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DETERMINANT CRITERIA IN THE OCEAN CARRIER SELECTION PROCESS

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This study examines key determinant criteria used by import and export shippers when selecting an international containership carrier. A sample of import and export shippers were asked to evaluate eighteen service characteristics based on whether or not the characteristics were required by their international containership carriers. The results of Pearson chi-square tests indicate a significant difference between import shippers and export shippers on three of the eighteen service characteristics. Import shippers were more demanding of their carriers by requiring door-to-door transportation rates, shipment expediting, and shipment tracing services.

INTRODUCTION

Both industry and academia have begun to place more importance on determining and understanding the selection criteria used in choosing a transportation provider. Differences between motor carriers and shippers perception of choice criteria have been explored by numerous researchers such as Evans and Southard (1974), Abshire and Premeaux (1991a) and Murphy, Daley, and Hall (1997). The effect of deregulation on the selection process was examined by Bardi, Bagchi, and Raghunathan (1989), while Evers, Harper, and Needham (1996) focused on the perceptions of attributes pertaining to intermodal rail-truck services. These studies found a variety of significant differences in the perceptions of shippers and carriers.

While the buyer behavior literature very clearly shows that a variety of evaluative criteria are used in the final selection of a product or service there are those few criteria that must be present for the product or service to be selected. Alpert (1971) referred to those attributes as determinant attributes. These are product or service attributes that actually lead to selection of the product or service and these attributes are generally best determined through the use of direct questioning techniques. It seems clear, based on the concept of determinant criteria, that some criteria are more important in the selection process than are other criteria.

The purpose of this study is to extend the carrier selection literature into international ocean carriers which is a mode of transportation that

has received much less study than other modes of transportation. While other studies have examined perceptual attribute differences between carriers and shippers, this study further expands the literature base by examining not only perceptual attribute differences that exist between carriers and shippers involved in international shipping, but also explores the use of determinant criteria used in the selection process of these carriers.

LITERATURE REVIEW

As noted earlier, Alpert (1971) has shown that certain product attributes are perceived as being more important than other attributes and that for a particular product or service to be chosen these attributes must be present. These attributes are known as determinant attributes as they ultimately determine if the product or service will be purchased. Sinclair and Stalling (1990) point out that consumers tend to look at products as possessing bundles of attributes and that these attributes differ in their contribution to evaluation and choice. They further note that determinant attributes are those that are not only important but also tend to separate one competitor from another and that by understanding those differences, manufacturers can adjust their marketing strategies to fit each market segment.

Over the years, a variety of methods have been used to detect which attributes could be considered determinant in nature. Alpert (1971) reported that a Direct Dual Questioning Determinant Attribute (DQDA) method was most appropriate in uncovering determinant attributes. Saaty (1977) found that an Analytic Hierarchy Process (AHP) provided a method for identifying determinant attributes. More recently, Armacost and Hosseini (1994) refined the AHP technique and produced a technique referred to as AHP-DA which uses the importance results derived from AHP and combines them with difference measures based on priorities of

alternatives. The DQDA method and the AHP-DA methods were found to perform in a similar fashion for smaller numbers of attributes while the AHP-DA method was found to be more effective in handling a large number of attributes.

It is reasonably clear that whichever method is used to attempt to identify determinant attributes, the ultimate purpose is still to use those attributes in the formulation of marketing strategy. This can only be accomplished if the product or service provider fully understands the needs of the consumer and how the consumer perceives the product or service attributes in question.

Companies face a real danger when they assume that they understand what their customers perceive as being important. Both Evans and Southard (1974) and Jerman, Anderson, and Constantin (1978) report that most trucking companies do not know which variables influence the choice of carrier or the importance placed on each of these criteria. Bardi, Bagchi, and T.S. Raghunathan (1989) found that transit-time reliability, transportation rates, total transit time, willingness to negotiate rates, and financial stability were considered to be the five most important or determinant characteristics in carrier selection. Research conducted in the shallow-draft industry by Burdget and Daley (1985) found that perceptual differences existed between shippers and carriers in terms of the importance placed on cost.

Foster and Strasser (1990) reported that carriers still do not have a good understanding of how shippers select carriers or modes of transportation. Carriers and shippers continue to disagree on the importance of cost. Carriers perceived cost to be more important than shippers. Differences were also found in selection criteria importance between rail and motor carriers with motor carriers ranking transit time as the most important criterion and rail carriers ranking schedule reliability as the most

important criterion. These results indicate that various types of carriers seem to place higher levels of importance on different selection criteria than do shippers. Morash and Calantone (1991) found that the service criteria of on-time delivery, reliability, and safe delivery were all ranked by shippers well above cost factors in the consideration of carrier selection. Abshire and Premeaux (1991b) found that most carriers do not understand how selection criteria factors influence the choice of a carrier. Shippers and carriers were asked to determine the importance of 35 selection criteria. Of those 35 criteria, the perceptions of importance differed on 19 items. They conclude that carriers may not be emphasizing the most important selection criteria as perceived by shippers which could result in lower levels of satisfaction and therefore, the replacement of the carrier. Evers, Harper, and Needham (1996) also report that the perception of service which the carrier provides may range from being completely wrong to totally correct. They suggest that when the perceptions are inaccurate, carriers must provide shippers with a more complete picture of their services or provide the services which they are not presently providing. They contend that the failure to do so will lead to dissatisfaction with the carrier and therefore the use of another carrier.

The literature presented clearly shows an industry which has yet to come to terms with how and why particular modes or specific carriers are selected. The present study is intended to help identify the determinant criteria used by importers and exporters in the selection of an international ocean carrier.

METHODOLOGY

The research methodology utilized in this study was a mail survey. The survey was one page in length and was sent to 125 companies. The sample companies consisted of import shippers, export shippers, and containerized transportation companies. The import and

export shipper companies consisted of the top 50 import shippers and the top 50 export shippers ranked by total Twenty-Foot Equivalent Units (TEUs) by the *Journal of Commerce* (1997). The 25 transportation companies consisted of the population of ocean containership carriers that call on the United States ocean water ports also published by the *Journal of Commerce*. A total of 58 usable surveys were returned resulting in a 46.4% overall response rate.

Each of the companies in the sample was contacted by phone to determine the most senior person responsible for the import management or export management functions in the import shipper and export shipper companies respectively. The containerized transportation companies were contacted by phone to determine the most senior marketing person responsible for import and export customers. In addition to confirming the appropriate contact person their address information was also confirmed. Subsequently, all potential respondents were mailed a cover letter explaining the purpose of the study, a copy of the survey, and a postage-paid return envelope. Each respondent was given a list of 18 characteristics that are likely to be used as factors in the carrier selection process. They were then asked to select those characteristics that must be present for a carrier to be considered for selection. Pearson Chi-Square values were calculated to evaluate the data for significant differences between the importer and exporter groups based on whether or not they required each of the eighteen characteristics to be present for carrier selection.

Non-response bias was analyzed by comparing earlier responses to later responses for all 18 of the factors analyzed. This is a commonly used procedure for testing for the presence of non-response bias (Armstrong and Overton 1977). No statistically significant differences were found from the comparisons and, therefore, non-response bias was not considered to be a problem.

RESULTS

The carrier selection characteristics used in this study are shown in Table 1 below. These

characteristics were selected for use in this study as they have been used in other carrier selection research (Bardi, Bagchi, and Raghunathan 1989; Murphy, Daley, and Hall 1997).

TABLE 1
SELECTION FACTORS FOR OCEANGOING CONTAINERIZED CARRIERS

Transit time reliability/consistency (hereafter, Reliability)
Special equipment (Special equipment)
Pickup and delivery service (PU&D)
Quality of carrier salesmanship (Carrier salesmanship)
Door-to-door transportation rates (Rates)
Freight loss and damage (Loss & damage)
Total door-to-door transit time (Transit time)
Claims processing (Claims)
Shipment expediting (Expediting)
Willingness of carrier to negotiate rate changes (Rate changes)
Frequency of service (Service frequency)
Linehaul services (Linehaul services)
Financial stability of carrier (Financial stability)
Scheduling flexibility (Scheduling flexibility)
Quality of operating personnel (Operating personnel)
Willingness of carrier to negotiate service changes (Service changes)
Equipment availability (Equipment availability)
Shipment tracing (Tracing)

Carrier selection factors. Source: Bardi, E.J., P.K. Bagchi, and T.S. Raghunathan (1989), *Motor Carrier Selection in a Deregulated Environment*, *Transportation Journal* 29,5.

As noted earlier, the sample used in this study consisted of three respondent groups: 1) export shippers, 2) import shippers, and 3) containerized transportation companies. The usable sample for this study consisted of 20 exporters (40% response rate), 19 importers (38% response rate), and 19 containerized transportation companies (76% response rate). Each respondent was asked to rate each

characteristic on a Likert-type scale where a response of 1 represented a perception of most important and a response of 5 represented a perception of least important. The resulting data are shown in Table 2.

The data shown in Table 2 provide a very different profile in terms of the importance each type of respondent places on each characteristic.

TABLE 2
MEAN SCORES

Factor	Import Shipper	Export Shipper	Carrier
Carrier Salesmanship	2.74	2.45	2.26
Claims	2.32	2.80	2.79
Equipment Availability	1.16	1.00	2.11
Expediting	1.74	2.10	2.47
Financial Stability	1.79	1.70	2.42
Linehaul Services	2.68	2.79	2.32
Loss & Damage	1.58	2.00	2.47
Operating Personnel	1.74	1.85	1.95
PU & D	2.37	2.89	2.63
Rate Changes	1.63	1.35	2.11
Rates	1.74	2.75	2.21
Reliability	1.11	1.45	1.37
Scheduling Flexibility	2.21	2.00	2.53
Service Frequency	1.37	1.30	1.79
Service Changes	2.21	1.80	2.68
Special Equipment	2.58	2.74	2.53
Tracing	1.68	2.40	2.50
Transit Time	1.84	2.20	1.84

For example, Import Shippers rated eleven characteristics with mean scores below two indicating that these items are seen as being very important to them. Export shippers rated seven items below two while Carriers rated only four items below two. These results clearly indicate a difference in the perceptions between the shippers and carriers.

Export shippers and import shippers were given the list of 18 characteristics and asked to select those characteristics that must be present in a carrier service offering for a carrier to be considered for selection. Table 3 shows the frequency and percent that each characteristic was checked as being mandatory by both export shippers and import shippers.

The data shown in Table 3 reveal significant differences between the perceptions of import shippers and export shippers on two characteristics (rates and tracing) at the .05 level and one characteristic (expediting) at the .10 level. In the case of rates and tracing, it is clear that a higher percentage of import shippers find these characteristics to be a requirement than do export shippers. The same is also true for the expediting characteristic. Interestingly, the mean scores of importance given each of these characteristics by the carrier respondents fell between two and three indicating that carriers only saw these variables as being moderately important.

TABLE 3

REQUIREMENT OF THE PRESENCE OF CARRIER SELECTION FACTOR

Selection Factor	Export Shipper n=20		Import Shipper n=19		Pearson Chi-Square
Carrier Salesmanship	n=2	%=10.0	n= 4	%= 21.1	.339
Claims	2	10.0	5	26.3	.184
Equipment Availability	9	45.0	9	47.4	.882
Expediting	2	10.0	6	31.6	.095 **
Financial Stability	5	25.0	8	42.1	.257
Linehaul Service	1	5.3	3	15.8	.290
Loss & Damage	3	15.0	7	36.8	.118
Operating Personnel	1	5.0	3	15.8	.267
PU&D	3	15.8	5	26.3	.426
Rate Changes	5	25.0	4	21.1	.770
Rates	2	10.0	7	36.8	.047 *
Reliability	9	45	10	52.6	.634
Scheduling Flexibility	3	15.0	4	21.1	.622
Service Changes	4	20.0	2	10.5	.412
Services Frequency	7	35.0	9	47.4	.433
Special Equip.	5	25	5	26.3	.925
Tracing	3	15.0	9	47.4	.029 *
Transit Time	6	30.0	6	31.6	.915

* Significant at the .05 level

**Significant at the .10 level

CONCLUSIONS

Based on the data shown in Tables 2 and 3 it is clear that the perceptions between import shippers, export shippers, and carriers do differ. If one assumes that those characteristics perceived as being very important in the selection process would attain a mean score of between one and two (i.e., very important) it is obvious

that carriers do not perceive many of the characteristics to be as important as do the shippers. This lack of understanding of what shippers deem important would most likely lead to a marketing strategy which would be faulty. By not placing the same amount of importance on seven of the items that import shippers found to be very important and four items that exporters rate as being very important would place the

carriers at a disadvantage in competing for the shippers business. Obviously, those carriers who understand the importance of each item to the various types of shippers and responds accordingly will have a competitive advantage in comparison to those who do not fully understand the importance of each item.

It is also important for carriers to understand the differences in perceptions between importers and exporters. For example, Table 3 reveals that there are significant differences in the perceptions of importers and exporters. These differences were not entirely unexpected. One would assume that importers in the U.S. might be more concerned about tracing and expediting than would exporters. This assumption is made due to the nature of the products being imported. Retail import shippers are replenishing

consumer product inventories and manufacturers are frequently staging component parts inventories to support efficient supply chain management strategies. Both types of importers are dependent on tracing and expediting capabilities from their carriers.

It is also clear from the data shown in Table 2 that even though there may not be statistically significant differences between many of the characteristics examined, there are differences in the mean scores which could be used to formulate marketing strategy, thereby giving one competitor a competitive advantage over another. Given that there are a number of carriers to chose from, the one that understands their customers the best will most likely be in the best position to satisfy those customers needs.

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