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CARRIER SELECTION CRITERIA: DIFFERENCES AMONG TRUCKLOAD MOTOR CARRIER OFFERINGS

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ABSTRACT

Effective customer service begins with an understanding of the service components customers' view as most important to their operations and business success. Within the transportation industry research has investigated the importance of such criteria at an industry level. This article offers detailed rankings of service criteria priority from a shipper's perspective by comparing criteria across five types of motor carrier offerings including dry van, temperature controlled, intermodal, tank, and flatbed. Results identify the ranked importance of 20 service characteristics, common themes, and distinct differences in the importance of service criteria among the alternative supplier offerings.

INTRODUCTION

Understanding customer criteria for product and service selection is an important consideration in any supplier management and marketing effort. Such an understanding helps to establish key customer-facing performance metrics and provides a means to more clearly define customer value and the factors that may help them establish differential advantage.

In transportation management, research has investigated carrier selection by comparing perceptions of service priorities between carriers and shippers (Premeaux 2002; Premeaux et al. 1995; Abshire and Premeaux 1991). Studies have

also addressed carrier selection criteria and processes as one implementation of customer-supplier relationships (Gibson, Rutner and Keller 2002), and as part of a broader service gap analysis framework (Kent and Parker 1999; Hopkins et al. 1993).

While such analyses have investigated selection criteria across one or more transportation modes, studies have not considered how such criteria may differ among specific services offered within a mode. The motor carrier industry, with its alternative forms of equipment and services, provides a context in which to evaluate whether, and to what degree, shipper's rank service attributes differently based on a subset of

product/service offerings. This article reports the results of a study which investigated the importance of carrier selection criteria across five truckload (TL) motor carrier service offerings including Dry Van, Temperature Controlled, Tank, Intermodal, and Flatbed. An evaluation of how such criteria may differ depending on the primary service requirements of the shipper is also provided.

LITERATURE REVIEW

Research investigating carrier selection criteria has been published in the logistics and distribution literature as well as the marketing literature within the context of customer service elements, service quality delivery and buyer-seller relationships.

Bardi (1973) identified carrier selection criteria and surveyed industry shippers concerned with the movement of household goods. Prior transportation research had been concerned primarily with mode selection characteristics. His study identified 21 relevant carrier selection determinants in areas such as reliability, security, user satisfaction, availability, transit time, costs and others. As he expected, due to the regulatory environment and joint rate publications, transportation cost was found to be less important than other service related characteristics. Factors related to shipment reliability, security, and satisfaction ranked highest among the survey participants.

Prompted by the deregulation of the transportation industry, Bruning and Lynagh (1984) investigated the extent to which shippers evaluated carriers, the selection criteria used in those decisions, and how they ranked seven key selection criteria. As part of their analysis, they considered the education level of those individuals responding to the survey, the commodity and industry areas of responding organizations, and the relative weight of the criteria. Their results suggested a positive relationship between education level of respondents and the application of more quantitative/objective evaluation criteria. In

addition, they identified variation in the frequency of carrier evaluation among industries, types of commodities transported, and types of mode employed in transportation.

Bardi et al. (1989) also investigated the impact of deregulation on carrier selection by asking survey participants to assess the importance of carrier selection criteria and to indicate whether the emphasis in selection criteria had changed over the previous five years transition to a deregulated transportation environment. Their study refined 18 carrier selection determinant measures into four selection factors including rate related factors, customer service, claims handling and follow up, and special equipment availability and flexibility. While his earlier study indicated little importance in transportation costs, the rate related factors ranked highest as a selection criteria in a deregulated environment followed by customer service, claims handling, and equipment availability and flexibility.

Abshire and Premeaux (1991) and Premeaux et al. (1995) investigated differences in the perceptions of carriers and shippers with regard to the importance of carrier selection criteria. Their analysis considered whether shippers and motor carrier perceptions of importance differed among 35 carrier selection criteria. At the time, findings indicated significant differences in priority with 19 of the 35 criteria. Summarizing their results, they noted that carrier understanding of the importance of selection variables to shippers was "moderately" well understood. They pointed out however, that carrier's overestimated importance of eleven criteria considered moderately important by shippers and underestimated four criteria rated as important by shippers.

Repeating his 1991 study, Premeaux (2002) reassessed carrier and shipper perceptions of 36 selection criteria (the study included one additional measure of web enhanced EDI). To establish a longitudinal view of how selection criteria may have changed, he compared responses from the two studies, including carrier to carrier responses and the relationship

between shippers and carriers responses. Significant differences between the perceptions of carriers over the 1991 to 2001 time period indicated greater importance for criteria related to information availability and the flexibility in rates and services. Significant differences between the perceptions of shippers and carriers over the same time period indicated greater agreement between the two groups among 25 of the 36 items. He concluded that shippers have become more concerned with certain selection criteria over time and that carriers were becoming more adept at assessing shipper needs.

Carrier selection criteria have been assessed in the literature from buyer-seller relationships to broader management strategies. Acknowledging the critical nature of JIT relationships in environments where perishability is a concern, Natarajan and Sersland (1994) focused on shipper perceptions of the importance of eight carrier selection criteria, comparing the criteria for bakeries which rely on JIT supplier relationships to those who do not rely on JIT relationships. Their results indicated that firms concerned with JIT supplier relationships found carrier willingness to negotiate service changes, equipment availability, shipment tracing and expediting, and transit time reliability to be significantly more important than those firms not involved in JIT supplier relationships.

Carrier selection has also been investigated within an international transportation context. Kent and Parker (1999) assessed the differences in perceptions between export shippers, import shippers and the container companies that provide global transportation services. They measured relative importance among 18 selection criteria evaluated in earlier studies on motor carrier selection. Results of their study identified two criteria with significant differences between import shippers and carriers (importance of loss and damage, and equipment availability were both assessed as more important by import shippers). Export shippers were found to consider rate changes, service frequency, financial stability, service changes, and equipment availability as significantly more

important than carriers. When compared to one another, import shippers identified one criteria (rates) as significantly more important than export shippers.

Hopkins et al. (1993) investigated perceived differences in customer and supplier evaluations of selection criteria within a broader conceptual model of service quality (Parasuraman et al. 1985). Parasuraman et al. (1985) developed a SERVQUAL model of service quality that illustrated five potential gaps where service breakdowns could occur. Gap one is concerned with a consumer expectation-management perception gap. Gap two is described as a gap between management perceptions and service quality specifications. Gap three is associated with the differences between service quality specifications and actual service delivery. Gap four involves the difference between service delivery and external communications of the company. Gap five addresses the differences between customer expected service and perceived service.

Hopkins et al. (1993) applied the SERVQUAL model after combining gaps two and three for ease of analysis. The population included shippers and carriers providing service using a variety of transportation modes. Of 19 measures collected regarding gap one, Hopkins et al. identified a significant difference in shipper/carrier perceptions involving equipment, delivery promises, record accuracy, individual attention, convenience of operating hours, and personal attention. Of 19 measures related to gap two/three, 16 items were perceived as significantly different between shippers and carriers. A significant difference was also noted in relation to gap four (1 of 1 measure) and gap five (18 of 19 measures indicated a significant difference).

Gibson et al. (2002) drew on a theoretical framework involving buyer-seller relationships (Dwyer et al. 1987) to compare the perceptions of shipper-carrier partnerships from each entities perspective. Their study extended research by adopting more robust, multi-item measures to evaluate the importance of and level of

satisfaction with 13 factors associated with buyer-supplier relationships in the motor carrier industry (Cost, Effectiveness, Trust, Flexibility, Channel Perspective, Information Sharing, Time Horizon, Performance Management, Planning, Strategic Fit, Rules of Engagement, Control/Power, Sharing of Risks and Rewards). Of the 13 factors developed involving importance and satisfaction, shipper assessments identified a significant difference in nine items. From a carrier perspective, 12 of 13 factors were found to be significantly different. When comparing shipper and carrier perceptions of the importance of partnership factors, four items including cost, flexibility, planning and the sharing of risks and rewards were significantly different. There were no significant differences in the evaluation of satisfaction between shippers and carriers among the 13 factors.

METHODOLOGY

The research methodology utilized in this study was a mail survey. The survey consisted of 20 services and other characteristics (see Table 1) that are offered by motor carriers and was sent to 2,132 companies. The sample of companies consisted of shippers that subscribed to *Distribution Magazine*. The TL shippers were categorized into dry van, temperature controlled, tank, intermodal, and flatbed. The shippers were asked to identify the importance of each of the 20 services and other characteristics on a 1–7 likert scale where 1 was not important and 7 was very important. A total of 420 usable surveys were returned resulting in a 20 percent overall response rate. Each of the companies in the sample was mailed, via USPS Priority Mail, a survey, postage paid return envelope, and complimentary mouse pad.

Non-response bias was analyzed by comparing earlier responses to later responses for all 20 of the factors analyzed (Armstrong and Overton 1977). No statistically significant differences were found from the comparisons, therefore, non-response bias was not considered to be a problem.

RESULTS

The results of this study are presented by evaluating mean importance scores and an ANOVA on a set of 20 services characteristics across five types of TL motor carriers. The 20 services characteristics are listed in the overall rank order of importance based on mean scores in Table 1. The respondents in this research were divided into five groups. The groups are: (1) Dry Van TL shippers, (2) Temperature Controlled TL shippers, (3) Tank TL shippers, (4) Intermodal TL shippers, and (5) Flatbed TL shippers.

The mean scores for all the characteristics in each of the groups were sorted in descending order. The characteristics were then ranked 1 through 20. The rankings are notated for each group with a superscript next to each mean score under each group heading. After sorting and ranking all five groups the table was reordered in the overall rank order for the 20 characteristics. Additionally, an ANOVA using Bonferroni post-hoc analysis was performed and statistical differences were found for five of the service characteristics between the five TL types (* indicates significance at a .05 level).

Overall, the results indicate that there are both rank mean and statistical differences for all five of the TL types. For instance, the most important service characteristic for dry van and tank shippers was consistent dependable transit times, temperature controlled shippers was communication of service disruptions, intermodal shippers was action and follow-up on service complaints, and flatbed shippers was billing accuracy. Consistent with prior research, competitive pricing did not rank as the most important characteristic for any of the groups. Competitive pricing ranged from 2nd most important for intermodal shippers to the 9th most important for temperature controlled shippers.

TABLE 1
20 SERVICE CHARACTERISTICS

Item	Description	Dry Van	Temp. Ctl.	Tank	Intermodal	Flatbed
1.	Consistent dependable transit times	6.48 ¹	6.50 ³	6.46 ¹	6.36 ⁵	6.34 ²
2.	Billing accuracy	6.46 ²	6.29 ⁸	6.15 ⁶	6.50 ²	6.36 ¹
3.	Competitive pricing	6.45 ³	6.12 ⁹	6.31 ⁴	6.50 ²	6.09 ⁵
4.	Action and follow-up on service complaints	6.31 ⁵	6.69 ²	5.92 ⁹	6.76 ¹	6.15 ⁴
5.	Communication of service disruptions	6.31 ⁴	6.75 ¹	6.0 ⁸	6.36 ⁵	6.28 ³
6.	Equipment availability	6.11 ⁶	6.33 ⁶	6.46 ¹	6.00 ¹⁰	6.0 ⁶
7.	Knowledge and problem solving skills of contact personnel	6.04 ⁷	6.38 ⁵	5.92 ¹¹	6.43 ⁴	5.81 ⁸
8.	Quality of drivers	6.03 ⁸	6.30 ⁷	6.31 ⁴	6.21 ⁷	5.96 ⁷
9.	General reputation for quality and integrity	5.95 ⁹	6.09 ¹⁰	6.33 ³	5.93 ¹¹	5.72 ⁹
10.	Financial Stability	5.85 ¹⁰	5.77 ¹³	6.08 ⁷	5.29 ¹³	5.55 ¹⁰
11.	Proactive monitoring of delivery appointments	5.70 ¹¹	6.40 ^{4*}	5.92 ¹⁰	6.07 ⁹	5.38 ^{12*}
12.	Ability to provide expedited service	5.53 ¹²	5.94 ¹¹	5.62 ¹²	6.14 ⁸	5.41 ¹¹
13.	Ability to handle all transportation needs	4.91 ¹³	5.08 ¹⁴	5.33 ¹³	5.93 ¹²	5.11 ¹³
14.	Satellite tracing and communications	4.88 ^{14*}	5.83 ^{12*}	5.15 ¹⁵	4.79 ¹⁴	5.02 ¹⁴
15.	Traditional EDI capabilities	4.43 ¹⁵	4.58 ¹⁵	4.83 ¹⁶	4.64 ¹⁵	4.28 ¹⁶
16.	Internet tracking	4.42 ¹⁶	4.44 ¹⁶	4.23 ²⁰	4.64 ¹⁶	4.51 ¹⁵
17.	Internet POD	4.06 ¹⁷	3.49 ¹⁸	4.50 ¹⁸	3.64 ¹⁹	4.23 ¹⁷
18.	Ability to implement fuel surcharge	3.76 ¹⁸	4.19 ¹⁷	5.33 ^{14*}	2.93 ^{20*}	3.60 ^{18*}
19.	Internet freight posting services	3.25 ¹⁹	2.91 ^{19*}	4.54 ^{17*}	3.79 ^{18*}	3.17 ¹⁹
20.	Internet pricing	3.14 ²⁰	2.66 ^{20*}	4.38 ^{19*}	3.86 ¹⁷	3.02 ²⁰

The importance of the information technology service characteristics (internet, satellite, and EDI) varied only slightly among the five groups, all five groups ranked them in the bottom quarter of the 20 characteristics as the least important services. The one exception was for satellite tracing and communications for temperature controlled shippers. They ranked satellite tracing and communications as the twelfth most importance characteristics.

The specific results for each of the five individual groups are presented in the following five subsections. Each TL type is presented with a top eight most important service characteristics table, discussion of significant findings, and observations. Note that all 20 characteristics for each TL type are ranked and presented in Table 1.

Dry Van Shippers

The top eight most important service characteristics for the Dry Van shippers are ranked one to eight in Table 2. The overall rank number for each characteristic is listed in the first column and the mean score and rank number superscript is listed for each of the other four TL types.

No significant differences were found in the top eight most important service characteristics. However, a significant difference was found between Dry Van shippers and Temperature Controlled shippers on the satellite tracing and communications characteristic. Dry Van shippers mean score for satellite tracing and communications of 4.88 was the lowest among four of the TL types, with intermodal being the lowest, and Temperature Controlled shippers mean score was 5.83.

Based on the results from the ANOVA, Dry Van shippers clearly believe that satellite tracing and communications is not as important as Temperature Controlled shippers. Satellite tracing and communications was the highest ranked information technology characteristic at Number 14 with the internet characteristics and EDI falling below that.

Consistent dependable transit times was ranked as the number one most important characteristic followed closely by billing accuracy and competitive pricing. While competitive pricing was third, it was only .03 behind the number one ranking, indicating a TL market segment with very competitive pricing and service requirements. Quality of drivers rounded out the top eight most important characteristics for this segment.

Temperature Controlled Shippers

The top eight most important service characteristics for the Temperature Controlled shippers are ranked one to eight in Table 3. The overall rank number for each characteristic is listed in the second column and the mean score and rank number superscript is listed for each of the other four TL types.

No significant differences were found in the top eight most important service characteristics. However, a significant difference was found between Temperature Controlled shippers and Tank shippers on the internet freight posting services and internet pricing characteristics. A significant difference was also found between Temperature Controlled shippers and Flatbed shippers on the proactive monitoring of delivery

TABLE 2
DRY VAN SHIPPERS

Item	Description	Dry Van	Temp. Ctl.	Tank	Intermodal	Flatbed
1.	Consistent dependable transit times	6.48 ¹	6.50 ³	6.46 ¹	6.36 ⁵	6.34 ²
2.	Billing accuracy	6.46 ²	6.29 ⁸	6.15 ⁶	6.50 ³	6.36 ¹
3.	Competitive pricing	6.45 ³	6.12 ⁹	6.31 ⁵	6.50 ²	6.09 ⁵
4.	Action and follow-up on service complaints	6.31 ⁴	6.69 ²	5.92 ⁹	6.76 ¹	6.15 ⁴
5.	Communication of service disruptions	6.31 ⁴	6.75 ¹	6.0 ⁸	6.36 ⁶	6.28 ³
6.	Equipment availability	6.11 ⁶	6.33 ⁶	6.46 ²	6.00 ¹⁰	6.0 ⁶
7.	Knowledge and problem solving skills of contact personnel	6.04 ⁷	6.38 ⁵	5.92 ¹¹	6.43 ⁴	5.81 ⁸
8.	Quality of drivers	6.03 ⁸	6.30 ⁷	6.31 ⁴	6.21 ⁷	5.96 ⁷

TABLE 3
TEMPERATURE CONTROLLED SHIPPERS

Item	Description	Dry Van	Temp. Ctl.	Tank	Intermodal	Flatbed
5.	Communication of service disruptions	6.31 ⁴	6.75 ¹	6.0 ⁸	6.36 ⁶	6.28 ³
4.	Action and follow-up on service complaints	6.31 ⁵	6.69 ²	5.92 ⁹	6.76 ¹	6.15 ⁴
1.	Consistent dependable transit times	6.48 ¹	6.50 ³	6.46 ¹	6.36 ⁵	6.34 ²
11.	Proactive monitoring of delivery appointments	5.70 ¹¹	6.40 ⁴	5.92 ¹⁰	6.07 ⁹	5.38 ¹²
7.	Knowledge and problem solving skills of contact personnel	6.04 ⁷	6.38 ⁵	5.92 ¹¹	6.43 ⁴	5.81 ⁸
6.	Equipment availability	6.11 ⁶	6.33 ⁶	6.46 ²	6.00 ¹⁰	6.0 ⁶
8.	Quality of drivers	6.03 ⁸	6.30 ⁷	6.31 ⁴	6.21 ⁷	5.96 ⁷
2.	Billing accuracy	6.46 ²	6.29 ⁸	6.15 ⁶	6.50 ³	6.36 ¹

appointments. The only other significant difference was between Temperature Controlled shippers and Dry Van shippers for satellite tracing and communications characteristic.

Based on the results from the ANOVA, Temperature Controlled shippers clearly believe that the satellite tracing and communications characteristic is more important than the Dry Van shippers and based on the face value of the mean scores, Temperature Controlled shippers believe that this characteristics is more important than any of the five TL shipper types. Satellite tracing and communications was the highest ranked information technology characteristic at number 12 with the internet characteristics and EDI falling below that.

Communication of service disruptions was ranked as the number one most important characteristic followed by action and follow-up on service complaints, consistent dependable transit times, and proactive monitoring of delivery appointments. All four of the top characteristics are very customer service intensive characteristics. Competitive pricing was not even ranked in the top eight for Temperature Con-

trolled shippers while quality of drivers was ranked as 7th most important for this segment.

Tank Shippers

The top eight most important service characteristics for the Tank shippers are ranked 1 to 8 in Table 4. The overall rank number for each characteristic is listed in the third column and the mean score and rank number superscript is listed for each of the other 4 TL types.

No significant differences were found in the top eight most important service characteristics. However, a significant difference was found between Tank shippers and Intermodal shippers and Tank shippers and Flatbed shippers on their ability to implement a fuel surcharge. A significant difference was also found between Tank shippers and Temperature Controlled, and between Tank shippers and Intermodal shippers on internet freight posting. Finally, a significant difference was found between Tank shippers and Temperature Controlled shippers on internet pricing.

TABLE 4
TANK SHIPPERS

Item	Description	Dry Van	Temp. Ctl.	Tank	Intermodal	Flatbed
6.	Equipment availability	6.11 ⁶	6.33 ⁶	6.46¹	6.00 ¹⁰	6.0 ⁶
1.	Consistent dependable transit times	6.48 ¹	6.50 ³	6.46¹	6.36 ⁵	6.34 ²
9.	General reputation for quality and integrity	5.95 ⁹	6.09 ¹⁰	6.33³	5.93 ¹¹	5.72 ⁹
3.	Competitive pricing	6.45 ³	6.12 ⁹	6.31⁴	6.50 ²	6.09 ⁵
8.	Quality of drivers	6.03 ⁸	6.30 ⁷	6.31⁴	6.21 ⁷	5.96 ⁷
2.	Billing accuracy	6.46 ²	6.29 ⁸	6.15⁶	6.50 ³	6.36 ¹
10.	Financial Stability	5.85 ¹⁰	5.77 ¹³	6.08⁷	5.29 ¹³	5.55 ¹⁰
5.	Communication of service disruptions	6.31 ⁴	6.75 ¹	6.0⁸	6.36 ⁶	6.28 ³

Based on the results from the ANOVA, Tank shippers indicated that they believe the internet freight posting and internet pricing characteristics are significantly more important than the Temperature Controlled shippers. Additionally, based on the face value of the mean scores, Tank shippers believe that those two characteristics, along with internet POD and traditional EDI capabilities, are more important than any of the five TL shipper types. Interestingly, the tank shippers ranked all the information technology characteristics, except internet tracking and satellite tracing and communications, above the other five TL shipper types.

Equipment availability, along with consistent dependable transit times, tied as the most important characteristic for Tank shippers. Tank shippers ranked quality of drivers 4th, and that is higher than any of the other TL shipper types. Competitive pricing was tied with quality of drivers with a mean importance score of 6.31. Additionally, different from any of the other shipper types, general reputation for quality and integrity and financial stability were ranked in the top eight most important characteristics for Tank shippers.

Intermodal Shippers

The top eight most important service characteristics for the Intermodal shippers are ranked 1 to 8 in Table 5. The overall rank number for each characteristic is listed in the fourth column and the mean score and rank number superscript is listed for each of the other 4 TL types.

No significant differences were found in the top eight most important service characteristics. However, a significant difference was found between Intermodal shippers and Tank shippers on their ability to implement a fuel surcharge. A significant difference was also found between Intermodal shippers and Tank shippers on internet freight posting.

From the ANOVA results, Intermodal shippers indicated that they believe the internet freight posting and the ability to implement a fuel surcharge characteristics are significantly less important than the Tank shippers. Additionally, based on the face value of the mean scores, Intermodal shippers believe that action and follow-up on service complaints, billing accuracy, competitive pricing, knowledge and problem

TABLE 5
INTERMODAL SHIPPERS

Item	Description	Dry Van	Temp. Ctl.	Tank	Intermodal	Flatbed
4.	Action and follow-up on service complaints	6.31 ⁵	6.69 ²	5.92 ⁹	6.76¹	6.15 ⁴
2.	Billing accuracy	6.46 ²	6.29 ⁸	6.15 ⁶	6.50²	6.36 ¹
3.	Competitive pricing	6.45 ³	6.12 ⁹	6.31 ⁵	6.50²	6.09 ⁵
7.	Knowledge and problem solving skills of contact personnel	6.04 ⁷	6.38 ⁵	5.92 ¹¹	6.43⁴	5.81 ⁸
5.	Communication of service disruptions	6.31 ⁴	6.75 ¹	6.0 ⁸	6.36⁵	6.28 ³
1.	Consistent dependable transit times	6.48 ¹	6.50 ³	6.46 ¹	6.36⁵	6.34 ²
8.	Quality of drivers	6.03 ⁸	6.30 ⁷	6.31 ⁴	6.21⁷	5.96 ⁷
12.	Ability to provide expedited service	5.53 ¹²	5.94 ¹¹	5.62 ¹²	6.14⁸	5.41 ¹¹

solving skills of contact personnel, and the ability to provide expedited service are more important characteristics than any of other the five TL shipper types.

Action and follow-up on service complaints ranked as the most important characteristic for Intermodal shippers. Billing accuracy and competitive pricing tied as the 2nd most important characteristics. Intermodal shippers were the only TL shipper type to rank ability to provide expedited service in the top eight most important characteristics.

Flatbed Shippers

The top eight most important service characteristics for the Flatbed shippers are ranked 1 to 8 in Table 6. The overall rank number for each characteristic is listed in the fifth column and the mean score and rank number superscript is listed for each of the other 4 TL types.

No significant differences were found in the top eight most important service characteristics. However, a significant difference was found between Flatbed shippers and Tank shippers on their ability to implement a fuel surcharge. A

significant difference was also found between Flatbed shippers and Temperature Controlled shippers on proactive monitoring of delivery appointments.

From the ANOVA results, Flatbed shippers indicated that they believe the ability to implement a fuel surcharge characteristic is significantly less important than the Tank shippers. Additionally, Flatbed shippers indicated significantly less importance on proactive monitoring of delivery appointments than for Temperature Controlled shippers.

Billing accuracy ranked as the most important characteristic for Flatbed shippers. This was the highest ranking for billing accuracy among all five of the shipper types. Competitive pricing ranked 5th for the Flatbed shippers.

SUMMARY AND CONCLUSIONS

While all five of the TL shipper types had a different mean score ranking of the 20 service characteristics, there were a few common themes and some distinctly different results. In common, all five shipper types ranked the billing accuracy, communications of service disruptions,

TABLE 6
FLATBED SHIPPERS

Item	Description	Dry Van	Temp. Ctl.	Tank	Intermodal	Flatbed
2.	Billing accuracy	6.46 ²	6.29 ⁸	6.15 ⁶	6.50 ³	6.36¹
1.	Consistent dependable transit times	6.48 ¹	6.50 ³	6.46 ¹	6.36 ⁵	6.34²
5.	Communication of service disruptions	6.31 ⁴	6.75 ¹	6.0 ⁸	6.36 ⁶	6.28³
4.	Action and follow-up on service complaints	6.31 ⁵	6.69 ²	5.92 ⁹	6.76 ¹	6.15⁴
3.	Competitive pricing	6.45 ³	6.12 ⁹	6.31 ⁵	6.50 ²	6.09⁵
6.	Equipment availability	6.11 ⁶	6.33 ⁶	6.46 ²	6.00 ¹⁰	6.0⁶
8.	Quality of drivers	6.03 ⁸	6.30 ⁷	6.31 ⁴	6.21 ⁷	5.96⁷
7.	Knowledge and problem solving skills of contact personnel	6.04 ⁷	6.38 ⁵	5.92 ¹¹	6.43 ⁴	5.81⁸

consistent dependable transit times, and quality of drivers characteristics in their top eight most important characteristics. Additionally, with only one shipper type exception, action and follow-up on service complaints, competitive pricing, and equipment availability were in their top eight most important lists. Also in common, all five ranked the information technology characteristics of internet, satellite, and EDI at the bottom of the list as least important characteristics.

The distinctions among the various shipper groups are evident and supported more on face value of the mean rankings than by the statistical differences. The Tank shippers seem to place more importance on internet freight posting services, internet pricing, internet POD, and quality of drivers. This may be a chemical tank characteristic. First, while all of the shipper types ranked quality of driver in their top eight, the Tank shippers ranked quality of drivers higher than all four other shipper types. Second, the chemical industry was one of the first to organize their industry around internet based purchasing groups and this may have influenced TL transportation requirements as well.

The distinguishing characteristics for the Temperature Controlled shippers appear to be two fold. First, ranked at 9th, competitive pricing fell outside the top eight most important listing for Temperature Controlled shippers. Second, Temperature Controlled shippers appear to be the most "customer service" demanding shipper group. Their top five most important characteristics are tied to communication, follow-up, consistency, proactive monitoring, and knowledge of contact personnel.

In conclusion, the information provided in this article should provide benefits to shippers, motor carriers, and for future research. Shippers will benefit from the information by identifying important service characteristics that should be measured to help insure continuous improvements within each of the service characteristics. Additionally, individual shippers will be able to benchmark their own list of important service characteristics to those in their industry peer group and overall in the TL transportation industry. This research provides an empirical reference for TL motor carriers to help them identify areas where they should allocate resources to better match their service offering

with the requirements of their customers. Finally, from an academic perspective, future transportation research should begin to identify important service factors or groupings of individual service characteristics. While a factor

analysis was beyond the scope of this article, potential factors that appeared to emerge from the data in this research were information technology and customer service.

REFERENCES

- Abshire, R. and Premeaux, S. (1991), "Motor Carrier Selection Criteria: Perceptual Differences Between Shippers and Carriers," *Transportation Journal*, 31 (1): 31-35.
- Armstrong, S., and Overton, T. (1977), "Estimating Non-Response Bias in Mail Surveys," *Journal of Marketing Research*, 14 (3): 396-402.
- Bardi, E., Bagchi, B. and Raghunathan, T. (1989), "Motor Carrier Selection in a Deregulated Environment," *Transportation Journal*, 29 (1): 4-11.
- Bruning, E., and Lynagh, P. (1984), "Carrier Evaluation in Physical Distribution Management," *Journal of Business Logistics*, 5 (2): 30-47.
- Gibson, B., Rutner, S., and Keller, S. (2002), "Shipper-Carrier partnership issues, rankings and satisfaction," *International Journal of Physical Distribution and Logistics Management*, 32 (8): 669-681.
- Hopkins, S., Strasser, S., Hopkins, W., and Foster, J. (1993), "Service Quality Gaps in the Transportation Industry: An Empirical Investigation," *Journal of Business Logistics*, 14 (1): 145-161.
- Kent, J. and Parker, S. (1999), "International containership carrier selection criteria," *International Journal of Physical Distribution and Logistics Management*, 29 (6):398-408.
- Natarajan, R., and Sersland, D. (1994), "JIT-Carrier Selection Link in Perishable Materials Operations," *American Business Review*, 10 (1): 93-97.
- Parasuraman, A., Berry, L., and Zeithaml, V. (1985), "A conceptual model of service quality and its implications for future research," *Journal of Marketing*, 49 (4): 41-50.
- Premeaux, S., Abshire, R., Mondy, J., and Rader, C. (2001), "The Perceptual Differences Between Shippers and Motor Carriers Regarding the Carrier Choice Decision and the Industrial Marketing Implications of these Differences," *Journal of Marketing Theory and Practice*, 3 (2): 98-105.
- Premeaux, S. (2002), "Motor Carrier Selection Criteria: Perceptual Differences between Shippers and Motor Carriers," *Transportation Journal*, 42 (2): 28-38.

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