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Cargo Logistics Airlift Systems Study (CLASS)

Volume 2. Case Study Approach and Results

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CARGO/LOGISTICS AIRLIFT SYSTEMS STUDY (CLASS)

VOLUME II – CASE STUDY APPROACH AND RESULTS

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PREFACE

In June 1977, the Douglas Aircraft Company (DAC) was awarded Contract No. NAS1-14948 for the Advanced System Division (ASD) of NASA/Langley Research Center, Langley Field, Virginia, to perform a Cargo/Logistics Airlift System Study (CLASS). The scope of this study as defined by the NASA Work Statement was as follows:

- Characterize current air cargo operations
- Survey shippers to determine nature of demand
- Develop commodity characteristics leading to high elegibility for air transport
- Determine sensitivity of demand to improved efficiency
- Identify research and technology requirements

To comply with the scope of the study, the effort was segregated into five discrete tasks.

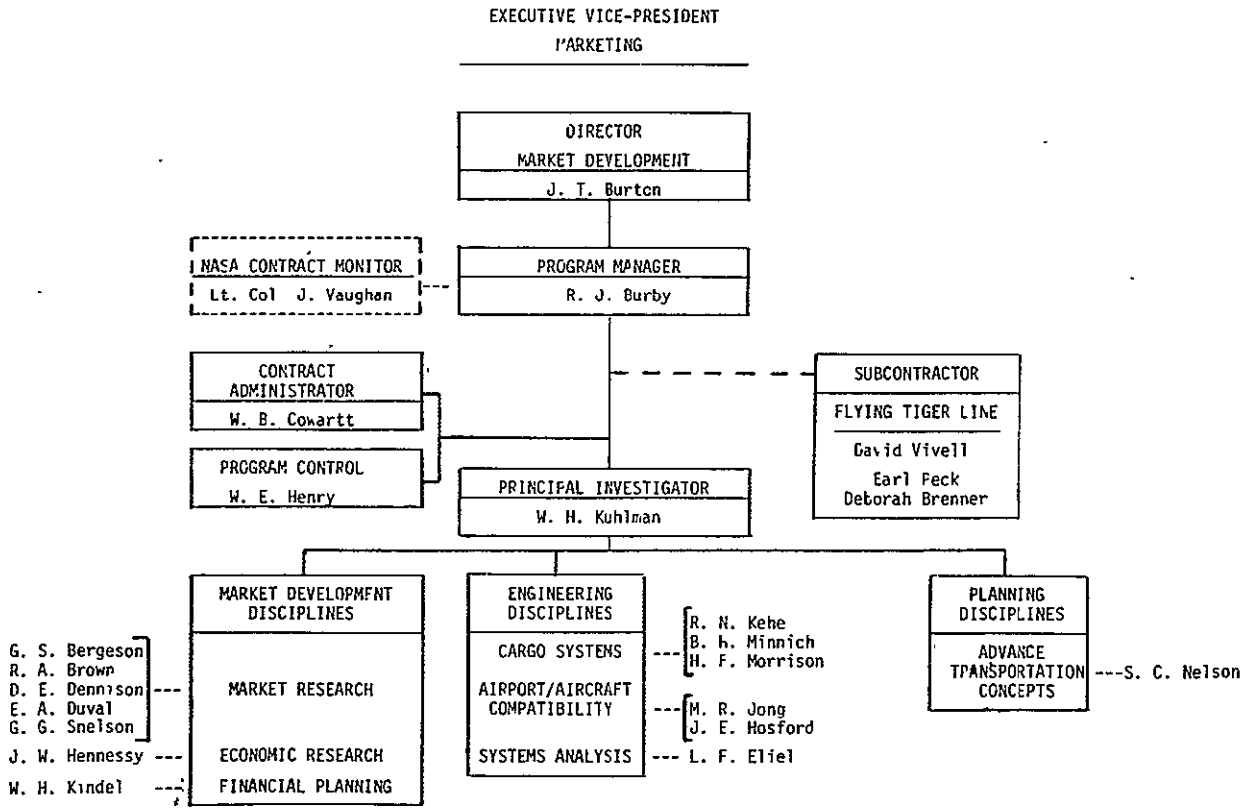
Task 1 was the analysis of the current air cargo system with the objective of clearly understanding what the air cargo operation is today and how prevailing conditions might impact on the 1990 time period. It can be noted here that during the preparation of the Task 1 report deregulation of the air cargo industry was signed into law. The affects of this legislation are not reported and the discussion is maintained as originally written prior to the legislation. This approach was taken in consideration for the short term during which any observation would be presumptuous.

Task 2 was to perform case studies with the objective of determing current distribution characteristics, total distribution cost concepts and their application, and the factors the consignor or consignee considered in their transport mode selection. Concurrent with the case studies was the development of a 1990 scenario designed to provide a framework for the total future environment, within which a 1990 market forecast and the 1990 system characteristics are postulated.

The findings of Tasks 1 and 2 provided the basic information necessary to accomplish Task 3, which was to define the characteristics and require-

ments for the 1990 system. In this task, the market and system growth factors were identified followed by a domestic and international forecast of the 1990 freight market.

The objective of Task 4 was to explain the cross impacts that exist between the air cargo market, technology development and implementation, and the operation of the air physical distribution system. Emphasis was placed upon identifying the factors which had to be considered to measure the possibility of achieving the NASA-defined goals of a 30-percent reduction in aircraft direct operation costs, a 40-percent reduction in indirect operating costs, and a 45-percent reduction in total operating costs. Task 5 identified future system and technology studies and was conducted as an integral effort within all tasks.



The Douglas CLASS study organization is shown above. Douglas is pleased

to acknowledge the excellent contribution made to the project by personnel of the Flying Tiger Line and, in particular, David Vivell, Director of Marketing Research; Earl Peck, Senior Economic Analyst; and Deborah Brenner, Director Advertising. It should be noted that the Flying Tiger team had prime responsibility for Sections 2, 4 and 5 of Volume I; Case Study Approach and Results, Volume II; and Section 6 of Volume III. In addition, they contributed to Section 5 and assisted in the analysis encompassed by Section 2 of Volume I. Douglas appreciates the keen interest and support provided by the NASA contract monitor Lt. Col. John Vaughan.

The study results comprise five volumes:

- Volume I - Analysis of Current Air Cargo Systems, NASA CR158912
- Volume II - Case Study Approach and Results, NASA CR158913
- Volume III - Cross Impact Between the 1990 Market and the Air Physical Distribution Systems
- Volume IV - Future Requirements of Dedicated Freighter Aircraft to Year 2008, NASA CR158950
- Volume V - Summary, NASA CR158951

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SUMMARY

The overall purpose of the case study research was to develop models of transportation mode decision-making and to obtain the user view of present and future air cargo systems. Some major findings resulting from this research are as follows:

- Shippers felt that the biggest airfreight problems are those associated with ground support and handling (airport congestion, pickup and delivery, operational procedures, customer service techniques, etc.) rather than the airport-to-airport segment.
- Shippers expressed limited interest in containerization. Containers are perceived as having a certain ability to provide a customer service to a specific segment, i.e., forwarders and large shippers, not small-shipment customers. Also, individual shippers would not increase their airfreight usage even if they improved their ability to load and handle containers.
- Essentially, shippers are primarily concerned with fast and reliable service rather than price, type of aircraft, availability of containers, or lift.
- Most shippers prefer using freight forwarders rather than dealing directly with the airlines. Most do not prefer having one company handle all their airfreight shipping needs.
- Vis-a-vis the airlines (particularly the combination carriers) the airfreight forwarder is viewed as providing better service and better satisfying the firm's airfreight shipping needs.
- Air carrier cargo sales personnel are often viewed as "unprofessional" and specifically lacking necessary product knowledge.
- Firms that consider themselves the dominant competitor in their markets use airfreight to a greater extent and with greater frequency than do other firms.
- Most shippers felt that intermodal capability will be a vital element of the future transportation system.

- Most airfreight is not currently price-sensitive. In fact, most shippers were unresponsive to a 30% rate reduction.
- The choice between air and surface is made on the basis of total service.
- Although most respondents said that the effectiveness of distribution systems is dependent upon inventory control, few felt that Inventory Carrying Cost (ICC) is an important element in the transportation mode selection process.

The use of depth interviews and a large-scale mail survey allowed for the development and testing of hypotheses relating to considered issues. This summary delineates integrated findings derived from these depth interviews and the mail survey and is organized under the following major topics.

Organization of the Distribution Function
Mode Choice Decision Making
Today's Airfreight System
The Future of Airfreight

Organization of the Distribution Function

The organization of the distribution function was examined because it can have direct influence on mode choice decision-making. Firms can be centralized or decentralized and have formal or informal interaction between upper management and staff which consequently affects how and why mode choice decisions are made.

Informal interaction with other functions.— Both the depth interview and mail survey results indicate that in the majority of cases, the distribution function interacts informally with upper management in Finance, Marketing and Production. Thus, while no formal standard interaction systems were apparent, it was clear that the distribution function is aware and sensitive to the needs of the other functions, as the collective needs of these other functions, in a fashion, dictate the traffic system.

Trend toward centralization in distribution decision-making. - Another aspect of the distribution function is the classification of companies as centralized or decentralized. The depth interviews indicate an almost even breakdown between centralized and decentralized firms. Centralized firms are primarily those termed distributors and professional service firms and decentralized firms tend to be manufacturers.

A trend toward greater centralization in distribution decision-making was identified in the mail survey results. The current decentralized nature of most manufacturing firms, however, presents a potential obstacle for the use of the Total Distribution Cost (TDC) concept because the viability of TDC is dependent upon the higher quality and totality of information that may be difficult to obtain in a decentralized environment.

Mode Choice Decision-Making

In this section the following factors relative to mode choice decision-making will be discussed:

- Consignee involvement
- Total service
- Mode choice decision criteria
- Use of total cost concept

Consignee involvement. - The depth interviews found that although it is difficult to generalize about mode decision-making behavior in each company, the high involvement of the consignee is unmistakable. This may be because the circumstances that surround the use of airfreight are related to market considerations. Since the economic impact of these circumstances are borne by the consignee, it follows that the consignee should make the mode choice.

However, this finding was refuted by the mail survey finding that consignee involvement in the mode decision process is less influential than the shipper, especially for heavy airfreight users. One possible hypothesis is that when the mode decision becomes routine (repetitive) the consignor assumes more responsibility for the decision. It is interesting to note, however, that

when the firm itself is the consignee, they decide the transportation mode in almost 60 percent of the cases. This apparent contradiction may be the result of subjective bias.

Total service. - If firms can be competitive in the marketplace using surface, that mode will prevail. The choice between air and surface is made on the basis of total service with consideration for the cost/benefit trade-offs. However, airfreight is often viewed as a tool that used routinely can give the shipper a competitive edge. In addition, over 30 percent of the respondents agreed that the use of airfreight is beneficial as a supplementary mode to surface in order to optimize their distribution systems.

In the depth interviews, some shippers leaned toward using surface rather than air because adequate air service did not exist where their manufacturing facilities were located. In those cases, transit times of trucks approached those of air at considerably lower cost. In fact, several shippers operate their own truck fleets for intercompany and intra-company transfers. This allows them to meet their transportation requirements at a lower cost, with greater flexibility and control than with other existing alternatives. This situation, in part, points to the problems shippers experience with mode interchange and ground support and handling systems.

The depth interviews found that most firms use airfreight on an "emergency only" basis. This was supported by the mail survey results. The most common situations defined as "emergency only" include plant breakdowns, distribution of samples, customer request, or deadlines. This "emergency only" use applied to most industries, except for those shipping perishables and high value per pound products. These firms tend to use airfreight due to the nature or economics of their products. It should be emplasized that the term "emergency only" is generic. The specific meaning varies widely.

Mode choice decision criteria. - The decision criteria involved in mode choice includes the transportation budget, inventory carrying costs, competition and many aspects related to marketing and customer service considerations.

The transportation budget: The transportation budget obviously influences mode choice by forcing shippers to use the most economical method of distribution.

As the total production cost of a product decreases the distribution costs increase in importance.

Inventory carrying cost (ICC):. Most of the respondents said that the ability to control inventory levels was an important factor in evaluating the effectiveness of their company's distribution system. However, a majority also stated that even though an ICC is calculated, it is not necessarily important in mode choice. A possible explanation is that ICC is not fully understood or correctly implemented by shippers. Another possible explanation is that the marketing and customer service considerations override ICC considerations.

Competition and customer service: The market in which most of the respondents function can be described as extremely competitive with many firms vying for a higher market share. In such a market, a high level of customer service is an important advantage. Most respondents felt that a high level of customer service could be maintained by surface transportation, yet if the use of airfreight gave them the competitive lead, it would be utilized. Heavy airfreight users (electronics, chemicals, manchinery manufacturers, etc.) and/or high value per pound producers tend to use airfreight less for customer service reasons than for reasons relating to the nature of their product (less pilferage, damage, insurance, etc.).

Use of total cost concept (TDC). - It was determined in the depth interviews and mail survey that rational cost/benefit tradeoffs are employed in mode choice yet formal use of the total distribution (TDC) is not widespread. Awareness of TDC is evident, yet its comprehension or use is not so evident. An important finding from the mail survey suggests that those who claim to use TDC in mode choice are not the heavy airfreight users, they are not choosing the planned use of airfreight when applying TDC concepts to their distribution system. It is suggested that perhaps firms are using TDC in an unsystematic manner or are employing the wrong costs and benefits in their tradeoff analysis. If this is true, it may be time to redefine or clarify TDC for shipper's use.

TDC is a cumpersome concept, regardless of its appeal. It can be difficult to use, for in many cases, transportation costs are viewed in isolation, and many necessary inputs may not be readily available. Some depth interview respondents claimed that the cost of implementing a TDC study can outweight the benefits

Both airlines and forwards feel there is a need for educating shippers regarding TDC, yet their lack of success thus far is blamed in part on the fact that these efforts appear to be self-serving.

Even if barriers to the complete use of TDC were overcome, mode decisions may not change. Mode choice decisions may be altered only through changes in the values attached to the major components of the TDC concept. This may suggest that the TDC model, in its current state of development, may not be valid as it pertains to the air mode decision.

Today's Airfreight System

The forwarder/airline relationship is at once competitive and mutually necessary. The forwarder is engaged in receiving goods and expediting their delivery. Thus, forwarders rely on the airlines for the airport-to-airport portion of the delivery process. The airlines, in turn, depend on the forwarders for the majority of their business since much freight is tendered through forwarders rather than airlines for the services they offer. For this same reason, forwarders are also airlines' biggest competitor.

The forwarder is viewed as the key element in the airfreight market because they more frequently meet the needs of the shipper. Forwarders are perceived as offering the following advantages better than do the airlines.

- Better tracing
- Door-to-door service
- Total possession of the freight
- The ability to set up the booking and guarantee the shipment will make a specific flight
- Documentation and follow-up capabilities

The freight forwarder is viewed as more sensitive to shippers' problems and needs.

In contrast, the airlines are seen as often not being responsive to shippers' or forwarders needs. They are viewed as being primarily concerned with airport-to-airport operations and large volumes of freight. Other problems cited in dealing with airlines relate to tracing, ground handling of freight, lack of lift to and from appropriate cities and the lack of availability of freighters. This inadequate service appears to be a significant barrier to increased airfreight use and caused shippers to have a negative cargo image about most U.S. airlines. However, some of these findings were not supported by the mail survey results where most respondents (primarily the manufacturers) felt that lift, frequency of service and capacity were adequate.

The forwarders interviewed complained that in spite of the high percentage of freight they represent to the airlines, the airlines rarely include them in the decision-making process for rates and schedules. On this issue, there is some suggestion that there may be a lack of total forwarder understanding of the economics of providing linehaul service.

The Future of Airfreight

Overall, the future of airfreight is described in cautious terms. Respondents' ideas as to the future of airfreight are described as they relate to the following pertinent system factors:

- Airline/forwarder relationship
- Deregulation
- 30 percent rate reduction
- Intermodality
- Aircraft

Airline/Forwarder relationship. - Forwarders, who are not only very dependent on the airlines but supply them with the majority of their freight, advocate better communication in a partnership relationship with the airlines.

They see their competitive image as counter productive to the whole industry. Although there are no specific shipper opinions on this subject in the survey results it is non the less evident that this relationship, good or bad, will impact the service provided to them.

Deregulation. - The concept of deregulation was explored in the personal depth interviews. There was no dominant opinion regarding deregulation. On one hand, respondents felt that competition (which will increase due to deregulation) will cause a reduction in rates. On the other hand, some shippers were concerned about the possibility of monopoly and felt that transportation is a form of utility which has to be protected.

Many of those interviewed thought regulatory reform might spawn another type of airfreight service. The demise of the combination carriers was predicted because freight markets are different than passenger markets. "Airlines per se won't be in the airfreight business -- they will carry people. And there will be an uncompromised freighter aircraft that will service airfreight markets only."

30 percent rate reduction. - Shippers were generally unresponsive to a 30 percent rate reduction. The interest in such a rate reduction was significantly higher with heavy airfreight users and higher value/pound producers. Some respondents felt that a 60-70 percent reduction would be required to stimulate substantial demand in the area of planned, volume shipments.

Intermodality. - One depth interview finding was that airlines' view of service and intermodality is generally production-oriented. This production orientation is characterized by emphasis on finding ways of increasing output rather than meeting customer needs, again confirming airlines' unresponsiveness to shippers' needs. In contrast to the airlines, shippers define intermodality in terms of their service needs, in which case it has strong appeal. They feel intermodality will:

- o Achieve the need for efficient door-to-door transportation,
- o Provide single carrier responsibility,
- o Benefit all shipment sizes, whether large or small.

Aircraft. - The future airfreight system will necessitate a more economical aircraft, of different sizes, designed for different markets. There will be aircraft providing service to/from major hubs and larger, long-haul aircraft between major hubs. There was not too much consideration given to the types of aircraft or their performance due to the fact that shippers are not concerned with aircraft, per se, but with services provided and rates charged.

Section 1

INTRODUCTION

For some time it has been apparent that the air cargo system in the United States is reaching a level of activity which requires careful consideration of changes necessary for an orderly growth into the future. The CLASS program was an attempt to define many of those changes with emphasis on obtaining design guidelines for future air cargo transports and insight into what technology studies should be made to support such a program. In essence, the bottom line intent of this program is to test shipper receptiveness to a new product.

In order to accomplish these goals it was necessary to understand clearly the following: what the air cargo operation is today and what it may be tomorrow; what the important factors are that determine if cargo is transported by air today and what they are likely to be in the future; what aspects of the whole cargo system would contribute to increasing the number of products considered air eligible; how a more efficient cargo operation could increase the volume of freight carried by air; preliminary aircraft design characteristics and research and design requirements.

The first two areas are those around which the case studies centered. The overall purpose of the case study research was to develop models of transportation mode decision-making and to obtain the user view of present and future air cargo systems.

Approach to Research

Through this research, we are essentially testing receptiveness to a new product. The complexity of this task is made evident by the danger of soliciting opinions which are easily formed in the respondent's mind but which have no relation to the respondent's actual behavior.

Thus, the approach taken in addressing the issues to be examined was to minimize self-reported reactions to new airfreight product concepts. This is because there are inherent drawbacks in the traditional techniques that rely on self-reporting. In other words, what respondents say about using a suggested future concept and what they will actually do when presented with all future choices in a changed future environment may be different. In fact, during the personal interviews, any specific ideas on future airfreight systems given by the interviewer were readily endorsed by the respondents. For this reason the acquisition of data and subsequent analyses were directed toward understanding the shipper's needs and motivations and out of that to draw inferences for the future. This approach was used in lieu of presenting shippers with ideas for the future and being certain they will choose whichever of these ideas appear to be better at the moment without due consideration for their own anticipated future behavior.

There are many distinct advantages in drawing inferences from observing and measuring the way buyers make choices between alternatives. Consequently, the effort concentrated on the decision-making process and criteria underlying mode choice, since the most valid research is that which observes and measures actual behavior, not opinions. By concentrating on what people actually do rather than what they might do, the effort has a greater potential to provide a useful and valid basis for understanding potential airfreight user response to alterations in their mode choice alternatives.

In today's state-of-the-art, the optimal technique for testing the way shippers make choices between alternatives is through the use of Conjoint Analysis. This measurement technique requires a respondent to consider "trade-offs" among desirable alternatives. Although this approach was beyond the resources allotted for this study, understanding today's mode decision-making process and choice criteria are vital steps in the development of a Conjoint Analysis research project. Therefore, we recommend that a future project use Conjoint Analysis to observe preference behavior.

Research Objectives and Scope

The overall purpose of the case study research was to develop models of transportation mode decision-making and to obtain the user view of present and future air cargo systems. In order to develop these transportation mode decision-making models, the variables underlying the choice of mode and an evaluation of these variables by shippers was performed. This was done by considering future distribution systems and assessing shippers' sensitivity to a total cost approach to distribution now and in the future. Specifically, the use of personal depth interviews clarified the issues raised above, and the use of a large-scale survey tested these issues.

The rationale for this approach was discussed in the Technical Proposal of January 24, 1977, and in the Case Study Approach for Approval of June 23, 1977. For clarity portions of these discussions are repeated here as an introduction to the methodology that follows.

"For some time it has been apparent that the air cargo system in the United States is reaching a level of activity which requires careful consideration of the changes necessary for an orderly growth into the future. This proposed study will define many of those changes with emphasis on obtaining design guidelines for future air cargo transports and insight into what technology studies should be made to support the program.

The analysis of the current air cargo system should provide a careful definition of the characteristics of airfreight users and the nature of airfreight demand. However, the case study program will add two critical dimensions to the analysis. In the first place, it will enable us to develop a more causal rather than descriptive definition of current and potential air cargo demand. Secondly, it will provide the opportunity to gain insight into shipper sensitivity to the specifications of the 1990 air cargo transportation scenario. Because this primary research is so important to an accurate assessment of the potential for a dedicated freighter aircraft, we are proposing an expansion of this phase of the project. The nature of this expansion will be apparent in the description of the survey methodology.

Indeed, it is an assumption of this project that the potential for increased airfreight penetration will be based largely on shipper response to new levels of airfreight service and rates arising from an advanced dedicated cargo aircraft. Because of this assumption, it is critically important to define the processes by which transportation mode decisions are made.

The variables underlying the choice of mode, how shippers assess these variables and make transportation decisions must be determined. This must be done by considering the future dimensions of distribution systems and shippers' receptiveness to a total cost approach to distribution in light of improved service and rates resulting from an advanced freighter aircraft.

The outcome of the research will be a segmentation of airfreight demand and of the transportation mode decision-making process.

This causal definition of current and potential demand for airfreight will enhance the validity of the forecasts which will follow. The results will also produce insight into shippers' definitions of distribution systems of the future and the potential role of airfreight given improvement and innovations in service and rates."

Guided by the preceding rationale the scope and depth of the interview and mail survey portions of the effort were defined in terms of issues as affected by overall study objectives. Among the more pertinent issues that were explored are:

- Factors important to users and non-users of airfreight in their transportation mode decision.
- The role of the total cost of distribution concept in shippers' mode decision process and how it will change in the future.
- The dimensions of shippers' current and future distribution systems.
- Non-user mode decision criteria in relation to the air cargo system now and in the future.
- Shipper requirements for the 1990 airfreight system.
- Regulations and other external influences that affect elements of shippers' distribution processes.

Research Methodology

The case study research design consisted of two phases -- the personal depth interviews and a large-scale mail survey. These case studies of selected major users and major potential users of airfreight were conducted to determine the current and potential nature of the demand for airfreight. The use of depth interviews and a large/scale mail survey was a means of achieving realism in documenting current distribution characteristics and developing the requirements for projected cargo market and system demand for 1990.

Depth interviews. - The personal interview, especially when coupled with a mail survey, is an indispensable research tool, yielding data that no other research tool can yield. It is an exploratory device that helps identify variables and relations, suggests hypotheses, guides other phases of the research or acts as the main instrument of the research. The personal interview is adaptable and uniquely suited to exploration in depth.

An in-depth interview questionnaire was developed based upon a literature review as well as on Flying Tigers' experience with a number of surveys on transportation decision-making which used a variety of survey techniques. Consideration was given to the unique interests of the user as evidenced in Table 1-1 for the shippers and professional firms, in Table 1-2 for the airlines and Table 1-3 for the forwarders. These questionnaires were used as a guide by the interviewers to assure that no pertinent areas were overlooked.

The depth interviews consisted of a series of open-ended questions which acted as a frame of reference for respondents' answers, but put a minimum of restraint on the answers and their expression. These questions allowed for the exploration of issues through probing and the subsequent development of hypotheses. An example of this probing technique is shown in the following excerpt from an actual depth interview:

Q. "You do use a forwarder though, to put together your shipments?"

A. "Yes."

Q. "What's the reason for that?"

A. "It takes a lot of people to make a shipment, and because of follow-up, control of the shipment, arrival or schedule. But, we let the forwarder do that, rather than do it ourselves."

TABLE 1-1

QUESTIONS FOR TRANSPORTATION CASE STUDIES

SHIPPER DEPTH INTERVIEWS

A. Decision-Making

1. Do you use airfreight? As a normal part of your distribution system? For emergency shipments only? How often do you use airfreight?

2. Why do you use airfreight? Why don't you use airfreight? What are the important factors in your choice of airfreight, surface (truck, rail, ocean)?

3. Who usually makes the decision for your shipments to go by airfreight? Who else is usually involved in the airfreight decision?

4. Who usually makes the decision for your surface shipments? Who else is usually involved in those decisions? What discriminating variables are considered?

5. Who usually pays the cost of airfreight? Who usually pays the cost of surface shipments?

6. Do you have an actual transportation policy? For air? For surface? Who is/was involved in its formulation? Is it formal (written) or informal? Inbound/outbound? Are there deviations? How are they handled?

7. Are you familiar with the total cost of distribution concept? Are records adequate to apply TDC? Does it play a role in your transportation mode decision? In what way? Will it become more important or less important in the future? Why?

8. Do you prefer shipping on combination aircraft or all freighters?

9. Do you use containers?

B. The Organization of the Logistics Function

1. How is distribution/logistics function organized in the firm?
   1) Organization chart?
   2) Reporting relationships?
   3) Functions and responsibilities?

2. Does any one department have responsibility for distribution and/or materials management? If so, is this department also accountable for customer service levels and the resulting distribution costs?

3. Is there a formal interface between the Marketing, Finance, Production, and logistical functions of the firm? To what extent is the Logistics Department aware of the firm's marketing and finance objectives as they relate to materials management and physical distribution decisions?

4. What use is made of system analysis and computer application in the distribution and materials management systems?

5. Please describe any recent changes in the distribution system of your firm?

6. What are the major needs not adequately being fulfilled by your distribution system? Will these change in the future? How?

7. What changes do you see in your distribution system in the next 5-10 years?

8. What is the potential for standardized surface/air containerization in your firm?

C. Customer Service

1. Is a measure of customer service made? If so, exactly how is this accomplished?

2. What department has this responsibility?

3. What level is specified?

4. Is this tracked? Compared with historical customer service levels?

5. What criterion is used for specification of the customer service level and what is the relative importance?

6. Is the firm cognizant of the nature of demand for its product? If so, what effect, if any, does this information have on specifying customer service levles?

D. Financial Objectives

1. Does the firm calculate any inventory carrying cost (ICC)?

2. What department has this responsibility?

3. What effect, if any, does this information have on the specification of customer service levels?

4. If an ICC is calculated, what components are included in it and how are they calculated?

5. To what value of inventory is the ICC applied?

E. Other Issues - External

1. What areas of opportunity do you see for airfreight in the next 20 years?

2. What innovations in airline scheduling, equipment or service would you like to see? What innovations in surface transportation (truck, rail, ocean) would you like to see in the future?

3. In your opinion, what is the future of containerized shipping?

4. What regulations in your industry affect your transportation mode decisions? What regulations in the transportation industry affect your distribution decisions?

TABLE 1-2

AIRLINE DEPTH INTERVIEWS

1. Are you familiar with the total cost of distribution concept? What role do you feel it plays in shippers' transportation mode decisions today? Will it change in the future? Why?

2. What do you see as your role in the airfreight process? What do you see as the role of the forwarder in the airfreight process?

2A. What changes in shipper distribution systems do you see in the future? How are these likely to affect your role?

3. What changes do you want in the airfreight process in the next five to ten years? What other changes do you see (i.e., technological advances, regulatory changes)? How will these affect your present role? How will these affect the present role of the forwarder?

4. What innovations in airline scheduling equipment or service do you see in the future?

5. In your opinion, what is the future of containerized shipping?

6. What do you feel is the potential for standarized surface/air containerization?

7. What areas of opportunity do you see for airfreight in the next 20 years?

TABLE 1-3

FORWARDER DEPTH INTERVIEWS

1. Are you familiar with the total cost of distribution concept? What role do you feel it plays in shippers' transportation mode decisions today? Will it change in the future? Why?

2. What do you see as your role in the airfreight process? What do you see as the role of the airline in the airfreight process?

2A. What changes in shipper distribution systems do you see in the future? How will these affect your role?

3. What changes do you want in the airfreight process in the next five to ten years? What other changes do you see (i.e., technological advances, regulatory changes)? How will these affect your present role? How will these affect the present role of the airline?

4. What are your major needs that aren't adequately being met by the airlines at the present time?

5. What innovations in airline scheduling, equipment or service would you like to see?

6. In your opinion, what is the future of containerized shipping?

7. What do you feel is the potential for standarized surface/air containerization?

8. What areas of opportunity do you see for airfreight in the next 20 years?

"It is primarily a monitoring situation rather than a consolidation. We choose a forwarder that has a worldwide network of offices overseas, as well as here, and they can do the job a lot more economically with the monitoring system they have set up than we could do with our own people."

Q. "So the service offered by the forwarder is greater than the cost?"

A. "We set the criteria of what we have to have in the way of service and the forwarder meets that criteria. But in meeting the criteria, we still maintain the right to select the air carrier and we get involved in rate negotiations and everything else. We have not relinquished any of that responsibility."

The sample consisted of 34 interviews among manufactureres, distributors, agricultural businesses, professional service firms (e.g., courier services, financial institutions, and advertising agencies), manufacturers in foreign countries, airlines and forwarders. Both present users and potential users of airfreight were included in the case studies in order to explore the concepts of planned and unplanned emergency use of airfreight and to compare and contrast the user and potential users transportation mode decision criteria as used in their distribution systems. This concept of planned emergency can be explained as follows: As we go beyond pure emergency-type usage we find a user need called "planned emergency." In this process, operational research methods compute the probability of not satisfying the customer demand through normal distribution channels. The matrix of probability indicates the number of times the established distribution system will not satisfy consumer requirements. A decision is then made to warehouse (inventory) the product (or part) downstream in the distribution channel -- or to inventory the product at origin and to utilize air freight. It is this latter case that we refer to as "planned emergency."

Table 1-4 shows the distribution of the interviews among the respective catagories of airfreight users and potential users.

TABLE 1-4

SAMPLE BREAKDOWN BETWEEN USERS AND POTENTIAL USERS OF AIRFREIGHT

		User	Potential User	Total
Manufacturer	14			
Electronics		4	0	4
Apparel		2	0	2
Chemicals		2	2	4
Machinery		2	2	4
Distributor	4	3	1	4
Agrigultural	3	2	1	3
Professional	2	2	0	2
Total - Airfreight Customer	23	17	6	
Airlines	7			
Forwarders	4			
Total - Depth Interview	34			

The shippers were selected according to the following criteria:

1. The top four commodities in domestic U.S. and international air trade were identified.
2. Economic information on manufacturing and population growth were used to determine the geographic segmentation of the sample. Both domestic U.S. and international firms were chosen from among major markets.
3. Only manufacturing firms having over $150 million in sales per year were eligible for selection. We realize the possible bias introduced by this parameter. It was felt, however, that firms in this subset represent the "leading edge" in terms of future transportation requirements.

The interviews were conducted jointly by a DAC and Flying Tiger marketing professionals and lasted approximately two hours. Each interview was taped, and the analysis was done from typed transcriptions. Results provided for the development of hypotheses through the exploration of issues by probing. Because of the small sample size, the data analysis is largely qualitative. Upon completion of the depth interviews, the writing of the mail survey was initiated.

Mail survey. - Mail survey research has the advantage of wide scope -- a great deal of information can be obtained from a large population. Another advantage is the fact that survey research information is accurate, within sampling error. A sample of 500-600 individuals (which was the case in this study) can give a remarkably accurate portrait of a group -- its values, attitudes, and beliefs.

This large-scale mail survey was undertaken in order to statistically test the hypotheses and issues examined in the depth interviews. The depth interviews delt with five major areas of interest:

Organization of the Distribution Function
The Total Cost Concept
Mode Choice
Today's Airfreight System
The Future of Airfreight

While exploring these five areas of discussion, other detailed issues were brought out by those interviewed. The mail survey thus enabled us to question a large number of subjects on these detailed issues. For example, the depth interviews failed to define any patterns for the differences between centralized and decentralized firms in relation to the distribution function organization. In order to explore the issue further, specific questions related to centralization and decentralization were included in the mail survey questionnaire. This technique enabled us to pin down respondents by giving them a specific, closed-ended statement to react to. Thus, in developing the mail survey results, the firms' perceptions of themselves as being centralized or decentralized could be segmented according to average monthly volume of airfreight shipments and high value/pound producers.

In essence, the information obtained from the depth interviews provided the criteria for performing the mail survey. The mail survey, in turn, provided a cross-check against the depth interview findings in that the results substantiated or refuted the findings of the interviews.

The survey questionnaire consisted of 56 closed-ended questions dealing with the five major topics explored in the depth interviews. Respondents were asked to answer these questions using a Likert scale which is a set of

attitude items, all of which are considered of approximately equal "attitude value" (agree strongly, agree, neither agree nor disagree, disagree, disagree strongly). An example of a survey question including the Likert scale is as follows:

"Overnight (next day) airfreight service is mandatory for my company."

Agree Strongly	Agree	Neither Agree Nor Disagree	Disagree	Disagree Strongly
☐	☐	☐	☐	☐

The purpose of the scale is to place an individual somewhere on an agreement continuum of the attitude in question. For example, subjects can "agree" or they can "agree strongly". Using the Likert scale, respondents answered questions with degrees or intensities of agreement or disagreement. An advantage of the use of this scaling technique is a greater amount of variance in the results, therefore more optimally differentiating shipper profiles.

There were also 16 classifying and demographic questions concerning, for example, level of airfreight use, value per pound of products shipped, firm size, staff size and reasons for using airfreight. The purpose of the classifying questions was to categorize respondents and examine the results for differences in responses, or even lack of differences where they would otherwise be anticipated. The form used for the mail survey is presented in Table 1-5.

A random sample of 1,000 distribution executives in the U.S. was used for this survey. A response rate of 20-30 percent was expected and considered normal for this type of survey. However, the survey produced 551 responses which represents a response rate of over 50 percent. The distribution among user categories was as follows:

418 manufacturers
82 distributors
6 professional
45 other

551 total respondents

Table 1-5

MAIL SURVEY FORM

The following are statements with which you may agree or disagree Please read each statement carefully and check the appropriate box

		Agree Strongly	Agree	Neither Agree Nor Disagree	Disagree	Disagree Strongly	Col
1	The transportation manager's performance is primarily measured against budget	☐ -5	☐ -4	☐ -3	☐ -2	☐ -1	4
2.	General management views distribution as merely the transportation budget	☐	☐	☐	☐	☐	5
3	An important factor in evaluating the effectiveness of my company's distribution system is the ability to keep inventory levels under control.	☐	☐	☐	☐	☐	6
4.	My company calculates an inventory carrying cost (ICC).	☐	☐	☐	☐	☐	7
5.	My company calculates an inventory carrying cost (ICC) and it is used as an important element in choosing modes	☐	☐	☐	☐	☐	8
6	Mode choice is primarily a company policy decision made at the level of the top distribution executive	☐	☐	☐	☐	☐	9
7	Mode choice is primarily a company policy decision made at a level of management above the top distribution executive	☐	☐	☐	☐	☐	10
8.	Company top management plays an active role in setting such distribution policies as customer service level and in-stock policies	☐	☐	☐	☐	☐	11
9	The top distribution executive in my company is considered senior management and is integrally involved in general business planning	☐	☐	☐	☐	☐	12
10	A high level of customer service is an important advantage in most of my company's markets	☐	☐	☐	☐	☐	13
11	Competition in most of my company's markets can be described as very competitive	☐	☐	☐	☐	☐	14
12	My company is the dominant competitor in most of its markets	☐	☐	☐	☐	☐	15
13.	My company is in a very concentrated industry where there are only a few competitors	☐	☐	☐	☐	☐	16
14.	My firm can almost always satisfy its customer service objectives by using surface transportation	☐	☐	☐	☐	☐	17
15.	One department has the responsibility for all distribution decisions	☐	☐	☐	☐	☐	18
16	I would characterize my company as being centralized in its mode decisions	☐	☐	☐	☐	☐	19
17.	Day-to day mode selection is made by a traffic manager at each plant location.	☐	☐	☐	☐	☐	20
18.	The headquarters transportation or distribution department acts in an advisory capacity only, as far as mode choice goes	☐	☐	☐	☐	☐	21
19	My company is moving towards greater centralization of distribution decision-making in the future.	☐	☐	☐	☐	☐	22
20	My company uses systems analysis in the distribution and materials management function	☐	☐	☐	☐	☐	23

Table 1-5. - Continued

MAIL SURVEY FORM

		Agree Strongly	Agree	Neither Agree Nor Disagree	Disagree	Disagree Strongly	Col
21.	The information provided by my company's accounting and information systems is useful for making distribution decisions.	☐ -5	☐ -4	☐ -3	☐ -2	☐ -1	24
22.	My company's information and accounting systems are not able to provide the information necessary to make optimum distribution decisions.	☐	☐	☐	☐	☐	25
23.	I have complete confidence in the accuracy of information provided by my firm's accounting and information systems as it relates to making optimum distribution decisions.	☐	☐	☐	☐	☐	26
24.	My company's future distribution system is constrained by warehouses or other fixed assets that it now owns.	☐	☐	☐	☐	☐	27
25.	My company uses airfreight as a routine, planned part of its distribution system	☐	☐	☐	☐	☐	28
26	My company uses airfreight on an unplanned, emergency-only basis.	☐	☐	☐	☐	☐	29
27.	My company uses airfreight as a supplemental mode to surface in order to optimize its distribution system.	☐	☐	☐	☐	☐	30
28.	I feel that my company makes cost/benefit tradeoffs in selecting the transportation mode.	☐	☐	☐	☐	☐	31
29	Truck service is more reliable than airfreight service.	☐	☐	☐	☐	☐	32
30	The consignee's purchasing agent selects the mode of transportation in many cases.	☐	☐	☐	☐	☐	33
31	In terms of mode choice, the consignee is more influential than the shipper.	☐	☐	☐	☐	☐	34
32	When my company is the consignee, we decide the mode of transportation.	☐	☐	☐	☐	☐	35
33	If the differential between surface and airfreight rates were reduced by 30%, my company would use more airfreight.	☐	☐	☐	☐	☐	36
34.	When my company ships by air, an airfreight forwarder usually handles the shipment.	☐	☐	☐	☐	☐	37
35.	My company prefers dealing directly with the airline rather than using an airfreight forwarder.	☐	☐	☐	☐	☐	38
36.	Airfreight forwarders provide better service than the airlines.	☐	☐	☐	☐	☐	39
37.	The airfreight forwarder satisfies my company's airfreight shipping needs	☐	☐	☐	☐	☐	40
38.	I would like one company to handle all my shipping needs — air, truck, rail and ocean	☐	☐	☐	☐	☐	41
39.	The present transportation system does not meet all my company's shipping needs so we have a private motor fleet to fill the gap	☐	☐	☐	☐	☐	42

Table 1-5. - Continued

MAIL SURVEY FORM

		Agree Strongly	Agree	Neither Agree Nor Disagree	Disagree	Disagree Strongly	Col
40	My company would use airfreight more frequently if we had the equipment necessary to load the containers ourselves	☐	☐ -4	☐ -3	☐ -2	☐ -1	43
41.	Overnight (next day) airfreight service is mandatory for my company	☐	☐	☐	☐	☐	44
42	The biggest problem with today's airfreight system is associated with ground handling, airport congestion and pick up and delivery rather than the airport to airport segment	☐	☐	☐	☐	☐	45
43	Scheduled airline service — either combination or cargo — today does not serve the cities my company ships to/from most often.	☐	☐	☐	☐	☐	46
44	Scheduled airline service today does not provide enough frequency of service to cities my company ships to/from most often.	☐	☐	☐	☐	☐	47
45	Scheduled airline service today does not provide enough capacity to cities my company ships to/from most often.	☐	☐	☐	☐	☐	48
46.	I would take lift in any form — freighter or combination — to/from cities where my company's operations are located.	☐	☐	☐	☐	☐	49
47.	The problem with the airlines is that they do not understand my company's shipping needs	☐	☐	☐	☐	☐	50
48	The characteristics of the product(s) my company ships by air frequently necessitate shipping on freighters	☐	☐	☐	☐	☐	51
49.	If my company has the choice, it prefers shipping on freighter aircraft	☐	☐	☐	☐	☐	52
50	My company prefers not to ship in belly containers	☐	☐	☐	☐	☐	53
51.	Intermodal capabilities are a vital element of the future transportation system	☐	☐	☐	☐	☐	54
52	Intermodal capabilities of the transportation system would be nice but are not necessary for my company	☐	☐	☐	☐	☐	55
53	Intermodal capabilities are appealing for the door-to door containerization it would offer	☐	☐	☐	☐	☐	56
54	Intermodal capabilities are appealing for the single carrier responsibility it would offer.	☐	☐	☐	☐	☐	57
55.	In the future airlines should handle total door-to-door transportation	☐	☐	☐	☐	☐	58
56.	The hub spoke concept — large aircraft for long haul to/from hub with smaller planes for feeder service to/from hub — will be the accepted network of the future transportation system	☐	☐	☐	☐	☐	59

Table 1-5. - Continued

MAIL SURVEY FORM

****

The following questions are for statistical purposes only

How many employees are involved in the traffic and/or distribution function at your company?

1- 4	☐ 60-1
5-10	☐ -2
11-15	☐ -3
16-20	☐ 4
More than 20	☐ -5

2 How many people are employed by your parent company?

1 100	☐ 61-1
101- 300	☐ -2
301 1,000	☐ -3
1,001- 5,000	☐ 4
5,001-25,000	☐ 5
Over 25,000	☐ 6

3 What are the commodities or products your company most often ships by air?

_____ 62-

_____

_____

No air freight

4. A reasonable estimate of your average monthly airfreight volume would be:

	Inbound	Outbound
0- 99 lbs	☐ 63-1	☐ 64-1
100 499 lbs.	☐ -2	☐ -2
500- 999 lbs.	☐ -3	☐ -3
1,000 1,999 lbs	☐ 4	☐ 4
2,000-4,999 lbs	☐ 5	☐ 5
5,000 9,999 lbs	☐ 6	☐ 6
10,000 or more lbs	☐ 7	☐ 7

5. From how many locations does your company ship?

1	☐ 65-1
2- 5	☐ 2
6-10	☐ 3
11 15	☐ 4
16-20	☐ 5
More than 20	☐ 6

6. A reasonable estimate of the average value per-pound of your company's shipments would be

Less than $1 00/lb	☐ 66-1
$ 1 00-$ 4 99/lb	☐ -2
$ 5 00-$ 9 99/lb	☐ -3
$10 00 $19 99/lb.	☐ 4
$20 00 or more/lb	☐ 5

7. Which category best describes your company?

Professional Service	☐ 67-1
Manufacturer	☐ -2
Wholesale Distributor	☐ -3
Distribution Service	☐ -4
Other _____	☐

8. What is your title? _____ _____ 68

9. What is the title the top distribution executive in your company?

_____ 69-

Table 1-5. - Concluded

MAIL SURVEY FORM

10 Do you consider your position line or staff?

Line	☐ 70-1
Staff	☐ -2

11 Are you involved in outbound shipping only, inbound shipping only, or both inbound and outbound shipping?

Outbound only	☐ 71-1
Inbound only	☐ -2
Both	☐ -3

12 Why does your company use airfreight? Below are some reasons why your company might use airfreight. Please indicate the most prevalent reason for your company by placing a 1 in the space provided, please indicate your next most prevalent reason by placing a 2 in the adjacent space, etc. Rank only 4.

	Inbound	Outbound
Speed in transit	___ 72-	___ 8-
Cheaper than alternatives	___ 73-	___ 9-
Limited handling	___ 74-	___ 10-
High dollar value of product	___ 75-	___ 11-
Maintain customer service level	___ 76-	___ 12-
Time reliability	___ 77-	___ 13-
Total cost concept	___ 78-	___ 14-
Cash flow considerations	___ 79-	___ 15-
Backorders	___ 80-	___ 16-
Deadlines	___ 1-	___ 17-
Down Production Lines	___ 2-	___ 18-
Less loss and/or damage	___ 3-	___ 19-
Tracing	___ 4-	___ 20-
Increase competitiveness	___ 5-	___ 21-
Consignee request	___ 6-	___ 22-
Other _____	___ 7-	___ 23-

13. How long have you been in your present position?

Less than 1 year	☐ 24-1	11-15 years	☐ -5
1 - 2 years	☐ -2	16-20 years	☐ -6
3 - 5 years	☐ -3	21-25 years	☐ -7
6-10 years	☐ -4	More than 25 years	☐ -8

14. How long have you been involved with traffic or distribution?

Less than 1 year	☐ 25-1	11-15 years	☐ -5
1 - 2 years	☐ -2	16-20 years	☐ -6
3 - 5 years	☐ -3	21-25 years	☐ -7
6-10 years	☐ -4	More than 25 years	☐ -8

15. What is the highest level of education you have attained?

High school graduate	☐ 26-1
Some college	☐ -2
College graduate	☐ -3
Post graduate	☐ -4

16. The information provided in this questionnaire has pertained to:

Entire company	☐ 27-1
Division of company	☐ -2
This location only	
Plant	☐ -3
Warehouse	☐ -4
Distribution Center	☐ -5
Other _____	☐ -6

I would like a copy of the results of this survey ☐

Name _____

Address _____

_____

Techniques that typically yield high response rates were employed in order to attain the realized response level. As an example, each mailed questionnaire had an accompanying personalized letter from Robert E. Hage, Executive Vice President of Marketing, Douglas Aircraft Co., appealing for reader response. A pre-addressed, stamped envelope was also included to facilitate response, and finally, a telephone follow-up was implemented to ensure respondent participation. These techniques resulted in the impressive level of participation which allowed for valuable insight into distribution system characteristics and potential changes which may have implications for the development of the future air cargo system.

A majority of the respondents requested copies of the preliminary survey results and were therefore provided a copy of the tabulated results as shown in Table 1-6. This summary presents the percent distribution of responses to each question and, where applicable, the mean, standard deviation, and standard error. If percentages total to less than 100 percent, the remainder represents "don't know/no answers". Since multiple responses were allowed on questions 7 and 12 on the last page, percentages will total to more than 100 percent.

Table 1-6
TABULATED RESULTS

The following are statements with which you may agree or disagree Please read each statement carefully and check the appropriate box

		Agree Strongly	Agree	Neither Agree Nor Disagree	Disagree	Disagree Strongly	Mean	Standard Deviation	Standard Error
1.	The transportation manager's performance is primarily measured against budget	6 8	38 8	16 5	33 5	4 6	3 10	1 08	.046
2	General management views distribution as merely the transportation budget	3 5	17 0	8 0	49.6	21.9	2 31	1 09	047
3	An important factor in evaluating the effectiveness of my company's distribution system is the ability to keep inventory levels under control	24 1	52.3	10 6	10 6	2.4	3 85	.98	042
4	My company calculates an inventory carrying cost (ICC)	10.6	59.9	9.8	14 5	5 2	3 56	1 03	044
5	My company calculates an inventory carrying cost (ICC) and it is used as an important element in choosing modes	4 4	25 7	23 1	39 1	7 6	2 80	1 05	045
6.	Mode choice is primarily a company policy decision made at the level of the top distribution executive	5 7	30.0	11.4	42 3	10.6	2 78	1 15	049
7.	Mode choice is primarily a company policy decision made at a level of management above the top distribution executive	6	4.0	7.7	56 6	31.1	1 86	.76	033
8	Company top management plays an active role in setting such distribution policies as customer service level and in stock policies	14.4	54.6	10.7	16 8	3.5	3 60	1 04	044
9	The top distribution executive in my company is considered senior management and is integrally involved in general business planning	16 7	46 3	10 8	21 8	4 4	3.49	1.13	048
10	A high level of customer service is an important advantage in most of my company's markets.	45 3	48 9	3 5	2.2	2	4 37	.67	.029
11.	Competition in most of my company's markets can be described as very competitive	46 0	48 5	3 6	1 8	–	4.39	65	028
12	My company is the dominant competitor in most of its markets	17 7	32 4	25 5	21.1	3 3	3 40	1 10	047
13	My company is in a very concentrated industry where there are only a few competitors	5 3	24 9	8 4	43.3	18.2	2.56	1.19	.051
14	My firm can almost always satisfy its customer service objectives by using surface transportation	17 9	55 7	3 8	17.9	4.7	3 64	1 11	.047
15	One department has the responsibility for all distribution decisions	13.3	39 5	7 7	34 2	5 3	3 21	1.20	051
16	I would characterize my company as being centralized in its mode decisions	13 9	51 5	7 7	22.1	4.9	3 47	1 12	048
17	Day-to-day mode selection is made by a traffic manager at each plant location	5 5	43.2	10.4	33 5	7 3	3.06	1.13	.048
18	The headquarters transportation or distribution department acts in an advisory capacity only, as far as mode choice goes	5 8	31 5	13.5	38.1	11.1	2 83	1.16	049
19	My company is moving towards greater centralization of distribution decision-making in the future	9.1	45 9	25 8	15 7	3.5	3 41	97	042
20	My company uses systems analysis in the distribution and materials management function	10 2	55.1	14.2	18.1	2 4	3.53	98	042

Table 1-6. - Continued

TABULATED RESULTS

		Agree Strongly	Agree	Neither Agree Nor Disagree	Disagree	Disagree Strongly	Mean	Standard Deviation	Standard Error
21	The information provided by my company's accounting and information systems is useful for making distribution decisions.	10.4	57.6	11 3	17.5	3 3	3.54	1.00	043
22.	My company's information and accounting systems are not able to provide the information necessary to make optimum distribution decisions	8 4	37 2	14 8	35.9	3 6	3 11	1.10	.047
23	I have complete confidence in the accuracy of information provided by my firm's accounting and information systems as it relates to making optimum distribution decisions	2.6	23.1	30.4	35.9	8.0	2.76	.98	.042
24.	My company's future distribution system is constrained by warehouses or other fixed assets that it now owns	2 4	19 8	14 2	54 0	9.6	2 51	99	.042
25.	My company uses airfreight as a routine, planned part of its distribution system.	4 9	15 8	6.7	52.4	20.2	2 33	1 11	047
26	My company uses airfreight on an unplanned, emergency-only basis	13.3	59 8	5 8	16 9	4.2	3.61	1.05	.045
27.	My company uses airfreight as a supplemental mode to surface in order to optimize its distribution system	2 2	28 1	13 5	44 8	11.5	2 65	1 07	.046
28	I feel that my company makes cost/benefit tradeoffs in selecting the transportation mode	12.0	66 7	10 9	8 2	2.2	3.78	.84	.036
29	Truck service is more reliable than airfreight service.	2.5	9 8	46 9	36 2	4.5	2.70	81	.034
30	The consignee's purchasing agent selects the mode of transportation in many cases	1 5	23.1	11 3	48 5	15.6	2.46	1.05	.045
31.	In terms of mode choice, the consignee is more influential than the shipper.	1 8	19 2	13 4	47.9	17 6	2.40	1 04	044
32.	When my company is the consignee, we decide the mode of transportation	9 5	49.6	23 5	16 0	1 5	3 50	.92	.039
33	If the differential between surface and airfreight rates were reduced by 30%, my company would use more airfreight.	6 7	39.6	29.9	21 4	2.4	3 27	95	040
34	When my company ships by air, an airfreight forwarder usually handles the shipment	8 2	53 9	15 3	20 8	1 8	3.46	97	.041
35	My company prefers dealing directly with the airline rather than using an airfreight forwarder.	4 0	25.0	31 2	35 9	3 8	2 89	.96	041
36	Airfreight forwarders provide better service than the airlines.	3 8	28.7	53 7	12.0	1 8	3 21	77	.033
37.	The airfreight forwarder satisfies my company's airfreight shipping needs.	3 5	46 4	34 4	14 2	1 6	3 36	.83	.035
38	I would like one company to handle all my shipping needs — air, truck, rail and ocean.	2 7	9 8	11 5	50 5	25.5	2.14	99	.042
39.	The present transportation system does not meet all my company's shipping needs so we have a private motor fleet to fill the gap.	14 4	42 1	10 6	27.0	6 0	3 32	1 19	051

Table 1-6. - Continued

TABULATED RESULTS

		Agree Strongly	Agree	Neither Agree Nor Disagree	Disagree	Disagree Strongly	Mean	Standard Deviation	Standard Error
40	My company would use airfreight more frequently if we had the equipment necessary to load the containers ourselves	5	2 6	24 6	63 1	9.1	2 22	66	.028
41	Overnight (next day) airfreight service is mandatory for my company	6 9	26 4	20 8	36.6	9.3	2 85	1 12	.048
42	The biggest problem with today's airfreight system is associated with ground handling, airport congestion and pick-up and delivery rather than the airport-to airport segment	17.5	48 9	26 5	6.4	.7	3.76	.84	.036
43	Scheduled airline service — either combination or cargo — today does not serve the cities my company ships to/from most often	3 1	17 0	37 2	39 2	3 5	2 77	.88	.038
44	Scheduled airline service today does not provide enough frequency of service to cities my company ships to/from most often	2 7	17 5	40.8	36 6	2 4	2 82	84	036
45	Scheduled airline service today does not provide enough capacity to cities my company ships to/from most often	2 6	12 2	44 9	37 8	2 6	2.75	.80	.034
46	I would take lift in any form — freighter or combination — to/from cities where my company's operations are located.	2 8	32 0	50 9	14 6	.6	3 22	.74	032
47.	The problem with the airlines is that they do not understand my company's shipping needs	3 3	11 5	52 1	30 8	2 4	2 83	.79	.034
48	The characteristics of the product(s) my company ships by air frequently necessitate shipping on freighters	4 4	22 1	24 5	43.4	5.7	2 76	00	043
49	If my company has the choice, it prefers shipping on freighter aircraft	2 0	17 2	52 1	26 3	2.4	2 90	78	033
50	My company prefers not to ship in belly containers	2	4 8	65.3	28.2	1.6	2.74	58	.025
51	Intermodal capabilities are a vital element of the future transportation system	26 4	55 6	14 6	3 5	—	4.05	.74	032
52	Intermodal capabilities of the transportation system would be nice but are not necessary for my company	1.6	27.4	24 3	39 9	6 8	2 77	98	042
53	Intermodal capabilities are appealing for the door-to door containerization it would offer	9 9	67.3	20.7	2 0	.2	3 85	62	.026
54	Intermodal capabilities are appealing for the single carrier responsibility it would offer.	8.3	59 4	27.6	4 6	2	3.71	69	.030
55.	In the future airlines should handle total door to door transportation	10 2	43 9	36 6	8 2	1.1	3 54	83	.035
56	The hub spoke concept — large aircraft for long haul to/from hub with smaller planes for feeder service to/from hub — will be the accepted network of the future transportation system	5 5	45 0	44.1	4.9	5	3 50	.70	030

Table 1-6. - Continued

TABULATED RESULTS

****

The following questions are for statistical purposes only.

1. How many employees are involved in the traffic and/or distribution function at your company?

1- 4	9.8
5-10	13.8
11-15	6 5
16-20	6.7
More than 20	62.6

2. How many people are employed by your parent company?

1- 100	4.4
101- 300	4.4
301- 1,000	10.5
1,001- 5,000	24.9
5,001-25,000	27.0
Over 25,000	27.2

3. What are the commodities or products your company most often ships by air?

Machinery	20 7	Chemicals	8.9	Electronics	6.5
Misc.	16.0	No Airfreight	8 7	Adv & Samples	6.4
Drugs	10.3	Food	7.6	Clothing	3.8

4. A reasonable estimate of your average monthly airfreight volume would be:

	Inbound	Outbound
0- 99 lbs.	15.2	9.3
100- 499 lbs.	12.9	11.7
500- 999 lbs.	8.5	8.9
1,000-1,999 lbs	10 9	12.3
2,000-4,999 lbs	12 9	12.9
5,000-9,999 lbs	6.5	12.9
10,000 or more lbs.	15 2	21.1

5. From how many locations does your company ship?

1	7.8
2- 5	26.0
6-10	16.0
11-15	8.9
16-20	4.4
More than 20	36.1

6 A reasonable estimate of the average value per pound of your company's shipments would be:

Less than $1.00/lb.	26.3
$ 1 00-$ 4.99/lb	38.1
$ 5 00-$ 9.99/lb.	13.2
$10 00-$19.99/lb.	8.2
$20.00 or more/lb	9.4

7. Which category best describes your company?

Professional Service	1.1
Manufacturer	77.9
Wholesale Distributor	5.8
Distribution Service	9.6
Other _____	7.8

8 What is your title? Distribution Mgr. 27.2 | Distribution Dir. 14 5 | Traffic Mgr. 10.0 | General Mgr. 5.1
Corp Traffic Mgr. 15.6 | Pres. or V.P. 13.6 | Other 6.7 | Mgr/Dir. Warehousing 3.4

9. What is the title the top distribution executive in your company?

Pres or V.P	31.6	General Mgr.	6 0
Distribution Dir.	20 9	Other	3.8
Distribution Mgr.	19.8	Traffic Mgr.	2.7
Corp Traffic Mgr.	9.6	Mgr/Dir. Warehousing	.7

10. Do you consider your position line or staff?

Staff	46.8
Line	41.9
Both	10.7

11. Are you involved in outbound shipping only, inbound shipping only, or both inbound and outbound shipping?

Outbound only	10.0
Inbound only	—
Both	89.5

12. Why does your company use airfreight? Below are some reasons why your company might use airfreight. Please indicate the most prevalent reason for your company by placing a 1 in the space provided, please indicate your next most prevalent reason by placing a 2 in the adjacent space, etc. Rank only 4.

	Inbound	Outbound
Speed in transit	69.7	76 3
Cheaper than alternatives	4 0	4.2
Limited handling	3.1	4.6
High dollar value of product	10.0	10.3
Maintain customer service level	29.2	57.5
Time reliability	26.0	26.8
Total cost concept	7.3	6.4
Cash flow considerations	1.3	2.6
Backorders	15.6	23.3
Deadlines	33.8	35.2
Down Production Lines	43.4	20.3
Less loss and/or damage	3.3	4.6
Tracing	2.0	3.4
Increase competitiveness	5.4	12.3
Consignee request	12.2	34.0
Other	2.7	3.8

13. How long have you been in your present position?

Less than 1 year	10.3	11-15 years	6.4
1 - 2 years	21.2	16-20 years	4.0
3 - 5 years	31.8	21-25 years	2.5
6-10 years	19.6	More than 25 years	3.8

14. How long have you been involved with traffic or distribution?

Less than 1 year	1.6	11-15 years	16.9
1 - 2 years	2.0	16-20 years	14.9
3 - 5 years	10.5	21-25 years	15.1
6-10 years	19.8	More than 25 years	18.3

15. What is the highest level of education you have attained?

High school graduate	2.7
Some college	20 3
College graduate	39.0
Post graduate	37.7

16. The information provided in this questionnaire has pertained to.

Entire company	62 3
Division of company	30.7
This location only	
Plant	5.8
Warehouse	3 1
Distribution Center	9.1
Other	4.5

Tabulations, cross-tabulations, measures of variability and tests of statistical significance of the responses were then performed by computer. An example of a computer print-out of an actual cross-tabulation is shown in Table 1-7. This particular example tabulates "Overnight airfreight service is mandatory for my company" against average monthly airfreight volume by inbound and outbound volumes. In this printout, "agree strongly" and "agree" have been combined, as have "disagree strongly" and "disagree." The responses have been printed in cross-tabulation form. This is a numerical presentation of data in frequency and percentage form, in which variables are cross-partitioned in order to study the relations between them. Cross-tabulations also organize data in a convenient form for statistical analysis. The statistical tests performed on the data are described below.

The MEAN is an arithmetic average -- a measure of central tendency. In this case, the responses on the Likert scale were assigned a numerical value (agree strongly = 1, agree = 2, neither agree nor disagree = 3, disagree = 4, disagree strongly = 5). The number of times each response was chosen were added and divided by the total number of responses to determine the mean. In the example, the mean is 2.8. This indicates that the average response fell close to "neither agree nor disagree." In essence, categorical information has been converted into scaled information.

The STANDARD DEVIATION, which is a measure of variability, helps describe the normal curve. When data takes the shape of the normal curve, standard deviation units measured off along the base line, starting from the mean, always cut off certain proportions of the area under the curve. In the example, the standard deviation is 1.322. This tells us that 68 percent of the responses fell within 1.3 standard deviations above or below the mean (2.8). This measure is valuable when used as a comparison between several questions. For example, a small standard deviation tells us the responses were very similar. Thus, in comparing two questions, the standard deviation tells us the degree of variation in the responses, relative to each other.

The STANDARD ERROR is the deviation of a series of means in a series of distributions. This measure is used to determine the significance between two responses. For example, our standard error in this example is .056. We

TABLE 1-7

CROSS - TABULATION

NASA MAIL SURVEY
TABLE 241-1
OVERNIGHT (NEXT DAY) AIRFREIGHT SERVICE IS MANDATORY FOR MY COMPANY.
TABLES BY AVERAGE MONTHLY AIRFREIGHT VOLUME

PARAMETER	TOTAL	OUTBOUND			INBOUND		
		0-999	1000-4999	5000 OR MORE LBS.	0-999	1000-4999	5000 OR MORE LBS.
TOTAL (BASE)	549 99.6 100.0	151 100.0 27.5	127 100.0 23.1	170 99.4 31.0	201 99.5 36.6	131 100.0 23.9	120 100.0 31.9
AGREE	183 33.3	40 26.5	49 38.6	69 40.6	54 26.9	57 43.5	45 37.5
NEITHER AGREE NOR DISCAGRE	114 20.8	35 23.2	21 16.5	30 17.6	42 20.9	24 18.3	25 20.8
DISAGREE	252 45.9	76 50.3	57 44.9	71 41.8	105 52.2	50 38.2	50 41.7
TOTAL (ALL)	551 100.0	151 100.0	127 100.0	171 100.0	202 100.0	131 100.0	120 100.0
DK/NA	2 .4			1 .6	1 .5		
MEAN	2.811	2.642	2.906	2.982	2.619	3.080	2.938
STANDARD DEVIATION	1.322	1.265	1.367	1.361	1.279	1.353	1.333
STANDARD ERROR	.056	.103	.121	.104	.090	.118	.122
CHI-SQUARE		-------	8.292 .0874	-------	------	11.042 .0260	-------

multiply this by 1.96 (to obtain a 95 percent confidence level) and end up with .10. Then take the mean (2.8) which is only the mean of this particular sample (not the true mean) and add and subtract this .10 to equal 2.7 and 2.9. This tells us that there is a 95 percent chance that the true mean (the mean of the universe) falls between 2.9 and 2.7 on the scale.

A better test of significance (because it is non-parametric -- does not depend on the normal curve) is Chi-square. CHI-SQUARE is the difference between obtained and expected frequencies.

The CHI-SQUARE SIGNIFICANCE has already been worked out in the print-out and can be interpreted as follows. We are concerned with significance at the .05 level which means we can be fairly confident that these results are different from those produced by change alone.

We need to know what it means to say that an obtained result is "statistically significant" -- that it departs "significantly" from chance expectation. The .05 level means that an obtained result that is significant at the .05 level could occur by chance only 5 times in 100 trials. In the cross-tab example for inbound freight, we can say that a discrepancy as large as this will happen by chance only about 5 times in 100 trials. It can happen more often or less often, but it will probably happen about 5 times in 100.

A level of statistical significance is to some extent chosen arbitrarily. The .05 level was originally chosen because it is considered a reasonably good gamble. Some researchers prefer the .01 level or the .10 level. The question remains whether or not to adhere to a certain level of significance. Some advocate reporting the significance levels of all results. That is, if a result is significant at the .08 level as in our example, it should be reported accordingly. This approach, however, is not utilized in the Mail Survey Findings herein. These findings only report those that are statistically significant at the .05 level or less.

For outbound freight, the chi-square significance is .08, which means these results are not significant at the .05 level. For inbound freight, it is .02, which being less than .05, tells us this finding is significant and probably did not occur by chance.

Section 2

DEPTH INTERVIEW FINDINGS

Following are the Depth Interview Findings which, by their nature, are qualitative. The findings are organized according to the following subjects:

- Organization of the Distrubution Function.
  - Mode Decision-Making.
  - Use of Total Cost Concept.
- The Transportation System - Current and Future
  - Role of Forwarders - Today's airfreight system
  - The airlines - Today's airfreight system
  - The Future of Airfreight
    - Deregulation
    - Intermodality
  - Scenarios for the Future

Actual quotations from the respondents have been included as they are the basis for the findings in this part of the case study research.

Organization of the Distribution Function

Presently there is no clear pattern among manufacturers regarding centralization or decentralization of the distribution function. For the most part, staff traffic managers offer advice and support, but they are not usually policy-makers. The following tabulated data is a partial categorization of companies according to the type of distribution which they employ. For the ten organizations not accounted for in this table the categorization could not be clearly defined from the recorded statements.

TABLE 2-1

CENTRALIZED, DECENTRALIZED OR COMBINED DISTRIBUTION

	Centralized	Decentralized	Combined
Manufacturer	6	7	1
Distributor	3	1	-
Agricultural	-	2	1
Professional	2	-	-
Total	11	10	2

"We feel that decentralization is the best way of running it. Nobody knows better what is needed than the man right on the spot. So consequently, a corporate office cannot direct, cannot issue directives on how to run business."

Apparel Distributor

"Well, we have a 'centralized' Traffic group. All traffic functions are centralized here. We do have traffic representatives at our individual facilities, including overseas, but the carrier selection, mode of transportation, rate negotiations, etc., are all done here. And, of course, our Director of Traffic gives us the specific guidelines on which way to go."

Machinery Manufacturer

"We have corporate traffic and we have traffic departments at each location whose responsibilities are total transportation functions. Each location's traffic department handles all decisions and all matters inbound and outbound. The role of the corporate function is advisory, strictly staffing. They devise the general policies, assist and direct where necessary."

Electronics Manufacturer

Centralized firms are primarily those who by the nature of their business are termed distributors and professional service firms. These firms are organized and operated in this manner precisely for the economics and the control that can be realized. The manufacturers, regardless of the product being produced, are for the most part decentralized in operations and mode decision-making. These firms often have staff traffic managers who offer advice and support, but they do not set strict policy.

Shippers were generally willing to concede that things would change, but were unwilling to pinpoint those changes.

"....I think we will change, I don't foresee anything, but I have been around long enough to know...I can tell you now the systems that we use today are completely different than they were then..."

"But how far out do you try and work?"

"Five years."

"You try and work 5 years? ....you look back and say five year plan..."

"... and you wonder who in the hell wrote that .... you go to any company and you're going to find the same thing. You're taking your best guesstimate."

Apparel Manufacturer

Another aspect of the distribution function is the informal involvement (or lack of any involvement) between staff traffic managers and policy makers in upper management. Often traffic managers suffer from a lack of formal business training, a lack of opportunity for advancement and a lack of integration into general business planning as shown in the following comments.

"I do know there are thousands and thousands of small firms out there that have a chap called the Traffic Manager who is really not equipped or trained in the overall field of distribution."

Machinery Manufacturer

"....Oh, yes, they're interested in it, they're (referring to traffic managers) smart, they want to move ahead and they are in a lot of cases. Of course, in a lot of cases they're not. It depends on management."

Apparel Manufacturer

"...They are too much confined and what has evolved is that they are the specialists in just moving products and they have a difficult time crossing departmental barriers to get the total picture. They will get away from this thinking, but it will take time."

Machinery Manufacturer

Mode decision-making. - The choice between air and surface is often made on the basis of total service, i.e., cost/benefit tradeoff.

> "I would have to tell you very frankly...we approach transportation as a marketing function....and that means it has to be looked at in terms of the best possible value for the dollar expended...It is our position that we are going to keep transportation costs as low as possible in return for the best possible service..."
>
> Agricultural Business

> "Transportation is a tool. It has to be considered in a total concept of merchandising with inventory. The value of time and money is so fantastic that transportation is inexpensive totally."
>
> Apparel Distributor

If firms can be competitive in the marketplace using surface, that mode will prevail. However, airfreight is often viewed as a tool that used routinely can give the shipper a competitive advantage.

> "...I know of several jobs that we got because, yeh, we can meet the deadline...." (Referring specifically to Federal Express)
>
> Professional Service Firm

> "To us airfreight is not used in emergencies. To us airfreight is a tool...our air shipment moves regularly, systematically on a day-to-day basis....I could quote you examples when merchants came to me and said they have improved their business because of our ability to move merchandise...So by providing airfreight service, I think we have improved our merchants' ability to sell faster, have a greater turnover, and that's what business is all about..."
>
> Distributor

There are many firms, however, who use airfreight on an "emergency only" basis. The most common situations defined as "emergency only" include plant breakdowns, distribution of samples or customer request.

> "...The name of the game is don't use airfreight unless your back is to the wall, unless you have run out of time."
>
> Chemical Manufacturer

"...I can only think of a couple of instances in the last couple of years when we used airfreight and it related to plant breakdowns...it was how much money we were losing because that plant was down."

Chemical Manufacturer

"We use airfreight...A hell of a lot of airfreight in herding around salesmen's samples...or say we're on backorder and then we may use airfreight...emergency shipments...or the customer might say I want it airfreight and it will go airfreight."

Apparel Manufacturer

Shippers said that in many cases they used surface rather than air because air service does not exist where manufacturing facilities are located. Thus, transit times of truck approach those of air at considerably lower cost.

"...You have transit time by motor carrier to that point. You have loading time. You have a certain amount of waiting time before the aircraft gets squared away and goes. Transit time for the aircraft. You have unloading time and then you have more transit time to its final destination...At the most we might save a good day in many cases. I can move...from California to New York City frequently just as fast by motor carriage as I can by airfreight..."

Agricultural Business

Seven shippers that were interviewed operate their own truck fleets for inter-company and intra-company transfers. This allows them to meet their transportation requirements at a lower cost, with greater flexibility and control than with other existing alternatives. This quote from an apparel manufacturer illustrates this reasoning:

"...say, for instance, Amarillo will move an air shipment to New York. That doesn't make sense. You can't get airfreight out of Amarillo to New York. You have to take it over to Dallas and then reload it...and then on to New York...and in thirty-six hours we're sitting there (New York from Amarillo) with the private fleet...And look at the cost differential. It's about three to one common carrier. And what do you think it is private fleet? You can almost say four to one...."

Apparel Manufacturer

Use of total cost concept. - Shippers, forwarders and airlines are well aware of the total cost concept but its comprehension or use is another matter.

"They've got some knowledge of it. Oh, they've heard the words. But anybody can throw the words around, but using it - ..."

Apparel Manufacturer

There are a number of barriers to the complete use of the Total Distribution Cost Concept (TDC). First there is the "supporting" organizational role of traffic managers as discussed under Organization of the Distribution Function. To reiterate, this involvement between traffic managers and general management is characterized by a lack of formal integration into general business planning which results in the difficult or incomplete flow of information between the functions. In essence, the traffic manager does not often have first level decision-making interface with other departments. On the other hand, there is management itself.

"...When you try to sell the total distribution concept to top management, they don't understand it. It's difficult for them to understand and a lot of people don't buy it."

Apparel Manufacturer

The concept, while conceptually appealing, is cumbersome. It is difficult to use because the inputs that are needed are not readily available in many firms. In some cases transportation costs are still viewed in isolation. Others claim that the cost of implementing a TDC study often outweights the benefit.

"It is rather time consuming exercise, that I think has value. But I don't know that we have found a way to effectively utilize it on a mass basis at this point in time."

Airline

"They believe in the theory of it and anybody will agree in a discussion...The problem is that while some of these things are tangible, a great many are intangible. What people have to do if you're talking total cost is actually quantify the tangible and the intangible. That's a problem because that's the unknown again."

Forwarder

In order to facilitate the use of the total cost concept, management's understanding of it must be developed.

"...management has to be sold first. Because the input they have from the traffic managers is it's very, very expensive and the service is not always dependable...But the average traffic manager in America really does not understand the profit making effort. He simply is too far removed from it."

Distributor

The involvement of the controller or finance department is also critical.

"Now the traffic manager would support you. The head of distribution would support you. Neither of those individuals could ever make the decision that would effect the action. It had to at least be the controller who...would turn it to either the vice president of manufacturing...or the chief operating officer of the corporation because they're the only ones who are qualified to make decisions that will go into the different areas. And total cost effects going across the either visible or invisible boundary lines."

Forwarder

Yet the airlines and forwarders have a problem in "selling" the concept to the appropriate level of management because the traffic manager controls today's freight.

"We go to the traffic manager, simply because he's giving us freight today. Now if we don't go to him and we go up through the controller ...he really understands turnover, which is the key to the whole thing...If we go through the controller and if the traffic manager finds out...he can easily cut our throat and give the business he gives us today to some other carrier...on the other hand, if you go to the traffic manager and say, 'Here is something you can use. Take it up the ladder.' The problem is this with the traffic manager, and I'm generalizing, that he doesn't understand it."

Airline

There is a feeling, however, that the failure of the total cost concept is primarily the result of a lack of education by the airlines. This education process is dependent on the airlines having the resources to devote to it.

> "I think maybe the underlying problem is that there is a great public education process that somehow has got to get done better than we are doing it now..."
>
> Airline

> "...till we can solve the sustained profitability situation, I think some of these things that you might put under the luxury tag are practically going to be put on the shelf...The constraints are such right now, we have to measure very, very carefully, every damn thing we do..."
>
> Airline

Both the airlines and the forwarders feel that there is a need for educating the shipper regarding the total distribution cost concept, but that when trying to introduce these concepts they have been singularly unsuccessful mainly because their efforts appear to be self-serving. A solution would be providing this training through various shippers councils or distribution consultants, although either choice was considered a time consuming exercise.

The Transportation System - Current and Future

This section considers the role of the forwarders and the airlines in today's airfreight system and that of the future. The discussions of the future airfreight system include comments on deregulation and intermodality. When reading the comments on deregulation one should keep in mind that the interviews reported on herein were conducted during 1977 well before the regulatory bill was signed.

Role of the forwarder -- today's airfreight system. - Industry views the forwarder as a key element -- the dominant force in shipping by air -- because they more adequately meet the needs of shippers.

"...why do you need a freight forwarder unless he's providing you with a service that the customer going direct to the airline probably hasn't gotten in the past."

Professional Service Firm

"That is what the customer wants and that is why the forwarder enjoys substantial success. The get out there and provide one hell of a good service."

Airline

"Forwarders handle more of the large shippers than do the airlines because they're looking at multi-services, and of course the forwarder has the multi-service and we really can take it point to point ... it's because the forwarder has the information about freight that the airlines really have about people...And it's causing more and more shippers to go with a forwarder because it's a total control."

Forwarder

"Well, I'd like to see really the freight forwarders having the predominance in the market for the simple reason they're handling the small shipments and, of course, that's what airfreight is -- small shipments. Basically that's what they will be -- and they're best to handle that -- for the pickup and delivery services and I think that your regular air freighters will be handling that which you can consolidate in the volumes. You can consolidate into containers."

Apparel Manufacturer

...But I think really to develop air cargo as I envision it, I would turn it all over to the airfreight forwarding industry, and as the prime movers, the airlines get out of the business in so far as shipper contact is concerned..."

Machinery Manufacturer

The forwarder is seen as "going out of the way" to help the customer, while the direct airlines fail to provide this one-on-one service. The following factors are seen as advantages of the forwarder:

- Better tracing ability
- The ability to set up the booking and guarantee the shipment will make a specific flight
- Door-to-door service
- Handling of documentation, follow-ups and control of the shipment
- Total possession of the freight

The freight forwarder is viewed as not only more sensitive to shippers' problems and needs, but, in some cases, as an extension of the firm itself.

The airlines - today's airfreight system. - In contrast to the forwarders, there was very little praise for the performance of the airlines. The airlines are seen as having abdicated the responsibility of dealing directly with shippers, as not being responsive to the shippers' or forwarders' needs, and as being generally reactive.

> "Well, we've had a lot of trouble initially going direct to the airlines. The work would get sent to Denver. When you called them up and asked them about it, they'd say, 'Yeah, well we don't know where it went, we'll let you know', and we'd wait and wait...We need control. So we went to a freight forwarder. That's what you're paying for, okay. Doing something you can't do unless you stay at the airport. He knows the airplanes. He knows the right people. He gets it on the right flight. If anything goes wrong, we call Airborne and they can trace that work very quickly. They just dig in and do it. In the past -- our experience with the airlines -- they would not -- they were not devoting the attention we wanted to this work which was lost. It seemed the impression we got was, 'Okay, when it turns up, it'll turn up -- I'll get back to you'."
>
> Professional Service Firm

Yet, even though the forwarder must put freight on the airline, the forwarder is perceived as having more control. The airlines view the forwarder as an indirect shipper yet the forwarder is in most cases the airlines' single largest customer. The forwarders complain that in spite of the magnitude of their business, the airlines rarely include them in the decision-making process for rates and schedules.

Shippers, who are generally shipping small packages, feel the airlines are only interested in large volume shipments and large/size pieces of freight.

> "We're under the impression more or less that the forwarder is geared to handle the LTL packages where the airline isn't..."
>
> Electronics Manufacturer

What is more, securing space from the airline is dependent on the shipper's volume.

"...at certain times out of New York the space demand from New York to Europe is very tight...Well a lot of freight forwarders are twelve month operators. We're four month operators. We don't have the contact to control the space from New York on..."

Agricultural Business

In more precise terms, a basic criticism of the airlines centers upon the lack of lift to and from appropriate cities. This criticism raises the question whether the airlines really know their markets.

"...The airline doesn't know where his business is because we consistently have the freight over there...So what we are saying is you'd better find out where the market is, and if you don't find out pretty quick we are going to get the freight from...Those airplanes are still flying in relation to something else other than the market question..."

Forwarder

"But, even as far west really as Salt Lake City, the time loss is minimum for us to go surface by truck from that point into New York, primarily because there is no lift capability out of that particular point. There is a fine, lovely air terminal but no cargo facilities at all. I'm sure the airlines watch these markets very closely and, apparently, it is not there, but I often wonder...they don't see our cargo since they simply can't move it. I wonder how many shippers there are like us? We are adding on two and a half days to our flow time into the New York gateway, rather than piecemealing it on combination aircraft."

Machinery Manufacturer

"One of the problems with the airlines is we can only get it into 3-4 cities. Basically, the airlines are in the business of moving people."

Electronics Manufacturer

The lack of geographic coverage refers not only to lift of any kind, but more specifically to availability of freighters.

"...right now the freight service out of Boston really stinks. It's just the coast, Chicago, Dallas, and Detroit."

"Where would you like to see it that it isn't?"

"Phoenix, Atlanta, Miami, Orlando."

Electronics Manufacturer

"...Many international carriers use narrow bodied aircraft and are limited on freight capacity. Not only the flight frequency, but you get a 2000 pound engine...and you have to wait for that freighter that might be going once a week..."

Machinery Manufacturer

This lack of adequate service to/from appropriate cities appears to be a significant barrier to increased airfreight use.

Other problems cited in dealing with airlines are related to tracing and ground handling.

"I sure wish they knew where my shipment was all along the way..."

Professional Service Firm

"Basically, the delivery problems - the ground handling problems at both ends -- the delivery problems at destination..."

Electronics Manufacturer

The future of airfreight. - The future of the airfreight industry is described in cautious terms.

"I think folks need to exercise some caution in what they see as the growth potential for cargo because I don't think it's going to grow as rapidly as...some dreamers speculated it might..."

Airline

Forwarders, who are dependent on the airlines to a great extent, advocate a partnership relationship with the airlines as opposed to one of competition which they see as counter productive to the industry as a whole.

"...if the service isn't here, the understanding isn't here; if the ability to work together or even the desire to work together doesn't come about here, growth is going to be affected...The airlines could actually make some indiscriminate decisions that would force us out of business and the business is not going to revert to them. It's going to revert to another mode of transportation. So we really do have to work together..."

Forwarder

There were some suggestions directed towards improving the growth potential of airfreight. From the airlines' point of view, profitability is a key issue.

> "...we have to be able to carry cargo profitably. Unless we can do that, that's going to inhibit any growth that might take place..."
>
> Airline

So is education. For example, the airlines realize that their future cannot be limited to just linehaul. They presently have the door-to-door capability but this is not well known. The success of the education process, however, is dependent on reaching the appropriate decision-makers.

> "First to find the traffic personnel. They don't understand yet the role that airfreight can perform...We have to educate masses, transportation people, what airfreight can do for them...And this education has to begin not with traffic managers, but with management...and I think transportation companies, particularly airfreight, that they are approaching wrong people...They are approaching traffic managers".
>
> Distributor

Deregulation: There does not appear to be a predominant opinion regarding deregulation. Ten of the shippers expressed indecision or mixed feelings concerning regulatory reform. On the whole it is seen as having negligible positive effects on the airfreight industry. Industry feels that where movements are non-competive, rates will skyrocket. Some shippers were concerned about the possibility of monopoly and felt that transportation is a form of utility which was to be protected.

> "Against deregulation...need regulation to require carriers to provide service and to maintain the service in safe operation. Transportation is a form of utility and you have to protect it."
>
> Machinery Manufacturer

> "I think everybody is for deregulation except the guy who has his monopoly."
>
> Forwarder

Both shippers and forwarders expressed concern that lift availability would deteriorate even further due to deregulation.

> "I think the lift capability out of your remote inland points would deteriorate."
>
> Machinery Manufacturer

Both forwarders and airlines agree that regulatory reform may spawn another source of airfreight service.

> "I think deregulation or re-regulation...is going to give an impetus to some other tier of cargo carrier to come along and provide the spoke service..."
>
> Airline

> "...deregulation from the standpoint of freight is going to kill the combination carriers...regardless of what people say they're going to do, you're going to go where the money is. In other words, your L.A. to New York run, your L.A. to Chicago run...They're high-yield markets...The real freight markets that are developing in this country are going to have to go to charter operations of the forwarders; they're going to go to second level carriers. So the actual total freight revenue is going to come out of the airline industry and go into a secondary industry...A combination carrier is going to lose more and more of their freight revenue because they're not going to service the markets even as well as they're doing now, which isn't that well."
>
> Forwarder

> "...we can conceive one of the alternatives in the future is the airlines per se won't be in the airfreight industry at all. They will carry people. That is all they will carry..."
>
> Forwarder

Intermodality: The airlines' view of service and intermodality is generally production oriented. This view is characterized by the aircarriers' emphasis on finding ways of increasing economic efficiency rather than meeting customer needs. This reinforces previously discussed findings that airlines are not responsive to shippers' or forwarders' needs and are generally reactive.

...what we find is that the bigger the airplane, the bigger the shipment it draws...Today it's the 8x8x10 container and tomorrow it's going to be the 8x8x20 container."

Airline

This production-oriented approach, however, is not without its limitations.

"We're finding that, yes, it's great to have a twenty foot container ...At the same time we're finding weight and balance problems on the 747...If you get half a dozen of these...there's only certain spots that you can put them in...So there's an awful lot of pre-planning involved which may increase your closeout time on the ground...at the same time as the shippers want to come in at the last minute."

Airline

...In fact we have some twenty footers now. We find a relatively limited use of these by the shippers..."

Airline

In contrast to the airlines, shippers define intermodality in terms of their service needs. They want to overcome airport-to-door inefficiencies with single carrier responsibility.

"I'd like to bring a trailer into the airport, put that trailer into the aircraft so that I would not have to unload, reload containers, so that I can have a direct movement from point of origin to point of destination."

Apparel distributor

...It has got to come to pass. It still is the number one problem ...the inability to get your door-to-door capability with single carrier responsibility..."

Machinery Manufacturer

"...I think the future of the transportation industry is going to be enhanced by an intermodal transportation company where you will have a combination of air, surface, etc...."

Chemical Manufacturer

Achieving benefits for all shipment sizes, whether large or small, is another service need fulfilled by intermodality.

> "...Most of our airfreight shipments would be generally smaller in weight and size than surface. And I don't think we ever would need a surface container capability for airfreight..."
>
> Machinery Manufacturer

The forwarder, as the party dealing with both the airline and the shipper, acts as the translater of these differing perspectives on the future of intermodality.

> "But as a forwarder...we are handling many, many different kinds of commodities and customer needs all together so we might have a mixture of international freight...the twenty foot container is not the answer to our prayer."
>
> Forwarder

> "Just visualize what I said about trying to build the twenty footer and get good utilization with the miscellaneous kind of cargo that we have and build it in four hours..."
>
> Forwarder

The problems of intermodality must be examined because it is felt that in the future, transportation services will be provided by large, multimode groups representing truck, rail, ship and air. These groups will provide worldwide forwarding services, including unbiased TDC analysis to shippers. Forwarders expect to see their numbers decrease and the possibility of conglomerates made up of steamship lines, truckers, and airlines getting into the forwarder business.

Scenarios for the future. - A complete separation between freight and passenger airlines is foreseen for the future by some shippers.

> "...we can conceive one of the alternatives in the future is the airlines per se won't be in the airfreight industry at all. They will carry people. That is all they will carry and the design of the aircraft, instead of swinging down to hold containers, may be reconfigured just to hold bags...And an uncompromised freight airplane...is going to be

sold to an entirely different element...Flying Tigers may finally have an airplane that is economical from a freight standpoint and American ...and United...will not even be in the freight business."

Forwarder

It can be hypothesized that the demise of the combination carriers would occur because both passenger needs and shipper needs could not be satisfied on the same aircraft, schedules and routes. In other words, the freight market is not the same as the passenger market. It is also suggested that forwarder groups will shrink but the size of forwarders will increase (conglomerates).

As far as rates are concerned, shippers want to know what it's going to cost them as a single price for door-to-door service. This may lead to a groupage of services. Shippers foresee one combined tariff that will be computerized and stored by a central source. Most documentation will be done by data processing due to an entirely new technology behind transportation paperwork. The transformation which will affect rating may also affect customs procedures.

"Customs regulations and procedures need changing. Export and import inspection and declaration should all be accomplished at point of export with standardized international forms. Such inspections should occur at the factory for large shippers."

Airline

There is some contrast between shippers on their perceptions of the "ideal cargo aircraft."

"...would like to see a large freighter capable of 300,000/400,000 pounds and capable of crossing this country at a reasonable speed with economy and efficiency and very effectively."

Apparel Distributor

"For the design of future aircraft we'd rather use a higher floor so you could get igloos on both upper and lower compartments...it would be a 50,000 pound airplane and probably turbo-prop."

Forwarder

There is definitely a need for a more economical aircraft, of different sizes designed for different markets.

The use of containers is seen as vital, especially in terms of inter-modality.

"I think containers are going to be the way of the future."

Forwarder

"Containerization is a neat thing and the way to go. We have to improve our systems -- trace and track them better -- keep them from getting banged up."

Airline

"Containers would give us control. Control the pilferage, prompt recovery, customs clearance."

Machinery Manufacturer

There are, however, specific problems relating to larger containers, in particular the 20 foot container.

"We have weight and balance problems with the 20 factors on B747's. There's a lot of preplanning involved which increase closeout time on the ground."

Airline

"We use LD-3 containers extensively -- primarily in domestic. Our problem is we don't have the volume to really utilize a container that will hold up to 22-23,000 pounds capacity."

Machinery Manufacturer

"When you have next a.m. service and we back it up into the evening before -- how you handle your freight and you are compacting in a four to six hour period, getting that freight ready and packed into a container -- and getting it to an airline. Just visualize what I said about trying to build the twenty footer and get the good utilization with the miscellaneious kind of cargo that we have and build it in four hours - it's a very realistic kind of situation..."

Forwarder

It is important that the real usefulness or value of containerization for the customer not be overstated. While containerization offers certain customer service advantages (protection from damage, pilferage, etc), these are mainly realized by freight forwarders and large shippers not by the small shipment customer who cannot fill a container. As far as the airlines are concerned, containerization is not necessarily cost effective due to tradeoffs that occur. For example, the tare weight of containers displaces usable revenue bearing weight on weight limited flights. Containerization can, at times, provide a customer service and an economy or efficiency, but it is not an end-all solution in and of itself.

Section 3

GENERAL EXPECTATIONS

This section includes ideas derived from comments from the depth interviews relating to additional aspects of the present and future airfreight system. These are based on remarks having limited exposure but which may be indicative of more widespread feelings in the industry. It must be remembered that the following are, for the most part, the expectations of a single shipper and hence must not be viewed as necessarily representative. The order of presentation is random and has no significance as to their relative importance.

Future U.S. Domestic Airfreight Business

Shipper expectations of the future U.S. domestic airfreight business are described in the following terms:

More fuel efficient aircraft. - Since the air mode competes in the domestic market with trucks, rising fuel costs have become the number one problem for the airlines in light of this competition. Even though many shippers use air as an emergency backup to truck and other shippers use truck as a backup to rail, rising fuel costs may swing more freight from air to truck and eventually truck to rail.

More knowledgeable hazardous cargo rules. - While there are current rules dealing with hazardous cargo, there are problems stemming from their interpretation by the many operating elements of the air cargo system. The future must see a set of universally accepted rules that clearly define what commodities can be air shipped and if acceptable what specific procedures must be followed by the shipper.

Better equipment utilization. - There is a need for better equipment scheduling including more aircraft leasing or split charters by several forwarders or by forwarders representing shipping associations.

Domestic overnight delivery. - There is a demand for door-to-door overnight delivery in hundreds of cities. There are 522 commercial airports in the U.S. which could be better utilized for this service through the reoptimization of aircraft routes. Deregulation is seen as improving service noticably (yet probably not reducing costs) and possibly favorable affecting this overnight delivery service.

Capital. - There is a confused picture as to who will risk capital for new cargo aircraft in light of possible strikes and recessions. Since most airlines and all forwarders are reluctant to risk this capital, a lack of aircraft could result.

Cargo growth. - The domestic growth rate is expected to be 5 to 9% a year, which is less than the expected international rate. Only a few airlines are seen as participating in this growth, namely, Flying Tigers, American, Northwest, and possibly Summit Airways and Federal Express. On the other hand, the number of U.S. forwarders is seen as decreasing substantially yet continuing to gather the majority of freight. Possibly a Federal Express concept for forwarders will develop.

Containers. - Small shipments must be consolidated into containers that can be quickly loaded, i.e., igloos. The big 8x8x20' containers are not practical for overnight delivery unless it is a customer loaded container (CLC) from a large shipper such as United Parcel Service (UPS) or the Postal Service.

Negative Cargo Image About Most U.S. Airlines

Certain factors cause shippers to have a negative cargo image about most U.S. airlines. Most of these factors involve lack of service, particularly with the combination carriers, since they are perceived as being most concerned with passenger needs.

- The airlines are seen as not being committed to airfreight development and not really knowing airfreight shipper needs.
- Scheduled airlines are too concerned with passenger needs, therefore, the freight goes where people go and when people go. Possibly a separate cargo company with shared maintenance would help to focus on costs and goals.

- Air cargo sales people are generally considered unprofessional.

  "They drop by, take up your time asking about your kids or your golf game, hand you a rate chart, can't answer your questions, and leave."

- Some airlines are seen as not recognizing shippers' insistence on the best service when they are paying top transportation dollar. The airlines believe they can fill belly containers by simply cutting prices, and hope to compete with forwarders by seeking CLC freight.

- Better communication between airlines and forwarders is needed in the area of service planning.

Future International Airfreight Business

Shipper expectations of the future international airfreight system again, primarily involve service considerations. They are concerned with delivery, containerization and intermodality, among other factors:

International delivery. - International delivery will be expected in 2-3 days worldwide. One day deliveries are not anticipated, due in part to foreign curfews from 10 p.m. to 6 a.m.

Growth. - International growth is expected to be 8%, yet its potential is seen as 10 to 15% per year. International trade is perceived as increasing considerably due to the effects of multi-national company interests. This will lead to the formation of new trade routes and new categories of items to be traded.

International Air Transport Association (IATA). - IATA is seen as being non-productive in promoting the growth of airfreight. Airlines, not forwarders, are the members while forwarders/agents participate in the vast majority of the freight. Also, according to some respondents, IATA holds prices up too high. Simpler rate structures are anticipated.

Containers. - Container leasing and customer loaded containers (CLC's) may be prevalent in the future according to one respondent. It is also felt that the 8x8x20 container will increase in use on balanced trade routes.

Competition. - One respondent expressed concern that the phenomenon of non-conference price competition that exists in the maritime industry (e.g., Russian Flagships) may be extended in some fashion to the airfreight sector.

The structure of future transportation services. - Transportation services are seen as eventually being provided by large multimode groups (possibly 10 worldwide) representing truck, rail, ship and air. In addition, it is felt that one aircargo trade hub may develop in each country near its manufacturing hub and this airport will allow nighttime departures.

New Cargo Aircraft for the Future U.S. Domestic Market

Shipper expectations of new cargo aircraft for the future U.S. domestic market and the international market were varied. There was also some lack of response from many interviewed due to the fact that shippers don't really care about the aircraft, per se, but are concerned with services that can be provided by the airline or forwarder.

- A new aircraft is needed before 1985.
- A very low cost aircraft is desired -- such as a $3 million aircraft -- which at the same time would be a smaller aircraft (payload of 50,000 for instance). This reference to aircraft price may be indicative of a lack of general understanding of air carrier economics.
- Since speed is not perceived as most important, a turboprop may be the best aircraft. A shorter range is needed -- 500 to 1500 miles, with an average range of 700-900 miles.

A high utilization rate is required -- not just a midnight takeoff and a 5 a.m. landing. Therefore a new TFAN QC aircraft may be best. Possibly the concept of "changing fuselages? could be used.

New Cargo Aircraft for the Future International Market

Similar to the domestic operations, the international shipper's expectations are centered upon the service to be provided not upon the aircraft by which it will be accomplished. In general, the shippers future planning efforts, (beyond five years), do not consider the interrelations between their anticipated future distribution problems and potential developments in transport systems.

The essence of this situation is that those concerned with cargo aircraft development must focus on the needs of shippers and not on isolated shipper perceptions as to required future design characteristics.

Section 4

MAIL SURVEY FINDINGS

This section discusses the results of the mail survey which, in effect, substantiate or refute the depth interview findings through quantitative analysis. The findings are organized as outlined below:

- Distribution Function Role and Organization
  - Informal interaction with other functions
  - Trend toward centralization in distribution decision making
  - Mode-choice decision process
    - Consignee involvement
    - Reasons for using airfreight
    - Total distribution cost concept (TDC)
    - Barriers to formal TDC use
    - Systems analysis
    - Inventory carrying costs (ICC)
    - Competition and customer service
- Airfreight Current and Future
  - User views of airlines and forwarders
  - Present barriers to increased airfreight use
  - Intermodal system
  - Rate reduction
  - Profile of heavy airfreight users

For clarity the statement associated with each table is identified by the same number it had in the Mail Survey Form, Tables 1-5 and 1-6, and actual cross-tabulations have been included where applicable.

Distribution Function Role and Organization

Shippers' perceptions of the current distribution system and functions were addressed in the mail survey questionnaire. This survey was helpful in determining the parameters of shippers' distribution systems now and in the future including the organizational role of the distribution function

and factors affecting mode choice. The relationship between shipper distribution systems and the present and future transportation system will be discussed primarily in terms of intermodal capabilities.

Informal interaction with other functions. - A key finding in terms of the role of distribution in overall management is the informal interaction of transportation mode decision-makers with other functions within the organization. The depth interviews indicated that the distribution function interacted informally with finance and marketing in setting distribution procedures, but was not formally involved in developing the broad objectives of their function. This finding was reinforced by the mail survey results.

According to the survey results, Statement 9, Table 1-6, 63 percent of the respondents agreed and 26 percent disagreed that top distribution executives are considered part of senior management and are integrally involved in general business planning. At the same time, the table below shows that 53 percent agreed that mode choice decisions are made below the level of top distribution executive and only 36 percent felt that these decisions were made at the level of the top distribution executive.

6. Mode choice is primarily a company policy decision made at the level of the top distribution executive.

	Total	Average monthly airfreight volume - pounds					
		Outbound			Inbound		
		0-999	1000-4999	5000-	0-999	1000-4999	5000-
Agree - %	36	33	38	39	35	37	33
Neither Nor - %	11	18	6	10	14	11	6
Disagree - %	53	49	56	51	51	52	61
Total - %	100	100	100	100	100	100	100

In a very small percentage of cases (5 percent), Statement 7, Table 1-6, mode choice is primarily a company policy decision made at the level of management above the top distribution executive. These figures indicate that actual mode decisions are made by staff traffic managers in a majority of cases.

Yet most respondents (49 percent) disagreed that the headquarters transportation or distribution department acts only in an advisory capacity. Thus, it appears that there is no distinct pattern as to what function top distribution executives perform. In half the instances, mode choice decisions are made below their level, and in half the instances they act in more than an advisory capacity.

18. The headquarters transportation or distribution department acts in an advisory capacity only, as far as mode choice goes.	
Agree - %	37
Neither agree nor disagree - %	14
Disagree - %	49
Total - %	100

These survey results reinforce the findings of the depth interviews in that they both conclude that staff traffic managers offer advice and support but are not business policy makers. There is no strong evidence that suggests that traffic managers are formally integrated into general business planning activities as overall policies may be made on a senior management level. However, day-to-day transportation mode decisions are made on the staff traffic manager level. This may suggest that the other marketing policies of the firm drive the transportation policy making activities. That is, the transportation function must be responsive to the overall marketing policies.

Trend toward centralization in distribution decision making. - Another finding relating to the distribution function is a trend toward greater centralization in distribution decision making. The distribution function of firms can generally be characterized as centralized or decentralized. 65 percent of the respondents characterized their company as being centralized in its mode decisions. However, heavy airfreight users and higher value/pound producers were characterized as less centralized. This finding for inbound shippers is statistically significant at the .05 level and at the 0.10 level for outbound shippers.

16. I would characterize my company as being centralized in its mode decisions.

	Total	Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
		0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	65	72	66	60	68	66	57
Neither Nor - %	8	8	8	6	10	4	8
Disagree - %	27	20	26	34	22	30	35
Total - %	100	100	100	100	100	100	100

	Total	Average Value per Pound - Dollars per Pound			
		Less than $1/lb	$1.00-4.99	$5.00-9.99	$10.00 or more
Agree - %	65	68	66	71	58
Neither Nor - %	8	3	9	4	11
Disagree - %	27	29	25	25	31
Total	100	100	100	100	100

While 65 percent of those surveyed characterized their company as being centralized in its mode decisions, 40 percent of the respondents, Statement 15, Table 1-6, disagreed that one department has the responsibility for all distribution decisions and 49 percent, Statement 17, Table 1-6, felt that day-to-day mode selection is made by a traffic manager at each plant location. This may be explained in two ways:

- In certain circumstances, policies made by staff distribution managers in conjunction with upper management may be disseminated down to each individual location for their action on a day-to-day basis.
- Respondents may not have a clear understanding of centralization. In that case, should the definition be reviewed in order to be operationalized?

However, a definite trend toward centralization is being experienced by 55 percent of the respondents:

19. My company is moving towards greater centralization of distribution decision making in the future.						
		Products Most Often Shipped				
	Total	Elec.	Machinery	Chemicals	Clothing	Food
Agree - %	55	56	47	54	67	71
Neither Nor - %	26	22	35	24	19	19
Disagree - %	19	22	18	22	14	10
Total - %	100	100	100	100	100	100

This trend may encourage further use of operations research techniques (e.g. TDC) in distribution decision making. This would be due to efficiencies and economies related to the timely availability of higher quality information and an increased ability to make fully integrated system decisions.

Mode-choice decision process. - In this section, the reasons underlying the use of transportation modes, which were determined in the depth interviews, have been ranked and quantified. This information gives us a basis for segmenting airfreight demand and forecasting the growth of particular segments. In addition, the survey allows us to test shipper sensitivity to the 1990 air cargo scenario and to validate further shipper mode decision-making behavior. The survey combined with the depth interviews, enables us to identify and assess the full nature and extent of actual mode choice decision-making.

Consignee involvement: Consignee involvement is not a prime variable in the mode choice decision process according to the mail survey results which refute the depth interview findings. Consignee involvement in this mode decision process is less influential than the shipper, especially for heavy airfreight users. The results of tabulating the following statement responses against average monthly airfreight volume are significant at the .05 level (outbound) and the .02 level (inbound).

30. The consignee's purchasing agent selects the mode of transportation in many cases.

	Total	Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
		0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	25	28	23	19	30	30	20
Neither Nor - %	11	12	12	7	12	7	8
Disagree - %	64	60	65	74	58	73	72
Total - %	100	100	100	100	100	100	100

The following results support those above and are significant at the .01 level for outbound freight

31. In terms of mode choice, the consignee is more influential than the shipper.

	Total	Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
		0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	21	23	27	15	23	18	23
Neither Nor - %	13	18	9	12	17	12	10
Disagree - %	66	59	64	73	60	70	67
Total	100	100	100	100	100	100	100

However, when the firm itself is the consignee, they decide the transportation mode in 59 percent of the cases.

32. When my company is consignee, we decide the mode of transportation.

	Total	Products Most Often Shipped				
		Elec. Machinery	Chemicals	Clothing	Food	
Agree - %	59	72	68	38	91	55
Neither Nor - %	23	17	19	40	-	21
Disagree - %	18	11	13	22	9	24
Total - %	100	100	100	100	100	100

Reasons for using airfreight: The data of Table 4-1 ranks and quantifies the reasons for using airfreight which can be considered part of the mode choice decision process. These data were developed in the following manner:

Statistical question 12 in the mail survey, Table 1-5, asked, "Why does your company use airfreight?" for inbound and outbound. The question allowed for multiple responses. Responses were transformed into percentages for each reason. Individual reasons relating to Urgency, Competition, Service and Cost were grouped and the percentages added together. These figures were divided by the total percentage to arrive at the figures shown in the table. For example, speed in transit, backorders, deadlines and down production lines can collectively be classified "Urgency." The percentages of responses for these four reasons (69.7, 15.6, 33.8 and 43.4 for inbound) were added together -- 162.5 -- and then divided by the total percents for inbound -- 269 -- to get 60.4 percent as shown in the table.

Total distribution cost (TDC) concept: It was determined in the depth interviews that rational cost/benefit tradeoffs are employed in mode choice yet at the same time, formal use of TDC was not widespread. The results of the mail survey again reinforce this depth interview finding.

28. I feel that my company makes cost/benefit tradeoffs in selecting the transportation mode.

		Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
	Total	0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	79	71	84	80	75	82	79
Neither Nor - %	11	18	6	9	14	9	12
Disagree - %	10	11	10	11	11	9	9
Total - %	100	100	100	100	100	100	100

A majority of the respondents also felt that the information provided by their company's accounting and information systems was useful for making distribution decisions.

Table 4-1

REASONS FOR USING AIRFREIGHT

Reason	Direction of Shipment	
	Outbound	Inbound
1. Urgency - %	47.7	60.4
o Breakdowns		
o Deadlines		
o Backorders		
o Speed in Transit		
2. Competition - %	21.4	12.9
o Customer Service		
o Increase Competitiveness		
3. Service - %	12.1	12.8
o Time Reliability		
o Less Loss/Damage		
o Limited Handling		
o Tracing		
4. Cost - %	7.2	8.4
o TDC		
o Cash Flow		
o Cheaper than Alternatives		
o High Product Value		
5. Other - %	11.6	5.5
Total - %	100.0	100.0

21. The information provided by my company's accounting and information system is useful for making distribution decisions.	
Agree - %	68
Neither agree nor disagree - %	11
Disagree - %	21
Total - %	100

However, results also indicated that only 21 percent of the respondents felt they used airfreight on a planned basis.

25. My company uses airfreight as a routine, planned part of its distribution system.							
		Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
	Total	0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	21	5	19	41	9	21	41
Neither Nor - %	7	8	5	5	6	8	7
Disagree - %	72	87	76	54	85	71	52
Total - %	100	100	100	100	100	100	100
		Average Value per Pound - Dollars per Pound					
	Total	Less than $1.00/lb	$1.00-$4.99		$5.00-$9.99	$10.00 or more	
Agree - %	21	5	15		29	49	
Neither Nor - %	7	8	6		5	5	
Disagree - %	72	87	79		66	46	
Total - %	100	100	100		100	100	

Although 72 percent responded that they did not use airfreight on a planned, routine basis, 30 percent responded that airfreight was used as a supplemental mode to surface in order to optimize its distribution system.

27. My company uses airfreight as a supplemental mode to surface in order to optimize its distribution system.	
Agree - %	30
Neither agree nor disagree - %	14
Disagree - %	56
Total - %	100

In tabulating statement 25 ("My company uses airfreight as a routine, planned part of its distribution system") against average monthly airfreight volume and average value per pound, it was determined that heavier airfreight users and high value per pound producers use airfreight as a routine, planned part of their distribution systems on a significantly higher basis than other shippers.

The fact that 79 percent of the respondents believe cost/benefit tradeoffs are employed in mode choice and only 21 percent of these same respondents use airfreight on a routine, planned basis, leads to the following possible conclusions. Firms employing cost/benefit tradeoffs are not necessarily choosing or are actually rejecting the planned, routine use of airfreight. When considering the total distribution cost, airfreight is not found to be most cost/effective.

This finding forces us to ask the following questions: When firms employ cost/benefit tradeoffs, what costs and what benefits are being traded off? How accurate is the information upon which they are basing the tradeoff? How extensive? Is it possible that not every economic variable associated with mode choice is considered or that variables considered may be incorrectly calculated? Thus, if cost/benefit analysis is unsystematic, it appears that it is time to clarify or redefine TDC and again present it to the shippers.

Barriers to formal TDC use: A major barrier to the formal use of TDC is the limited organizational role of traffic managers which was discussed in the Distribution Function section. Their lack of integration into general business planning is evident by the fact that although top distribution executives are part of upper management, day-to-day decisions are made on a lower level.

Another barrier to TDC use is the fact that the transportation manager's performance is not primarily measured against budget.

1. The transportation manager's performance is primarily measured against budget.	
Agree - %	46
Neither agree nor disagree - %	16
Disagree - %	38
Total - %	100

Therefore, the traffic manager is not necessarily conducive to TDC or ICC use.

System analysis: The use of systems analysis in distribution decision-making is widespread, yet most of the respondents lacked complete confidence in Management Information System (MIS) data.

20. My company uses systems analysis in the distribution and materials management function.

	Total	Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
		0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	65	62	69	67	63	70	68
Neither Nor - %	14	21	11	8	17	8	7
Disagree - %	21	17	20	25	20	22	25
Total - %	100	100	100	100	100	100	100

23. I have complete confidence in the accuracy of information provided by my firm's accounting and information systems as it relates to making optimum distribution decisions.

	Total	Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
		0-999	1000-4999	5000 or more	0-999	1000-499	5000 or more
Agree - %	26	32	27	21	27	24	22
Neither Nor - %	30	33	28	29	31	30	31
Disagree - %	44	35	45	50	42	46	47
Total - %	100	100	100	100	100	100	100

22. My company's information and accounting systems are not able to provide the information necessary to make optimum distribution decisions.							
		Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
	Total	0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	46	43	48	50	40	49	50
Neither Nor - %	15	17	9	10	20	9	11
Disagree - %	39	40	43	40	40	42	39
Total - %	100	100	100	100	100	100	100

Inventory carrying costs (ICC): 76 percent of the respondents said that the ability to control inventory levels was an important factor in evaluating the effectiveness of their company's distribution system. However, inventory control was less important in measuring effectiveness for heavy airfreight users. This is possibly explained by the fact that for heavy airfreight users, customer service considerations outweigh inventory cost considerations.

3. An important factor in evaluating the effectiveness of my company's distribution system is the ability to keep inventory under control.							
		Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
	Total	0-999	1000-4999	5000 or more	0-999	1000-499	5000 or more
Agree - %	76	85	73	71	81	76	70
Neither Nor - %	11	6	11	12	9	9	13
Disagree - %	13	9	16	17	10	15	17
Total - %	100	100	100	100	100	100	100

In a majority of cases (70 percent) an ICC is calculated, but it is not necessarily important in mode choice.

4. My company calculates an inventory carrying cost.	
Agree - %	70
Neither agree nor disagree - %	10
Disagree - %	20
Total - %	100

5. My company calculates an ICC and it is used as an important element in choosing modes.

	Total	Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
		0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	30	30	32	33	24	35	32
Neither Nor - %	23	24	21	19	27	15	21
Disagree - %	47	46	47	48	49	50	47
Total - %	100	100	100	100	100	100	100

This contradiction (most companies calculate an ICC in part to evaluate the effectiveness of their distribution system, yet most also deny that this ICC calculation is used as an important element in choosing modes) may be explained by the fact that shippers possibly do not fully understand the ICC concept or its objectives. ICC importance in mode choice is somewhat more important for heavy inbound airfreight users, possibly to minimize cash flow considerations and the economic burden of inventory costs.

Competition and customer service: Almost all the respondents (94 percent) agree that a high level of customer service is an important advantage in most of their company's markets.

10. A high level of customer service is an important advantage in most of my company's markets.	
Agree - %	94
Neither agree nor disagree - %	4
Disagree - %	2
Total - %	100

An equal percentage (94 percent) maintained Table 1-6, Statement 11, that competition in their company's markets could be described as very competitive. 74 percent felt that customer service could be maintained by surface transportation.

14. My firm can almost always satisfy its customer service objectives by using surface transportation.

	Total	Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
		0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	74	84	76	61	82	70	61
Neither Nor - %	4	3	3	5	5	2	5
Disagree - %	22	13	21	34	13	28	34
Total - %	100	100	100	100	100	100	100

This finding (which was significant at the .01 level) was somewhat less applicable to heavy airfreight users and higher value per pound producers.

When questioned as to the reliability of truck service compared to airfreight service, airfreight service was perceived as being more reliable.

29. Truck service is more reliable than airfreight service.

Agree - %	12
Neither agree nor disagree - %	47
Disagree - %	41
Total - %	100

Most firms also had private motor fleets in order to better meet their shipping needs.

39. The present transportation system does not meet all my company's shipping needs so we have a private motor fleet to fill the gap.	
Agree - %	56
Neither agree nor disagree - %	11
Disagree - %	33
Total - %	100

So even though airfreight was seen as more reliable, most firms felt surface transportation could satisfy their customer service objectives. The unreliability of surface transportation, however, was probably reduced due to the utilization of private motor fleets which most firms employed.

At the same time, firms who feel they are dominant competitors in their industries are heavy airfreight users.

12. My company is the dominant competitor in most of its markets.							
		Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
	Total	0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	50	43	48	58	44	61	46
Neither Nor - %	26	32	24	22	29	18	21
Disagree - %	24	25	28	20	27	21	33
Total - %	100	100	100	100	100	100	100

Perhaps this is because the use of airfreight is viewed as a tool that used routinely can give the shipper a competitive edge. This is evidenced by the predominance of cost and competition as reasons for using airfreight by both inbound and outbound shippers.

My company is the dominant competitor in most of its markets.						
	Why does your company use airfreight?					
		Inbound				
	Total	Cost	Urgency	Service	Competition	Other
Agree - %	50	57	50	51	55	97
Neither Nor - %	26	22	23	24	23	25
Disagree - %	24	21	27	25	22	29
Total - %	100	100	100	100	100	100
		Outbound				
	Total	Cost	Urgency	Service	Competition	Other
Agree - %	50	53	46	48	54	48
Neither Nor - %	26	21	27	27	24	27
Disagree - %	24	26	27	25	22	25
Total - %	100	100	100	100	100	100

Firms who consider themselves dominant competitors in their field tend to use airfreight outbound for competitive reasons, again reinforcing the fact that airfreight can give one the competitive lead.

The following responses suggest the market atmosphere in which the respondents operate.

11. Competition in most of my company's markets can be described as very competitive.	
Agree - %	94
Neither agree nor disagree - %	4
Disagree - %	2
Total - %	100

13. My company is in a very competitive industry where there are only a few competitors.	
Agree - %	30
Neither agree nor disagree - %	9
Disagree - %	61
Total - %	100

This market can be described as extremely competitive and broad-based with a profusion of competitors.

The majority of firms surveyed use airfreight on an "emergency only" basis (due to plant breakdowns, samples or customer request) as evidenced in the following table.

26. My company uses airfreight on an unplanned, emergency only basis.

	Average Monthly Airfreight Volume - Pounds						
		Outbound			Inbound		
	Total	0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	73	89	80	56	82	76	54
Neither Nor - %	6	4	4	6	5	5	8
Disagree - %	21	7	16	38	13	19	38
Total - %	100	100	100	100	100	100	100

	Average Value per Pound - Dollars per Pound				
	Total	Less than $1.00	$1.00-$4.99	$5.00-$9.99	$10.00 or more
Agree - %	73	84	80	67	49
Neither Nor - %	6	3	5	8	7
Disagree - %	21	13	15	25	44
Total - %	100	100	100	100	100

Since the findings in both cases were statistically significant at the .01 level, it can be hypothesized that this "emergency only" use is less applicable to heavy airfreight users and high value per pound producers. They tend to see airfreight as more planned and routine in its use, due to the nature of their business and/or products.

Airfreight Current and Future

The discussion contained in Section 2 summarized the users view of current and future airfreight operations as derived from depth interviews. This section addresses the same subject from the viewpoint of the mail survey

inputs. In most cases the correlation of the results with shipper characteristics added little over the general findings and hence are not presented.

User views of airlines and forwarders. - The airfreight forwarder presently plays a dominant role in shipping by air. This will continue in the future only if airlines do not start providing the service that is demanded. Also in the future (due to deregulation which will allow forwarders to acquire aircraft fleets and in essence perform as airlines), the differences between airlines and forwarders may diminish.

36. Airfreight forwarders provide better service than the airlines.

Agree - %	32
Neither agree or disagree - %	54
Disagree - %	14
Total - %	100

37. The airfreight forwarder satisfies my company's airfreight shipping needs.

Agree - %	50
Neither agree or disagree - %	34
Disagree - %	16
Total - %	100

34. When my company ships by air, an airfreight forwarder usually handles the shipment.

		Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
	Total	0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	62	70	63	62	65	59	61
Neither Nor - %	15	9	12	15	15	17	13
Disagree - %	23	21	25	23	20	24	16
Total - %	100	100	100	100	100	100	100

35. My company prefers dealing directly with the airline rather than using airfreight forwarder.

	Total	Average Monthly Airfreight Volume - Pounds					
		Outbound			Inbound		
		0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	29	31	34	29	28	37	29
Neither Nor - %	31	29	24	27	34	30	26
Disagree - %	40	40	42	44	38	33	45
Total - %	100	100	100	100	100	100	100

It is suggested that the use of forwarders is preferred due to their door-to-door possession of the freight coupled with their PU & D capabilities. In support of this, respondents felt that airlines should handle door-to-door transportation in the future.

55. In the future airlines should handle total door-to-door transportation.

Agree - %	54
Neither agree or disagree - %	37
Disagree - %	9
Total - %	100

While most respondents were neutral in regard to airlines not understanding their shipping needs, 33% disagreed that airlines did not understand their needs. It is hypothesized that the problems with airlines are specific (namely, lack of door-to-door transportation) rather than a general misunderstanding of shippers' needs.

47. The problem with the airlines is that they do not understand my company's shipping needs.

Agree - %	15
Neither agree or disagree - %	52
Disagree - %	33
Total - %	100

However, there was strong disagreement against one company handling all shipping needs -- air, truck, rail and ocean.

38. I would like one company to handle all my shipping needs -- air, truck, rail and ocean.	
Agree - %	13
Neither agree or disagree - %	11
Disagree - %	76
Total - %	100

Present barriers to increased airfreight use. - Since it has been determined that urgency/competition/service are dominant reasons for using airfreight today, it can be ascertained that service in general is the primary factor in airfreight use. Since service rather than rates is the primary factor in airfreight use, its deficiencies and/or limitations, account for the greatest barriers to increased airfreight use.

According to the respondents, the service that is inadequate is pick-up and delivery (PU&D) and ground handling. In fact, 66 percent agreed Statement 42, Table 1-6, that the biggest problem with today's airfreight system is associated with ground handling, airport congestion, and PU&D. In the depth interviews the lack of lift to/from appropriate cities was cited as a major complaint. Such inadequate geographic coverage and frequency were not, however, found to be the case as shown in the following survey results which contradicted the findings of the depth interviews.

43. Scheduled airline service -- either combi or cargo -- today does not serve the cities my company ships to/from most often.	
Agree - %	20
Neither agree or disagree - %	37
Disagree - %	43
Total - %	100

44. Scheduled air service today does not provide enough frequency of service to cities my company ships to/from most often.	
Agree - %	20
Neither agree or disagree - %	41
Disagree - %	39
Total - %	100

45. Scheduled airlines service today does not provide enough capacity to cities my company ships to/from most often.	
Agree - %	15
Neither agree or disagree - %	45
Disagree - %	40
Total - %	100

Intermodal system. - Intermodality can be defined as single carrier responsibility -- airfreight as a partner in a fully integrated transportation system. An intermodal system has strong appeal in terms of single carrier responsibility and efficient door-to-door transportation.

51. Intermodal capabilities are a vital element of the future transportation system.	
Agree - %	82
Neither agree or disagree - %	14
Disagree - %	4
Total - %	100

52. Intermodal capabilities of the transportation system would be nice but are not necessary for my company.	
Agree - %	29
Neither agree or disagree - %	24
Disagree - %	47
Total - %	100

An intermodal system also has service appeal. First, it satisfies the need for efficient door-to-door transportation and secondly, it provides single carrier responsibility.

53. Intermodal capabilities are appealing for the door-to-door containerization it would offer.	
Agree - %	77
Neither agree or disagree - %	21
Disagree - %	2
Total - %	100

54. Intermodal capabilities are appealing for the single carrier responsibility it would offer.	
Agree - %	68
Neither agree or disagree - %	27
Disagree - %	5
Total - %	100

Respondents did not show a strong preference for freighter aircraft.

48. The characteristics of the product(s) my company ships by air frequently necessitate shipping on freighters.	
Agree - %	27
Neither agree or disagree - %	24
Disagree - %	49
Total - %	100

Neither would they use airfreight more frequently if they had the equipment necessary to self-load containers.

40. My company would use airfreight more frequently if we had the equipment necessary to load the containers ourselves.	
Agree - %	3
Neither agree nor disagree - %	25
Disagree - %	72
Total - %	100

There does not seem to be a dominant attitude concerning the shipment of freight in belly containers.

50. My company prefers not to ship in belly containers.	
Agree - %	5
Neither agree or disagree - %	65
Disagree - %	30
Total - %	100

Again, this reinforces the fact that shippers are not greatly concerned with types of aircraft or where the containers go on the aircraft. The concern is with the quality of service provided.

49. If my company has the choice, it prefers shipping on freighter aircraft.	
Agree - %	19
Neither agree or disagree - %	52
Disagree - %	29
Total - %	100

46. I would take lift in any form -- freighter or combi -- to/from cities where my company's operations are located.	
Agree - %	35
Neither agree or disagree - %	50
Disagree - %	15
Total - %	100

Overnight service is necessary for one-third of the Respondents.

41. Overnight (next day) airfreight service is mandatory for my company.	
Agree - %	33
Neither agree nor disagree - %	21
Disagree - %	46
Total - %	100

Rate reduction. - Only 46 percent of the respondents agreed that if the differential between surface and airfreight rates were reduced by 30 percent, their company would use more airfreight. The interest in a rate reduction was substantially higher with heavier airfreight users and higher value/pound producers for obvious reasons.

33. If the differential between surface and airfreight rates were reduced by 30%, my company would use more airfreight.

	Average Monthly Airfreight Volume - Pounds						
		Outbound			Inbound		
	Total	0-999	1000-4999	5000 or more	0-999	1000-4999	5000 or more
Agree - %	46	38	51	59	36	54	57
Neither Nor - %	30	31	28	24	34	26	26
Disagree - %	24	31	21	17	30	20	17
Total - %	100	100	100	100	100	100	100

	Average Value per Pound - Dollars per Pound				
	Total	Less than $1.00	$1.00-$4.99	$5.00-$9.99	$10.00 or more
Agree - %	46	29	46	58	63
Neither Nor - %	30	31	32	30	23
Disagree - %	24	40	22	12	13
Total - %	100	100	100	100	100

Profile of heavy airfreight users. - A correlation of the responses to the 56 statements of Table 1-5 with the 16 statistical questions provided the means for profiling the current heavy airfreight users. The following is a list of the six more important features of this profile. It is quite likely that the future expansion of the planned use segment of the airfreight market will, at least initially, occur from the ranks of shippers fitting this profile.

- o Customer service motivation
- o Higher value/pound producer
- o Less centralized
  - therefore uses less systems analysis
  - has less confidence in management information systems
  - less use of TDC
- o Usually a shipper decision
  - therefore less concern with ICC and
  - less concern with inventory control-O/B
- o Dominant competitor in their industry
- o Ship from a large number of locations

Section 5

RECOMMENDATIONS FOR FUTURE RESEARCH

Several areas in this study have been identified where further research could lend additional insight into developing models of transportation mode decision-making and understanding present and future air cargo systems. They are as follows:

The Use of Total Cost Concept

The findings from the research reported here suggest that firms applying TDC to their distribution system are not choosing the air mode of transportation on a planned basis. This poses a significant strategical problem, as TDC has played a large role in the marketing and selling of airfreight for some time. Future research demands a re-evaluation of the potential for the use of the complete TDC concept in light of these findings.

The total cost concept is based on the assumption that the use of airfreight allows for cost/benefit tradeoffs with other areas of the firm's distribution system. For example, savings in capital and inventory handling and storage costs are attained and packaging, damage, pilferage, insurance and taxes can be reduced. In essence, the use of airfreight as part of the TDC concept increases acquisition costs, but reduces possession costs, which may result in lower total distribution costs.

The findings from this study and much previous research indicate that service (speed, urgency, reliability) is the most important reason for using airfreight. The airfreight decision is, in fact, based upon the need for a premium service. Cost is one of the least important factors in airfreight choice. Thus, the past demand for airfreight has not been very price sensitive. This fact, coupled with the difficulty of systematically applying TDC to a distribution system, may explain the lack of TDC use or the failure of TDC to promote airfreight usage.

Future research is therefore recommended in order to further explore the feasibility of TDC. Should the TDC approach be abandoned? Or should it be directed at regular bulk shippers rather than "emergency only" users of air-freight who are only interested in speed and service?

If TDC is still to be promoted, mode decision-making behavior and market and product air eligibility characteristics must be examined in tandem. It is necessary to study the circumstances surrounding the use of airfreight as well as to consider the party that bears the economic impact of the circumstance.

Conjoint Analysis

As discussed in the Case Studies Introduction, the optimal technique for testing the way shippers choose between alternatives is through the use of Conjoint Analysis. If the case study research were to continue, this technique would be invaluable in testing shipper preferences for the following reasons:

When developing or repositioning products or services, a company must know its market and understand the nature of its product. Understanding the nature of the product can be difficult when it has different qualities each appealing to diverse consumers with different interests. Thus, it can be difficult for a company to evaluate which of the product's characteristics the customer perceives to be most important. Since most products are multi-attribute, judging characteristics individually does not give a complete picture. It becomes necessary to determine how consumers value various levels of each attribute and the extent to which they would trade a high level of one to achieve a high level of another.

Again, the basis of the technique is that inferences about consumer behavior can best be made by measuring the way they make choices between various alternatives instead of relying on self-reported preferences.

Thus, utilizing Conjoint Analysis in testing shipper mode-choice behavior would enable one to:

- Obtain predictions about the levels of interest for new products or concepts, and,
- Acquire information about the tradeoffs among product attributes -- whether one feature can be increased, decreased or substituted for another without loss of market share.

Extension of the Mail Survey

Certain issues investigated in the depth interviews were not fully explored in the mail survey questionnaire. A review of these issues in the light of the completed results indicate that further research in these areas could yield additional data pertinent to the future market and air cargo system developments. Examples of such considered issues are delineated below:

The depth interviews indicated that linehaul limitations (lack of lift to/from appropriate cities, lack of frequency of service and lack of availability of freighters) were a significant barrier to increased airfreight use. Yet, when tested in the mail survey, these factors proved to be relatively unimportant to most of the respondents. The mail survey findings pointed to the fact that problems related to ground services (pick-up and delivery, tracing, etc.) were the major obstacles to reliable, efficient airfreight service. Thus, further study on the importance of linehaul and ground handling factors should be considered.

Deregulation was addressed only in the depth interviews. Opinions regarding regulatory reform were quite mixed and on the whole, it is seen as having negligible positive effects on the airfreight industry. Now that deregulation has been approved and implemented, it may be the appropriate time to study its effects on the industry thus far. How has deregulation affected routes, rates, service, competition, etc.? How has it benefited or impeded shippers, forwarders or the airlines themselves? Will regulatory reform spawn another source of airfreight service as some respondents suggested? What will be the impact upon the combination carriers?