaction. Since many practitioners believe that performance is the primary aspect of a shipper-carrier relationship, it was no surprise that the analysis supported the significant affect of comparison level given an alternative to satisfaction. Performance levels on seven criteria were compared in order to obtain comparison level given an alternative; the criteria used were taken from transportation literature and practitioner suggestions in order to offer a 'real world' aspect to the concept. A carrier's performance on standard criteria relative to the best alternative carrier's performance greatly influences the shipper's level of satisfaction because a shipper will not be satisfied in a relationship if it knows another carrier provides a superior service.

Satisfaction can be influenced through superior performance on the criteria which comprised comparison level given an alternative. All of the indicators in the final model were statistically significant and are therefore important; a few practical suggestions are meant to highlight how each indicator can be viewed as an opportunity to distinguish a carrier's comparison level; it is important to remember that all criteria were equally weighted in importance and the issue of rates was omitted during the research for analytical reasons.

Since delivery time is part of the order cycle, shipper's include an estimate of transit time based on carrier's claims when dealing with customers; a consistent transit time has become an essential characteristic of even adequate carriers. A superior carrier needs to set transit time standards that are both competitive and reasonable in order to obtain a reputation for reliability for delivery. Even carriers with poor reliability histories can readily change that reputation by establishing and consistently meeting transit time standards.

Given the highly competitive environment of our business market, shippers require carriers to pick-up and deliver freight when needed, not just during normal business hours. Carriers need to stagger drivers' work hours to incorporate flexible pick-up and delivery times

into a carrier's normal operations. Currently most management personnel are on hand for extended periods of time. Staggering drivers' hours during this time would extend potential pick-up and delivery times and would allow flexibility to become a natural part of a carrier's operations.

Although information-flows have only recently been studied by transportation academics, practitioners obviously realize its importance for smooth operations. Carriers need to encourage and reward proactive problem solving. Initiative in problem solving requires corporate procedures in dealing with problems and properly trained office personnel whose creativity in problem solving has not been smothered. Taking the initiative in problem solving includes admitting to a problem, determining alternative solutions, and suggesting to the shipper a specific solution which best fits the situation. No shipper wants problems, but a carrier who aggressively meets and deals with problems helps create a satisfactory relationship.

Responsiveness to shipper inquiries is another criteria involved in comparison level given an alternative. There is a distinct difference between answering questions with a minimal reply and enthusiastically helping a shipper to fully understand the point in question. The issue is not simply length of

response or excitement of tone or speed of reply; the carrier's willingness to discuss or research the inquiry is an important key to satisfying a shipper. Therefore, a carrier must establish a working environment that breeds a willingness to be responsive to shipper inquiries.

6.3.3 Comparison level given an alternative to trust. As a carrier is perceived as performing better than an alternative carrier with respect to several criteria, a shipper will perceive the carrier as trustworthy, in the long-term. Subpar performance by a firm on standard criteria might suggest opportunistic behavior, the stretching of a firm's performance capability, or subpar capabilities; any one of these would suggest the carrier should not be trusted to always fulfill its obligations.

In order to influence shipper's trust, a carrier needs to increase their performance relative to other carriers. The preceding several paragraphs discussed in detail several ways to increase performance and distinguish itself. All of these suggestions hold true for influencing trust as well as increasing satisfaction, trust being a latent construct which is built over the long-term. Although also important to satisfaction, a key point to remember in influencing trust: do not promise what you can not accomplish. Promising the next to impossible may result in an increase in short-term business, but failing to deliver on these promises will

have negative outcomes which will far outweigh any short-term gains.

6.3.4 Satisfaction to trust. Satisfaction is an important short-term goal of shipper-carrier relationships. In feeling that a carrier provides adequate service, a shipper would be more likely to want to continue the relationship, at least in the short-term. This short-term belief that the carrier is performing in a satisfactory manner leads to the establishment of trust. Trust is built over time and requires long-term exposure in a satisfactory environment. Trust is heavily influenced by satisfaction, much more than it is by comparison level given an alternative.

Shipper's satisfaction is an affective response to the shipper-carrier relationship. The shipper's perception of the relationship and individual aspects of the dyad all add to the overall feeling of satisfaction. A carrier needs to create a satisfactory feeling in every possible area of the relationship, regardless of how insignificant it may seem. Over and above the performance on criteria discussed previously, the shipper needs to consider the carrier a 'good company with which to do business' and a company worthy of recommending to others. By creating this perception of satisfaction, a shipper's feelings of trust will be positively influenced.

The previous detailed discussion concerning the effect on satisfaction of both shipper's power and comparison level given an alternative offer several suggestions for creating satisfaction. These suggestions will also indirectly affect trust, through satisfaction, and are important to keep in mind.

6.3.5 Satisfaction to commitment. The more satisfaction a shipper feels in a relationship, the more likely it will be willing to commit to a long-term relationship. In and of itself, satisfaction within a relationship is very important; satisfaction in a dyad generally leads to repurchase behavior. As a heavy influencer of commitment, satisfaction is essential to a relationship; commitment to a relationship guarantees a long-term partnership environment in which the perception of risk is decreased and the desire to operate in a mutually beneficial manner is heightened.

Satisfaction heavily influences a shipper's desire to commit to a relationship. Fundamental operating and sales procedures influence a shipper's feelings of satisfaction with the dyad and a carrier's suitability as a partner in a committed relationship. Every contact between shipper and carrier offers the opportunity to display an efficient, professional operation. Meeting established standards for the transportation service allows a carrier to be considered adequate, but differentiation often comes

from the 'extras' that are expected from carriers interested in keeping its customers happy. Employing support personnel dedicated to handling requests, inquiries, and problems in a manner conducive to supporting the smooth operations of the shipper should increase a shipper's satisfaction level. Carriers that repeatedly deliver short-term satisfaction will increase the likelihood of establishing and maintaining committed, long-term relationships.

6.3.6 Trust to commitment. Trust is the belief that another party will not act in an opportunistic manner; it is important to hold this belief in order to commit to a relationship with regard to the long-term. The absence or lessening of opportunistic behavior in a business exchange offers the involved parties an opportunity to waste less energy on protecting oneself and focus on gaining the most out of the exchange, the most for both parties. Once this environment of trust is created, the dyad should offer advantages to the shipper over competing relationships so that a shipper would want to commit to this carrier and minimize transactions with other carriers.

Trust was measured in this research with respect to salesperson's performance. During the years of regulation, the choice of carrier was often determined by the personal relationship of the traffic manager and the salesperson. Although the salesperson is still a key

component of the sales decision, the salesperson's important attributes for establishing trust in the relationship have changed. The following contains a few suggestions on increasing the level of trust in order to influence commitment from the shipper.

Reliability and conscientious performance is valued highly by shippers. Salespeople should never promise some service which a carrier is unlikely to be able to perform. This behavior may convince a shipper to buy from the carrier this time but when the carrier fails to fulfill the promise, the long-term damage to trust impacts the shipper's desire to commit.

Another important aspect of salesperson's performance is competency. Salespeople are the primary contact between the carrier and the shipper's decision makers. Uninformed salespeople are viewed as a reflection of the carrier and lack of knowledge is considered unforgivable. Carriers should not only train its people how to sell but teach salespeople about the trucking industry in general and how to find out about the special needs of each shipper <u>before</u> making a sales call. Carriers should also have seminars to teach salespeople how to take the initiative in problem solving and to be creative in determining alternative solutions to problems. Shippers are impressed by knowledgeable salespeople and this influences the desire for commitment.

6.3.7 Commitment. Commitment is the implicit or explicit pledge of a continuing relationship. It is the desire to continue the relationship in the long-term because of perceived additional benefits found in this particular dyad. The importance of commitment in shipper-carrier relationships depends on the viewpoint. Shipper's hope to gain an arena for business transactions which is not opportunistic but proactive in improving service, handling problems, etc. because the relationship is based on the belief of mutually beneficial operations. Carriers expect a committed relationship to offer stability in sales and consistency of freight flow, two valuable commodities for any carrier.

6.3.8 Overall model. The overall model represents a network of interrelationships between concepts representing both short- and long-term perspectives. Specifically, satisfaction was operationalized from a short-term perspective while commitment and trust are long-term constructs by definition. Satisfaction and the short-term perspective clearly had major impacts on the other endogenous variables while the influence of trust (a long-term construct) on commitment was significant but weak.

It is important to note that the analysis was computed with regards to the model as a whole. The relationship between any two constructs without the rest

of the network may result in slightly different results. When looking at shipper-carrier relationships, it is necessary to look at the network of construct interrelationships simultaneously to understand what determines commitment. Otherwise, the complexities introduced by performance and expectations, interpersonal or interfirm relationships, or time perspective may be lost.

6.3.9 Suggestions for carriers' management. It is important for carriers to develop and implement an overall program that focuses on shipper's commitment. At a minimum, carriers need to institute a "systems approach" to shipper-carrier relationships: focusing on each aspect that influences the relationship and acknowledging the interrelationships of these aspects.

Although an in-depth discussion of managerial implications precedes this section, the following is a brief summation of suggested features to help gain shipper's commitment:

1.) Institute a 1-800 number for shippers to talk directly to carrier's personnel who are both friendly and informed.

2.) Assignment of one carrier contact employee in addition to the sales people for every account targeted for commitment.

3.) Create quality teams comprised of members of both shipper and carrier employees to directly address crucial issues for a committed relationship.

4.) Write and implement a company policy which states that when a shipment is not going to be delivered or picked-up on-time, the shipper will be notified of the problem and the actions being taken by the carrier to correct it.

5.) Write and implement a company policy which states that when a shipment is going to be delivered short or damaged, the shipper will be notified of the problem and the actions being taken by the carrier to correct it.

6.) Stagger drivers' work hours to increase flexibility of pick-up and delivery times.

7.) Never promise a shipper anything that it is unlikely you will be able to accomplish as promised.

Although certainly not a complete list of possible featuress to institute for a program concerned with gaining shipper's commitment, the preceding suggestions offer a solid foundation for a 'commitment program'. Since establishing and maintaining commitment requires additional costs for each and every shipper, this program is not feasible as a company-wide program although some of these aspects may lend themselves to incorporation into a general 'quality program'.

6.4 Limitations of Research

Using a correlation matrix instead of a covariance matrix does place restrictions on the generalizability of the research. Specifically, a covariance matrix must be used if the research objective is to compare structural parameter across populations or across time (given the same population). T-values may be inflated when using a

correlation matrix and the chi-square statistic loses much of its validity as a test statistic (Hair, et.al. 1992).

The coefficient of determination for structural equations is 67.3%. Although acceptable, the model does not address over 30% of the variance found in the data. The hypothesized model is an attempt to bridge the gap between marketing literature and the transportation literature; as such, the model is based on marketing theory operationalized with the carrier choice criteria found in the transportation literature. As a first attempt at modeling a shipper-carrier relationship in the LTL segment of the motor carrier industry, it is not unreasonable to expect moderate variance in the data unaccounted for by the model.

Although LISREL calculations suggested that several of the indicators be freed or dropped from the model, this research chose to keep as many indicators as possible and only drop indicators when necessary. The modification indices are calculated values which quantitatively determine how to make the model better. They are obviously devoid of theory and the researcher must be wary of capitulating to the 'numbers' (Hair et. al. 1992). The largest modification index suggested freeing the pathway from trust to satisfaction, an issue which has theoretical support, but LISREL was unable to calculate a logical, identified solution.

Ten questions were originally used as the set of criteria to be used in measuring the constructs shipper's power, carrier's power, and comparison level. This set of criteria was drawn from the transportation literature, pretest result suggestions, and the practical experience of the researcher and the cooperating LTL firm. In the preliminary analysis of the data, the questions concerning EDI were dropped from further evaluation due to a lack of adequate response. The issue of rates was dropped during the factor analysis stage; the factor loading value for rates failed to meet the appropriate cutoff on each of the constructs individual calculations.

This is not a refutation of the importance of rates (Chow and Poist 1984; Bardi et. al. 1989) in shipper-carrier relationships; rates as an indicator simply did not behave in a manner similar to other indicators. The other carrier choice criteria used in the research were primarily service-oriented: flexibility and consistency of transit time; information flows; claims ratio; etc. It is not surprising that rates were dropped in a factor analysis procedure; rates would not be expected to vary in a manner similar to these service-oriented criteria.

Although weaknesses of the present findings, these limitations do not diminish the importance of the preceding research. It is important to view the results while acknowledging areas which might constrain the

implications or suggest possible improvements for future research.

6.5 Future Research

This dissertation has added insights into the area of shipper-carrier relationships in the LTL industry. It has also suggested many aspects of shipper-carrier relationships that require further attention. In general, other data should be used to analyze this model of commitment in buyer-seller relationships in order to determine if it is generalizable. Shipper-carrier models need to add constructs which influence the presently unexplained 30% variance in commitment. Since rates are so important in the transportation industry, a variation in the modeling or operationalization used in this research needs to insure the inclusion of rates as an indicator in constructs which determine commitment. Another avenue of research suggests analyzing whether firms which are more likely to desire a commitment can be categorized based on shipper size, industry, shipping budget or other factor.

The objective of this research was to model the determinants of commitment in shipper-carrier relationships and the research also focused on the relative importance of the various constructs in the model. In order to do this, a correlation matrix was used; this left the generalizability of the model in

question. The final model analyzed in this research should be used in future research with data from a different buyer-seller scenario. A comparison of the findings from the two research projects would offer commentary on the determinants of commitment and their relative importance with regard to commitment.

Commitment is too valuable an area in shipper-carrier relationships to ignore and much is left to understand. Although the model analyzed in this research was successful in modeling determinants of commitment in shipper-carrier relationships, other factors which determine commitment were not included in the model. Further research into the interpersonal / interfirm constructs discussed by MacNeil in his Relational Exchange Theory should be considered in addition to trust. Satisfaction as measured in this research may also need additional refinement.

Another issue of great importance is the incorporation of the issue of rates into the shipper-carrier model. Although JIT and MRP relationships have increased the importance of service issues, buyer-seller relationships of any type consider the price of the exchange; it would be naive to believe otherwise.

Although shippers generally consider the same performance criteria important, the relative importance of these criteria vary widely with the perspective of the

given shipper. Future research should incorporate each shipper's weighting of the relative importance of the criteria into the analysis. It is quite possible that rates might re-emerge as an important component of the constructs shipper's power, carrier's power, and comparison level given an alternative. Not only would weighing the criteria offer a more accurate view of the shipper's perceptions but further analysis may reveal a significant difference between shippers who are more concerned with rates or consistency of service versus another group of shipper's categorized by a different criterion focus.

There are many avenues for future research given the broad area of buyer-seller relationships set in the LTL industry. These suggestions are only a few of the many possibilities.

6.6 Summary and Conclusions

The transportation industry offers a unique arena to study buyer-seller relationships because of the recent deregulation and increasing importance of logistics. The LTL segment constitutes an area of the trucking industry in which firms are very likely to possess close, long-term relationships. The trend of using fewer LTL carriers, along with the need for closer relations due to JIT, MRP, and competitive pressures, has required shippers to be more selective in choosing carriers. The changing needs

of shippers has required carriers to provide flexibility in the services offered in order to remain competitive in this economic recession. These factors all affect the necessity for partnerships and therefore requires the proactive approach of determining those factors which will create satisfaction for the shipper in order to establish a committed, long-term relationship.

This research has provided a model of the determinants of satisfaction and commitment in shipper-carrier relationships using a sample of firms who ship with LTL carriers. It offers insights into the complexities of these relationships, going beyond the standard transportation view of focusing solely on performance criteria. Channels and satisfaction literature offered help in establishing a conceptual framework for the hypothesized model. LISREL allowed structural equations modeling to be handled with ease, in spite of the complex nature of the model and the many parameter estimates that were required.

There are many practical implications that may be gained by managers from this research. The increasing desire by both shippers and carriers to establish and sustain working partnerships or committed relationships requires businessmen to understand what determines commitment in a relationship. As the business world continues to move in the direction of JIT or MRP

relationships the corresponding need for reliable carriers is magnified. This research directly addresses the need to better understand satisfaction and commitment in shipper-carrier relations in a transportation setting.

In order to successfully manage a committed relationship, it is essential to understand satisfaction and commitment. This research focused on the shipper's perspective of commitment within a dyad. Of the hypothesized relationships in the shipper-carrier model, the only hypotheses which failed to find support were that carrier's power had a negative relationship with satisfaction and the issue of satisfaction's influence on trust, possibly because of the presence of a reciprocal relationship.

Comparison level given an alternative and shipper's power each had a significant impact on satisfaction. Comparison level given an alternative weakly influenced the development of trust while shipper's satisfaction was relatively strong in its impact on trust. Commitment was significantly influence by both satisfaction and trust, although the importance of satisfaction was much greater, relatively speaking.

The overall significance of the model also reinforced the need to acknowledge shipper-carrier relationships as complex networks. By bridging the gap between transportation literature and channels and satisfaction

literature, a 'real world' sense of shipper-carrier relationships was gained. This research was successful in contributing to the body of literature concerning buyer-seller dyads and modeling the complex nature of shipper-carrier relationships.



APPENDIX I

UNIVERSITY OF MARYLAND AT COLLEGE PARK

COLLEGE OF BUSINESS AND MANAGEMENT

Dear Manager:

I am a doctoral student in the Transportation and Logistics Program in the College of Business and Management at the University of Maryland. This questionnaire, the basis for my doctoral thesis, is designed to explore the level of commitment a buyer (a shipper in this case) may feel for a specific vendor (a motor carrier) in a business environment.

The questionnaire focuses on the relationship between your firm and ZZZ. Although I ask some questions regarding your firm, most of the questions refer to your establishment, defined as your specific work place. In many cases, the firm and the establishment are the same. Some larger firms, however, consist of separate work establishments. Your responses should be viewed from the perspective of the establishment unless specifically instructed to answer the question from the firm perspective.

Although ZZZ graciously allowed me to use a random sample of their customers, my work is completely independent and your responses will be strictly confidential. All survey responses will be returned to me at the University of Maryland at College Park.

Thank you for cooperating in this study. Since your responses will form the basis for my dissertation they will be appreciated greatly. Upon completion of the questionnaire, please mail in the enclosed envelope as soon as is convenient for you.

Sincerely,

Judy Jarrell
(301) 405-2284
(301) 776-3787

GENERAL INSTRUCTIONS

Thank you very much for agreeing to complete this questionnaire. The following comments should make answering the questions easier.
1. Most of the questions refer to your establishment - the site where you work. Questions about your 'firm', refer to the entire company.
2. Some of the questions refer to your perception of a situation. Please give the best response you can given the amount of information you have.
3. Your answers will be kept confidential, only the consolidated responses of all participants will be made public. ZZZ will not be mentioned by name in any published research resulting from this study.

INTRODUCTION

The following are basic questions concerning your establishment and its relationship with ZZZ. Please indicate your response with an X.

1. Does your establishment have a contractual agreement with ZZZ?
yes_____ no_____

2. How many years has your establishment been doing business with ZZZ?
1-2____ 3-4____ 5-6____
7-8____ 9-10____ >10____

3. Is your establishment connected by electronic data interchange (EDI) to ZZZ?
yes_____ no_____

COMMITMENT

The following questions refer to your perceptions of your establishment's long-term relationship with ZZZ. Specifically, try to distinguish your perceptions of a commitment to continuing the relationship as opposed to simple repeat purchase behavior without a commitment to working together. Please circle the number which best describes how closely you agree or disagree with each statement.

1. My establishment is committed to continuing this relationship.
Disagree 1 2 3 4 5 Agree

2. My establishment has a vested interest in continuing this relationship.
Disagree 1 2 3 4 5 Agree

3. My establishment has let ZZZ know that we desire to continue this relationship.
Disagree 1 2 3 4 5 Agree

4. It would take very little to cause my establishment to quit doing business with ZZZ.
Disagree 1 2 3 4 5 Agree

5. My establishment plans to increase ZZZ's percentage of our LTL freight business in the future.
Disagree 1 2 3 4 5 Agree

6. My establishment would modify its behavior to continue this relationship.
Disagree 1 2 3 4 5 Agree

SATISFACTION

The following questions request your opinion on your establishment's present relationship with ZZZ. Please circle the number that most closely measures your agreement or disagreement with each statement.

1. Overall, my establishment is satisfied with its dealings with ZZZ.
Disagree 1 2 3 4 5 Agree

2. My establishment would recommend ZZZ to others.
Disagree 1 2 3 4 5 Agree

3. My establishment expects to continue doing business with ZZZ in the future.
Disagree 1 2 3 4 5 Agree

4. ZZZ provides satisfactory service in handling my establishment's freight.
Disagree 1 2 3 4 5 Agree

5. ZZZ is a good company with which to do business.
Disagree 1 2 3 4 5 Agree

SALESPERSON PERFORMANCE

Think of the last ZZZ salesperson who called on you. Please give your opinion of that salesperson by circling the number that expresses the extent of your agreement or disagreement with each statement below.

1. The salesperson is honest.
Disagree 1 2 3 4 5 Agree

2. The salesperson is undependable.
Disagree 1 2 3 4 5 Agree

3. The salesperson is enjoyable.
Disagree 1 2 3 4 5 Agree

4. The salesperson is uninformed.
Disagree 1 2 3 4 5 Agree

5. The salesperson is sly.
Disagree 1 2 3 4 5 Agree

6. The salesperson is conscientious.
Disagree 1 2 3 4 5 Agree

7. The salesperson is competent.
Disagree 1 2 3 4 5 Agree

8. The salesperson has a good personality.
Disagree 1 2 3 4 5 Agree

9. The salesperson is ethical.
Disagree 1 2 3 4 5 Agree

10. The salesperson is reliable.
Disagree 1 2 3 4 5 Agree

11. The salesperson is knowledgeable.
Disagree 1 2 3 4 5 Agree

12. The salesperson is likable.
Disagree 1 2 3 4 5 Agree

RELATIVE POWER

The following questions refer to the balance of power in the relationship between your establishment and ZZZ. Your answers should reflect your perceptions concerning each establishment's ability to modify the partner establishment's behavior. Please circle the number which best measures your perception of the amount of probable change in each establishment's behavior.

Shipper's power

1. If your establishment wanted ZZZ to become more consistent with its transit time, to what extent do you believe ZZZ would cooperate?
None At All 1 2 3 4 5 A Great Deal

2. If your establishment wanted ZZZ to become more flexible in its pick-up and delivery schedule, to what extent do you believe ZZZ would cooperate?
None At All 1 2 3 4 5 A Great Deal

3. If your establishment wanted ZZZ to decrease its rates, to what extent do you believe ZZZ would cooperate?
None At All 1 2 3 4 5 A Great Deal

4. If your establishment wanted ZZZ to improve its claims ratio, to what extent do you believe ZZZ would comply?
None At All 1 2 3 4 5 A Great Deal

5. If your establishment wanted ZZZ to increase its initiative in problem solving, to what extent do you believe ZZZ would comply?
None At All 1 2 3 4 5 A Great Deal

6. If your establishment wanted ZZZ to become more responsive to your inquiries, to what extent do you believe ZZZ would become more responsive?
None At All 1 2 3 4 5 A Great Deal

7. If your establishment wanted ZZZ to improve its equipment availability, to what extent do you believe ZZZ would cooperate?
None At All 1 2 3 4 5 A Great Deal

8. If your establishment wanted ZZZ to improve its billing accuracy, to what extent do you believe ZZZ would cooperate?
None At All 1 2 3 4 5 A Great Deal

9. If your establishment wanted ZZZ to decrease its ancillary / accessorial charges, to what extent do you believe ZZZ would cooperate?
None At All 1 2 3 4 5 A Great Deal

10. If your establishment wanted ZZZ to improve its computer linkage / EDI (electronic data interchange) capability, to what extent do you believe ZZZ would cooperate?
None At All 1 2 3 4 5 A Great Deal

Carrier's power

1. If ZZZ wanted your establishment to relax its demands concerning consistency of transit time, to what extent would your establishment be willing to cooperate?
None At All 1 2 3 4 5 A Great Deal

2. If ZZZ wanted your establishment to become more flexible in your pick-up and delivery, to what extent would your establishment be willing to cooperate?
None At All 1 2 3 4 5 A Great Deal

3. If ZZZ wanted your establishment to accept an increase in its rates, to what extent would your establishment be willing to cooperate?
None At All 1 2 3 4 5 A Great Deal

4. If ZZZ wanted your establishment to lower its expectations concerning claims ratios, to what extent would your establishment be willing to cooperate?
None At All 1 2 3 4 5 A Great Deal

5. If ZZZ wanted your establishment to relax your requirements for ZZZ's initiative in problem solving, to what extent would your establishment be willing to cooperate?
None At All 1 2 3 4 5 A Great Deal

6. If ZZZ wanted your establishment to relax your requirements for ZZZ's responsive to its inquiries, to what extent would your establishment be willing to cooperate?
None At All 1 2 3 4 5 A Great Deal

7. If ZZZ wanted your establishment to lower your requirements concerning ZZZ's equipment availability, to what extent would your establishment be willing to cooperate?
None At All 1 2 3 4 5 A Great Deal

8. If ZZZ wanted your establishment to lower your requirements concerning ZZZ's billing accuracy, to what extent would your establishment be willing to cooperate?
None At All 1 2 3 4 5 A Great Deal

9. If ZZZ wanted your establishment to lower your requirements concerning ZZZ's ancillary / accessorial charges, to what extent would your establishment be willing to cooperate?
None At All 1 2 3 4 5 A Great Deal

10. If ZZZ wanted your establishment to lower your requirements concerning ZZZ's computer linkage / EDI (electronic data interchange) capability, to what extent would your establishment be willing to cooperate?
None At All 1 2 3 4 5 A Great Deal

Relative power

The following question refers to your perception of the balance of power in your relationship with ZZZ. Please divide 100 points between the two parties, giving more points to the more powerful party. If you feel your establishment and ZZZ have equal power, give each 50 points.

1. Your establishment _____

2. ZZZ _____

100

DEPENDENCE

The following questions refer to your establishment's and ZZZ's relative dependence on each other. Please give the best response you can given the amount of information you have.

Shipper's dependence

1. In your opinion, how dependent is your establishment on ZZZ?
Not Dependent 1 2 3 4 5 Very Dependent

2. How does your establishment view ZZZ?
primary carrier ____
secondary carrier ____
tertiary carrier ____

3. Of your establishment's estimated total dollar expenditures for LTL shipments (sent and received), what percentage was ZZZ responsible for in 1990?
<20%_____ 21-40%_____
41-60%_____ 61-80%_____
>81%_____

4. Of your establishment's total dollar expenditures for LTL shipments (sent and received), what percentage is ZZZ expected to be responsible for in 1991?
<20%_____ 21-40%_____
41-60%_____ 61-80%_____
>81%_____

5. Including ZZZ, how many LTL carriers serving your geographic ares could you do business with?
_____

6. Of the carriers you could do business with, how many, including ZZZ, are you doing business with?
_____

7. How easy would it be to discontinue doing business with ZZZ?
Very Easy 1 2 3 4 5 Very Difficult

8. For what portion of your establishment's LTL freight would it be easy to substitute a truckload carrier (i.e. J. B. Hunt)?
<5% _____ 6-10%_____
11-15%_____ 16-20%_____
21-25%_____ 26-30%_____
31-35%_____ 36-40%_____
41-45%_____ 46-50%_____
>51% _____

9. For what portion of your establishment's LTL freight would it be easy to substitute a small package carrier (i.e. UPS)?
<5% _____ 6-10%_____
11-15%_____ 16-20%_____
21-25%_____ 26-30%_____
31-35%_____ 36-40%_____
41-45%_____ 46-50%_____
>51% _____

Carrier's dependence

1. In your opinion, how dependent is ZZZ on your establishment?
Not Dependent 1 2 3 4 5 Very Dependent

2. In your opinion, how does this ZZZ terminal view your establishment's account?
Not Dependent 1 2 3 4 5 Very Dependent

3. In your opinion, approximately what percentage of this ZZZ terminal's total freight revenue was accounted for by your establishment in 1990?
Very Low 1 2 3 4 5 Very High

4. In your opinion, approximately what percentage of this ZZZ terminal's total freight revenue is expected to be accounted for by your establishment in 1991?
Very Low 1 2 3 4 5 Very High

5. How big is your establishment's account relative to other shipping establishments in this ZZZ terminal's territory?
Very Low 1 2 3 4 5 Very High

Freight flow imbalance

1. In your opinion, to what degree is the incoming LTL freight to all shippers in this ZZZ terminal's territory balanced by the outgoing freight?
Far More Far More
Incoming Frt 1 2 3 4 5 Outgoing Frt

2. How balanced is your establishment's incoming LTL freight relative to your outgoing LTL freight?
Far More Far More
Incoming Frt 1 2 3 4 5 Outgoing Frt

PERCEIVED PERFORMANCE

The following questions pertain to the perceived performance of LTL carriers on criteria that may be important to shippers in choosing a carrier. The first row refers to ZZZ; the second row refers to the LTL firm you believe to be your best alternative to ZZZ. Please rate both ZZZ and your best alternative LTL firm on each criteria by circling the number that corresponds most closely to your perception of its performance.

	Poor				Excellent
1. Consistency of transit time					
ZZZ	1	2	3	4	5
Best Alternative	1	2	3	4	5
2. Flexibility of pick-up & delivery					
ZZZ	1	2	3	4	5
Best Alternative	1	2	3	4	5
3. Rates					
ZZZ	1	2	3	4	5
Best Alternative	1	2	3	4	5
4. Claims ratio					
ZZZ	1	2	3	4	5
Best Alternative	1	2	3	4	5
5. Initiative in problem solving					
ZZZ	1	2	3	4	5
Best Alternative	1	2	3	4	5
6. Responsiveness to inquiries					
ZZZ	1	2	3	4	5
Best Alternative	1	2	3	4	5
7. Equipment availability					
ZZZ	1	2	3	4	5
Best Alternative	1	2	3	4	5
8. Billing accuracy					
ZZZ	1	2	3	4	5
Best Alternative	1	2	3	4	5
9. Ancillary / assessorial charges					
ZZZ	1	2	3	4	5
Best Alternative	1	2	3	4	5
10. Computer linkage / EDI					
ZZZ	1	2	3	4	5
Best Alternative	1	2	3	4	5

Please rank the following criteria in order of importance in choosing a carrier. Assuming a total of 100 points, split the points among the ten criteria based on their relative importance.

1. Consistency of transit time _____
2. Flexibility of pick-up and delivery _____
3. Rates _____
4. Claims ratio _____
5. Initiative in problem solving _____
6. Responsiveness to inquiries _____
7. Equipment availability _____
8. Billing accuracy _____
9. Ancillary / accessorial charges _____
10. Computer linkage / EDI _____

100

ESTABLISHMENT SPECIFIC

1. Which of the following industry groups best describes your establishment's primary line of business? Please check only one.

____Food	____Pharmac / Medical
____Textile	____Paper / Packaging
____Chemical	____Computer/Electronic
____Retailers	____Furniture/Fixtures
____Machinery	____Other Manufacturing
____Automotive	____Other Service
____Building Supply	

2. How many employees are there at your establishment?

1-9____	10-19____	20-49____
50-99____	100-249____	250-499____
500-999____	1000-2499____	>2500____

3. Rounding to the nearest $50,000, what was your establishment's total (received and shipped) LTL dollar expenditures for 1990?

_____

4. How much control does your establishment have in choosing the LTL carrier(s) used?
Little Control 1 2 3 4 5 Much Control

5. Does your firm have a contractual agreement with ZZZ?
yes_____ no_____

6. Does your establishment have a contractual agreement with any other LTL carrier?
yes_____ no_____

7. Does your firm have a contractual agreement with any other LTL carrier?
yes_____ no_____

8. How much of the total freight your establishment receives or ships is part of a Just-in-Time relationship?

<20% ____	21-40%____	41-60%____
61-80%____	>80% ____	

9. How much of this Just-in-Time freight is carried by an LTL carrier?

<20% ____	21-40%____	41-60%____
61-80%____	>80% ____	

10. How many LTL carriers is your establishment presently connected to by electronic data interchange (EDI)?

_____

11. How often does your establishment formally evaluate its LTL carriers?
monthly____ quarterly____
annually____ never____ other____

12. In which state is your establishment located?

_____

RESPONDENT

1. What is your position or job title?
traffic manager____ warehouse mgr____
dock foreman____ purchasing mgr____
logistics manager____
physical distribution manager____
other (please specify)_____

2. How many years have you held this position?

_____

3. How many years have you been involved in an area related to transportation?

_____

4. How old are you?

_____

THANK YOU VERY MUCH
FOR COMPLETING THIS QUESTIONNAIRE

APPENDIX II

SAMPLE CHARACTERISTICS

	N	%
Industry Classifications		
Food	16	3.1
Pharmaceuticals / Medical	8	1.5
Textile	48	9.2
Paper / Packaging	12	2.3
Chemical	40	7.6
Computer / Electronics	22	4.2
Retailers	20	3.8
Furniture / Fixtures	15	2.9
Machinery	35	6.7
Automotive	47	9.0
Building Supply	12	2.3
Other Manufacturing	189	36.1
Other Service	40	7.6
Firm Size		
1 - 9	34	6.5
10 - 19	50	9.6
20 - 49	100	19.1
50 - 99	98	18.7
100 - 249	100	19.1
250 - 499	56	10.7
500 - 999	32	6.1
1000 - 2499	20	3.8
$\geq$ 2500	18	3.4
Respondent		
Traffic Manager	191	31.5
Warehouse Manager	37	7.1
Dock Foreman	2	.4
Purchasing Manager	36	6.9
Logistics Manager	15	2.9
Physical Distribution Manager	29	5.5
Other	194	37.1

Respondent's Years in a Transportation Related Field

Median: 12.0

Mean: 17.3

APPENDIX III FACTOR ANALYSIS LOADINGS

Construct	Variable	Communality	Factor	Eigenvalue	Percent of Variance
Commitment	Com1	.67766	1	3.21951	53.7
	Com2	.61878			
	Com3	.65498			
	Com4	.35168			
	Com5	.55493			
	Com6	.36154			
Satisfaction	Sat1	.85945	1	4.25028	85.0
	Sat2	.86642			
	Sat3	.80514			
	Sat4	.83067			
	Sat5	.88860			
Shipper's Power	Shpow1	.64396	1	4.79574	53.3
	Shpow2	.54027			
	Shpow3	.28555			
	Shpow4	.50670			
	Shpow5	.68663			
	Shpow6	.67558			
	Shpow7	.52756			
	Shpow8	.55945			
	Shpow9	.37005			

APPENDIX III FACTOR ANALYSIS LOADINGS (continued)

Construct	Variable	Communality	Factor	Eigenvalue	Percent of Variance
Comparison Level Given An Alternative	CL1	.56879	1	4.93137	54.8
	CL2	.56637			
	CL3	.37776			
	CL4	.53558			
	CL5	.71373			
	CL6	.65790			
	CL7	.58547			
	CL8	.50306			
	CL9	.42271			
Carrier's Dependence	Cdep1	.57678	1	3.19399	63.9
	Cdep2	.58015			
	Cdep3	.79388			
	Cdep4	.78950			
	Cdep5	.45368			

APPENDIX III FACTOR ANALYSIS LOADINGS (continued)

Construct	Variable	Communality	Factor	Eigenvalue	Percent of Variance
Trust	Trust1	.71886	1	7.41325	61.8
	Trust2	.54901	2	1.04998	8.7
	Trust3	.68642			
	Trust4	.67572			
	Trust5	.51245			
	Trust6	.69839			
	Trust7	.73213			
	Trust8	.80754			
	Trust9	.73097			
	Trust10	.79645			
	Trust11	.72227			
	Trust12	.83301			

Rotated Factor Matrix

	Factor 1	Factor 2
Trust1	.76534	.36485
Trust2	.23142	.70388
Trust3	.81466	.15087
Trust4	.11858	.81342
Trust5	.39425	.59750
Trust6	.78085	.29776
Trust7	.82071	.24202
Trust8	.87819	.19060

APPENDIX III FACTOR ANALYSIS LOADINGS (continued)

Construct	Variable	Communality	Factor	Eigenvalue	Percent of Variance
Carrier's Power	Cpow1	.69815	1	4.07638	45.3
	Cpow2	.78568	2	1.01532	11.3
	Cpow3	.15978			
	Cpow4	.40243			
	Cpow5	.59020			
	Cpow6	.67149			
	Cpow7	.53036			
	Cpow8	.59448			
	Cpow9	.57914			

Rotated Factor Matrix

	Factor 1	Factor 2
Cpow1	.31386	.77436
Cpow2	.11760	.87855
Cpow3	.34528	.20140
Cpow4	.61919	.31468
Cpow5	.73947	.20829
Cpow6	.79151	.21212
Cpow7	.69641	.21301
Cpow8	.75721	.14528
Cpow9	.75588	.08828

APPENDIX III FACTOR ANALYSIS LOADINGS (continued)

Construct	Variable	Communality	Factor	Eigenvalue	Percent of Variance
Shippers Dependence	Shdep1	.72155	1	2.39946	60.0
	Shdep3	.93085	2	1.01178	25.3
	Shdep4	.93359			
	Shdep7	.82525			

Rotated Factor Matrix

	Factor 1	Factor 2
Shdep1	.34590	.77583
Shdep3	.95167	.15865
Shdep4	.94399	.20609
Shdep7	.05106	.90699

APPENDIX IV

MEANS, STANDARD DEVIATIONS, AND COORELATIONS

	Mean	SD	τ_1	τ_2	τ_3	τ_4	τ_5	τ_6	τ_7	τ_8	τ_9	τ_{10}	τ_{11}	τ_{12}	τ_{13}
τ_1	2.0671	1.0755	.5130												
τ_2	2.2677	1.0938	.4877	.6240											
τ_4	2.1353	1.0363	.3306	.4630	.5652										
τ_5	2.3172	.9924	.4392	.4585	.5750	.4665									
τ_6	2.2484	.9671	.4086	.4432	.4734	.5013	.5461								
τ_7	3.5090	1.0983	.1420	.0729	.0729	.0102	.0224	.0431							
τ_8	3.8317	1.0944	.0587	.0504	.0564	.0355	.0116	.0583	.5948						
τ_9	3.2743	1.0582	.1069	.0783	-.0162	.0276	.0207	.0246	.5250	.3311					
τ_{10}	3.6323	1.0816	.0708	.0998	.0224	.0104	-.0169	.0312	.6070	.5490	.5959				
τ_{11}	3.8617	1.0134	.0505	.0497	-.0080	-.0082	-.0460	.0314	.6029	.6058	.4970	.7316			
τ_{12}	3.6670	1.0553	.1342	.1202	.0542	.0613	.0676	.0506	.5284	.5800	.4126	.5120	.5588		
τ_{13}	3.7518	1.0513	.0850	.0222	-.0254	-.0022	.0276	-.0036	.5382	.4602	.5173	.5516	.5918	.4927	
τ_{14}	-.2002	1.0280	.1071	.0867	.0559	.0089	.0793	.0984	.3785	.3699	.3180	.3487	.3545	.3542	.2792
τ_{15}	-.1690	1.2657	.0931	.1085	.0511	.0875	.0117	.0667	.3392	.5441	.2671	.4225	.4005	.4051	.2436
τ_{16}	-.0420	1.0774	.1045	.0918	.0736	.0648	.0800	.0928	.2998	.2766	.3531	.4317	.3636	.3456	.3316
τ_{17}	-.0594	1.2632	.0682	.1015	.0516	.0228	.0236	.0971	.3820	.4332	.3323	.4990	.5210	.3764	.3513
τ_{18}	-.0538	1.2172	.0848	.0671	.0495	.0341	.0149	.0743	.3701	.4293	.3006	.4504	.5136	.3883	.3309
τ_{19}	-.0204	.9687	.1102	.1179	.0655	.1392	.0352	.1043	.3470	.4304	.2370	.3521	.3789	.4378	.2553
τ_{20}	-.0379	.8566	.1087	.1080	.0856	.0324	.1247	.1026	.3054	.2962	.2962	.3426	.3266	.3148	.4063
τ_{21}	3.9004	1.1166	.0300	.0618	.0595	.0113	-.0258	.0368	.5100	.5412	.3689	.5213	.5921	.4636	.4111
τ_{22}	3.8809	1.2071	.0245	.0902	.0252	-.0115	-.0566	.0244	.4916	.5286	.4012	.5486	.6052	.4286	.4264
τ_{23}	4.0843	1.0724	.0136	.0867	.0657	.0335	-.0088	.0402	.4417	.4953	.3379	.4972	.5794	.4213	.4276
τ_{24}	4.0441	1.0413	.0695	.1022	.0352	-.0198	-.0402	.0307	.4569	.4789	.3455	.4861	.5391	.4322	.3945
τ_{25}	4.0786	1.0861	.0614	.1143	.0398	-.0186	-.0443	.0347	.5068	.5237	.3879	.5560	.6166	.4561	.4608
τ_{26}	4.2868	.9438	.0011	.0286	-.0288	-.0311	-.0257	.0324	.3672	.4011	.3049	.4581	.4797	.3642	.3838
τ_{27}	3.9943	1.0237	.0254	.0387	-.0834	-.0348	-.0151	-.0238	.4235	.4335	.3452	.4951	.4733	.3765	.3916
τ_{28}	4.1281	1.0617	-.0126	.0351	-.0531	-.0826	-.0681	-.0156	.4304	.4345	.2925	.4926	.5417	.3996	.4023
τ_{29}	4.1950	1.0153	.0379	.0522	-.0150	-.0089	-.0121	.0106	.4404	.4218	.2990	.4749	.5334	.4185	.4105
τ_{30}	4.2065	.9425	.0402	.0422	-.0180	-.0238	-.0071	-.0255	.4128	.3941	.3128	.4360	.4624	.3704	.4086
τ_{31}	4.2294	.9966	.0014	.0403	-.0174	-.0518	-.0475	-.0219	.4412	.4110	.3024	.5082	.5127	.3950	.4220
τ_{32}	4.1147	1.0238	.0321	.0524	.0295	-.0328	-.0449	.0050	.4753	.4687	.3064	.5352	.5817	.4297	.4315
τ_{33}	4.2524	.9104	.0201	.0841	.0161	.0181	.0035	.0412	.4566	.4550	.3363	.5048	.5806	.4224	.4767
τ_{34}	4.1816	.9901	.0272	.0606	.0160	-.0088	-.0257	.0021	.4258	.4260	.3304	.5031	.5036	.4070	.4161
τ_{35}	3.6143	1.3920	.0255	.0627	.0172	-.0083	-.0030	.0262	.4098	.3939	.3328	.4397	.4618	.3099	.3391
τ_{36}	2.9503	1.5565	.0499	.0546	.0057	-.0092	.0420	-.0029	.3130	.2972	.2228	.3260	.3415	.3215	.2620
τ_{37}	3.4914	1.4214	.0267	.0764	.0077	.0041	.0483	.0244	.3790	.3824	.3393	.4357	.4399	.3208	.3233
τ_{38}	2.8413	1.4462	.0636	.1048	.0170	-.0059	.0056	.0504	.2963	.3463	.3234	.3984	.3615	.3134	.3533

APPENDIX IV (continued)

MEANS, STANDARD DEVIATIONS, AND COORELATIONS

	Mean	SD	τ_{14}	τ_{15}	τ_{16}	τ_{17}	τ_{18}	τ_{19}	τ_{20}	τ_{21}	τ_{22}	τ_{23}	τ_{24}	τ_{25}	τ_{26}
τ_1	2.0671	1.0755													
τ_2	2.2677	1.0938													
τ_3	2.1353	1.0363													
τ_4	2.3172	.9924													
τ_5	1.7923	1.0717													
τ_6	2.2484	.9671													
τ_7	3.5090	1.0983													
τ_8	3.8617	1.0944													
τ_9	3.2743	1.0582													
τ_{10}	3.6323	1.0816													
τ_{11}	3.8617	1.0134													
τ_{12}	3.6670	1.0553													
τ_{13}	3.7518	1.0513													
τ_{14}	-.2002	1.0280													
τ_{15}	-.1690	1.2657	.5514												
τ_{16}	-.0420	1.0774	.5316	.4483											
τ_{17}	-.0594	1.2632	.5831	.5984	.5951										
τ_{18}	-.0538	1.2172	.5280	.6046	.5458	.7808									
τ_{19}	-.0204	.9687	.4944	.6483	.4629	.5670	.5778								
τ_{20}	-.0379	.8566	.4732	.3658	.5292	.5253	.4851	.4735							
τ_{21}	3.9004	1.1166	.5234	.5392	.4983	.5655	.5420	.4566	.4428						
τ_{22}	3.8809	1.2071	.5396	.5346	.4900	.5961	.5345	.4531	.4348	.8681					
τ_{23}	4.0786	1.0724	.4629	.4654	.4639	.5067	.4918	.4152	.3905	.7990	.7862				
τ_{24}	4.0441	1.0413	.5019	.4891	.4684	.5309	.4826	.3968	.4180	.7914	.7860	.7498			
τ_{25}	4.0786	1.0861	.5043	.5092	.4727	.5867	.5376	.4353	.4408	.8136	.8473	.8068	.8744		
τ_{26}	4.2868	.9438	.3041	.3587	.2884	.4065	.4087	.3162	.2502	.4838	.4843	.4698	.4002	.4785	
τ_{27}	3.9943	1.0237	.3007	.3436	.2900	.4083	.3719	.3064	.1875	.4842	.4911	.4836	.4152	.4912	.6739
τ_{28}	4.1281	1.0617	.3141	.3640	.2813	.4484	.4284	.2842	.2343	.4846	.5231	.4703	.4180	.5256	.6712
τ_{29}	4.1950	1.0153	.3050	.3200	.2750	.4271	.3977	.3187	.2817	.5064	.4987	.4570	.4475	.5213	.7180
τ_{30}	4.2065	.9425	.2773	.2905	.2732	.3749	.3164	.2777	.2170	.4750	.4833	.4790	.3927	.4723	.6871
τ_{31}	4.2294	.9966	.2726	.3150	.2776	.3805	.3450	.2870	.2528	.4902	.5303	.4862	.4121	.5021	.7835
τ_{32}	4.1147	1.0238	.3698	.4092	.3294	.5212	.5039	.3525	.3356	.5816	.5940	.5442	.4965	.6068	.7351
τ_{33}	4.2524	.9104	.2979	.2986	.2676	.4285	.3856	.2803	.2594	.5070	.5171	.5190	.4782	.5552	.6859
τ_{34}	4.1816	.9901	.2851	.3464	.3224	.4330	.3713	.2998	.2729	.5123	.5248	.4995	.4361	.5315	.7108
τ_{35}	3.6143	1.3920	.3251	.3617	.3440	.3821	.3879	.3334	.3406	.5453	.5429	.6097	.5042	.5820	.3665
τ_{36}	2.9503	1.5565	.2357	.2848	.2359	.2760	.2872	.2323	.2174	.3162	.3417	.4075	.3465	.4033	.2977
τ_{37}	3.4914	1.4214	.2956	.3250	.3099	.3671	.3596	.2236	.2682	.4533	.4851	.5520	.4592	.5330	.4202
τ_{38}	2.8413	1.4462	.3605	.3467	.3266	.3910	.3768	.2804	.3100	.4245	.4871	.4592	.4086	.4689	.2968

APPENDIX IV (continued)

MEANS, STANDARD DEVIATIONS, AND COORELATIONS

	Mean	SD	τ_{27}	τ_{28}	τ_{29}	τ_{30}	τ_{31}	τ_{32}	τ_{33}	τ_{34}	τ_{35}	τ_{36}	τ_{37}	τ_{38}
τ_1	2.0671	1.0755												
τ_2	2.2677	1.0938												
τ_3	2.1353	1.0363												
τ_4	2.3172	.9924												
τ_5	1.7923	1.0717												
τ_6	2.2484	.9671												
τ_7	3.5090	1.0983												
τ_8	3.8317	1.0944												
τ_9	3.2743	1.0582												
τ_{10}	3.6323	1.0816												
τ_{11}	3.8617	1.0134												
τ_{12}	3.6670	1.0553												
τ_{13}	3.7518	1.0513												
τ_{14}	-.2002	1.0280												
τ_{15}	-.1690	1.2657												
τ_{16}	-.0420	1.0774												
τ_{17}	-.0594	1.2632												
τ_{18}	-.0538	1.2172												
τ_{19}	-.0204	.9687												
τ_{20}	-.0379	.8566												
τ_{21}	3.9004	1.1166												
τ_{22}	3.8809	1.2071												
τ_{23}	4.0843	1.0724												
τ_{24}	4.0441	1.0413												
τ_{25}	4.0786	1.0861												
τ_{26}	4.2868	.9438												
τ_{27}	3.9943	1.0237												
τ_{28}	4.1231	1.0617	.6495											
τ_{29}	4.1950	1.0153	.6408	.7901										
τ_{30}	4.2065	.9425	.7538	.7073	.7583									
τ_{31}	4.2294	.9966	.6516	.7250	.7267	.7418								
τ_{32}	4.1147	1.0237	.6733	.8024	.7983	.7120	.7771							
τ_{33}	4.2524	.9104	.6408	.7498	.8095	.7538	.7228	.7925						
τ_{34}	4.1816	.9901	.7665	.7330	.7560	.8815	.7742	.7637	.7572					
τ_{35}	3.6143	1.3920	.3271	.3587	.3503	.3196	.3736	.4186	.3680	.3634				
τ_{36}	2.9503	1.5565	.2796	.2745	.2637	.2536	.2993	.3502	.2830	.2569	.5915			
τ_{37}	3.4914	1.4214	.3898	.4278	.3947	.3878	.4560	.4950	.4373	.4174	.6564	.5917		
τ_{38}	2.8413	1.4462	.3141	.3371	.3350	.3319	.3309	.3775	.3277	.3483	.4583	.3965	.5023	

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