

# Understanding Carrier Strategy and Performance

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**Summary:** This research analyzed freight performance to determine the groupings of attributes that influence carrier performance. Binary logistic regression and clustering analysis were used to identify individual and groupings of freight attributes that impacted performance success in terms of on time delivery, on time pick up, and first tender acceptance rate. Shipper's portfolios of carriers were also analyzed which gave insight into the different freight strategies employed and their subsequent service performance. These guide routing guide choices for shippers and informs future evaluation of the metrics that should be used to understand the relative performance of carriers filling different roles.



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## Key Insights

1. Carriers and shippers employ different freight strategies which correspond to different levels of service performance.
2. More focused strategies in terms of lane and customer focus showed stronger service performance regardless of carrier's asset bases.
3. Carriers were shown to have different underlying roles within shippers' portfolios which may suggest the need for different ways of measuring their performance than the current universal scorecard method.

## Introduction

As inventory costs rise and consumer service level expectations grow, transportation efficiency is increasingly becoming a critical component of business strategy for shippers. Shippers and carriers within the freight industry are increasingly seeking to improve their efficiency and profitability in this competitive market. Currently, carriers are measured on a common scorecard that does not take strategy or marketplace role into consideration. We propose consideration of the performance impacts of the market roles that carriers play.

The goal of this research was to determine what attributes and groups of attributes have the most significant impact on the performance success or failure of a truckload shipment. This research sought to develop a statistically significant model, in the form of linear regression algorithms and clustering analysis, to quantitatively describe how different combinations of attributes impact final performance results. From this, the research developed into a study of what types of carrier portfolios lead to better transportation level of service. In turn, this research profiled shippers by their portfolio of clustered carriers to gain insights into what types of carrier portfolios lead to stronger shipper performance.

Our research partner, C.H. Robinson, provided us with stop-level and tender-level data from the contiguous 48 United States over the period of January 2014 to December 2016. This data was used as the bases for the models used to highlight structural and systemic trends that lead to strong freight performance from both the carrier and shipper perspective.

## Regression

Binary Logit Regressions were used to determine the individual key influencers of performance for On Time Delivery, On-Time Pickup, First Tender Acceptance, and Perfect Shipment. Perfect Shipment, for this research, is considered the combination of all three performance metrics.

From the regressions, clear relationships between individual attributes and each of the three-success metrics used were identified. From these relationships, the guidance gleaned from the regression analysis for a shipper is that they should offer ample lead time to their carriers, have younger price ages, and attempt to control their shipment volatility. A profile is shown in Table 1 that was built from the combined performance metric, Perfect Shipment, regression.

Attribute	Perfect Shipment
Carrier Type	Asset Carrier
Tendered On	Weekday
Shipper Industry	Manufacturing
Bid Type	Non-Spot
Length of Haul	>716 miles
Tender Lead Time	>2.4 days
Price Age	<148 days

Table 1: Profile of Attributes the Increase the Likelihood of a Perfect Shipment

### Clustering

The research centered upon clustering analysis as the core methodology which was done from both the carrier and shipper perspective. For carriers, clustering was done for asset and non-asset carriers separately and each group had internal underlying distinct strategy clusters as shown in Figure 1 for the asset based carriers.

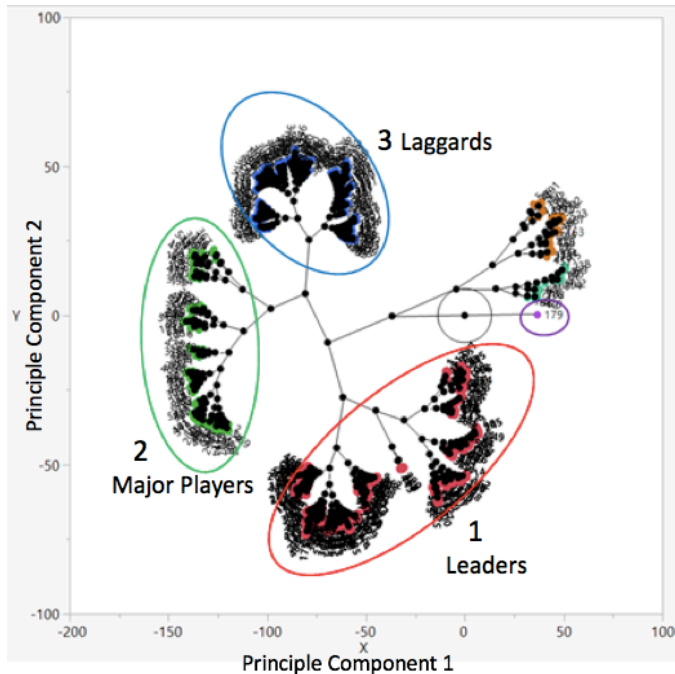


Figure 1: Asset Based Carrier Clustering Visualization Showing 3 Distinct Clustered Strategies

In terms of industry guidance, the insights from the clustered attributes are more predictive and arguably actionable than those of regression in terms of maintaining lane balance in a carrier's portfolio to become more successful as they consider grouped

attributes rather than individual attribute impact. From the clustering analysis, the focus of a carrier surfaced as one of the stronger indicators of performance. However, more focused carriers have a smaller geographical coverage offering. Meanwhile, the larger fleet carriers, who have a much wider geographical coverage and mediocre performance aggregated, have certain lanes with more focus to make them a "regional leader" and an appropriate strategic choice for those lanes. This implies a carrier deployment strategy for a shipper to take advantage of carriers who fit into specific strategic roles to optimize the service level while fulfilling all the truckload demand from its different geographical areas.

Additionally, when the clustered carrier performance was compared between asset and non-asset based carrier proportions of shipper's portfolios it was determined that that both the highest and lowest performing shipper groups heavily relied on asset based carriers while the portfolios of the second highest performing shipper group and medium performing shipper groups are near inverses of each other. This is shown in Table 2 and implies that choosing a carrier simply based on their asset base will not result in stronger performance. Rather, there are more underlying performance measures that should be considered in the measurement and choice of the tender list of carriers on the part of the shipper community.

Clustered Shipper Perfect Shipment Rate	Asset Based Proportion of Carriers	Non-Asset Based Proportion of Carriers
<b>82%</b>	70%	30%
<b>81%</b>	33%	67%
<b>60%</b>	63%	37%
<b>46%</b>	79%	21%

Table 2: Clustered Shipper Performance by Asset Base Proportion of Carriers

The actual carrier portfolios employed by different shippers also provide detailed empirical evidence for this strategy. The strategy drawn from this would suggest the pecking order of carrier selection follow the three guidelines below:

1. Identify focused carriers in the lanes a shipper needs truckload service on and maximize leader carrier's available capacity.
2. Identify larger fleet carriers, maximize their capacity in the lanes they are "regional leaders" on.
3. Complement the remaining loads using carriers that provide broader service coverage.

The first of the guidelines stems from the focus based performance findings from the asset and non-asset clustering analyses completed. Focused carriers implies that the carriers selected for the routing guide would

likely have an established relationship with the shipper, familiarity with the lanes used, and have free capacity assets or access to capacity on a relatively consistent basis within the specified geographic region.

The second guideline is to use regional leaders when a shipper needs a broader coverage. These leaders come from the clustered larger fleet group but play a strong role in the higher performing shipper portfolios and fill a significant market need. Regional leaders also stem from a specific strategy of focus, a shipper should look to find a carrier with familiarity on their respective lanes and region.

The final guiding principle for shippers is to complement the remaining loads they are offering to carriers following a strategy from the larger fleet size carriers as opposed to the lower performing strategy of shippers. Not every lane will have constant volume and carriers with both capacity and familiarity with that lane especially in an industry highly susceptible to seasonal and meteorological fluctuations. However, in selecting an unknown carrier this research suggests finding a larger carrier with a clear strategy beyond universal load acceptance.

This research also supports the concept of relationships inherent in the lane focus measurement. Higher lane focus correlated with stronger performance giving strategic value to the niche carriers with lane and shipper familiarity. These close relationships are a proxy for focus. This research further strengthens the idea of consistency, in volume and lanes, as well as focus as the keys to success in the freight industry.

In terms of consistency, one approach that proved useful in interpreting some of the underlying potential causes of the regression and clustering results was comparing the results against the volatility of demand. For example, in the first order acceptance model, asset based carriers were found to have significantly better first tender acceptance than non-asset carriers. However, this difference may not be due to non-asset carriers being less reliable. Rather, when the underlying demand trends and strategic market role for those carriers were considered, the lanes and corresponding volumes were not as consistent over time as the lanes and volumes given on the asset based first tender lanes. The difference could be accounted for by the trend of shipments which were offered first to non-asset carriers; these tended to be more volatile and less predictable, making it more difficult to guarantee first tender acceptance. This difference indicated that having pre-planned shipments would serve to stabilize demand and could in turn increase first tender acceptance.

## **Implications**

The research suggests that carriers cater to different market needs. The differences in strategy discovered within the clustering analyses for both asset and non-asset carriers suggests that the uniform scorecards used

to evaluate shipper performance may not be the most appropriate way to rate carriers. There is a research opportunity in developing more strategy specific key performance metrics (KPIs) and corresponding scorecards to give shippers a better understanding of the performance of the carriers relative to their specific market needs.

## **Broader Significance**

The broader significance of this research is in the suggestion of building relationships with carriers where possible. Rather than focusing on universal blanketed metrics and changing carriers based on their short-term performance, to improve overall service it is important to holistically consider a full profile and ensure that it is simultaneously balanced and composed of focused carriers.

