

Understanding Shipper Performance in the LTL Market

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Summary: This research focused on quantifying which variables have an impact on on-time shipment performance in the less-than-truckload market. We narrowed in on the differences between on-time pickup and on-time delivery, and how shippers compare in their performance. We further discuss the operational implications of these findings and what shippers can do to improve their LTL shipping performance.



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KEY INSIGHTS

1. Number of pallets and the weight of the shipment are the largest drivers of on-time pickup performance while the biggest driver of on-time delivery performance is the published transit days (length) of the shipment.
2. Shippers large and small can obtain high levels of on-time performance from their LTL carriers.
3. Shipments traveling to high volume destinations obtain higher performance on average.

Introduction

On-time performance in the less-than-truckload market is dependent on many more variables than in full truckload. Performance often comes down to attributes such as shipment size and weight as well as

geographical factors. Furthermore, the boom in e-commerce has created an environment that expects fast, on-time deliveries. Working with C.H. Robinson (CHR) and TMC, a division of CHR, we analyzed two years of shipment data through a mix of regression models. Our on-time performance metric for pickup and delivery was defined as:

$$\text{On-Time} = \text{Actual Arrived Date} \leq \text{Evaluation Date}$$

$$\text{Eval. Date} = \text{Scheduled Date, o.w. Requested Date}$$

Using this definition, the data showed that 91% of shipments were picked up on-time and 86% were delivered on-time.

On-Time Pickup Performance

We found that shipment weight, number of pallets in the shipment, and distance of shipping origin from the first terminal are all correlated to on-time pickup

performance. Weight is positively correlated while number of pallets is negatively correlated leading to a inferred correlation that higher density and fewer pallets leads to better performance. Since LTL pickups are performed via local routes making multiple stops, available capacity for both weight and number of pallets in a given truck can become an issue. This is particularly true if shippers provide inaccurate weight or dimensional data with the carrier. Number of pallets and associated on-time pickup performance is shown in Figure 1.

Pallets & On-Time Pickup

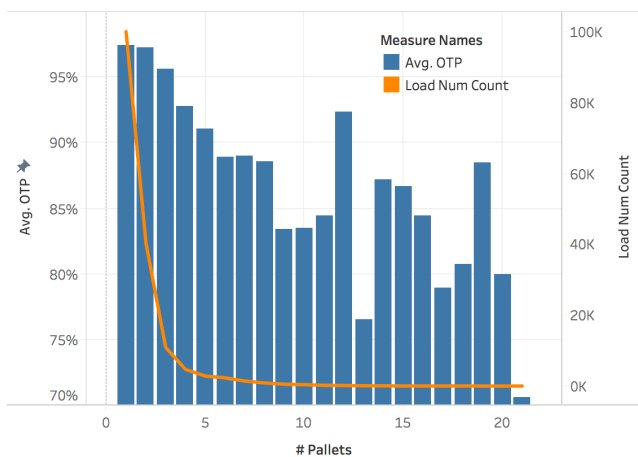


Figure 1: Number of Pallets in Shipment, Number of Shipments with Given Number of Pallets, & On-Time Pickup Performance

Interestingly, the distance between the shipping terminal has a positive correlation with pickup performance. This is likely due to drivers beginning their pickups with the furthest and working their way back to the terminal. Lack of space, as discussed earlier, may account for the decreased performance of closer locations.

On-Time Delivery Performance

For delivery, we found that on-time pickup, published transit days, weight, and load volume within the 3-digit destination zip code all correlated to on-time

performance. All of these variables are positively correlated to on-time delivery performance except for published transit days which are negatively correlated. It makes intuitive sense that shipments to higher volume regions with shorter published transit days are correlated with higher on-time delivery performance. The larger number of shipments to a certain area, the more opportunities there are for continuous improvement. The learning opportunity increases delivery performance. Shorter published transit days mean not only the reduced number of terminals to go through, which eliminates the handling and wait time, but the reduced possibility of getting delayed due to the many other risk factors when the goods are in the carrier's hands.

Published Transit Days & On-Time Delivery Performance

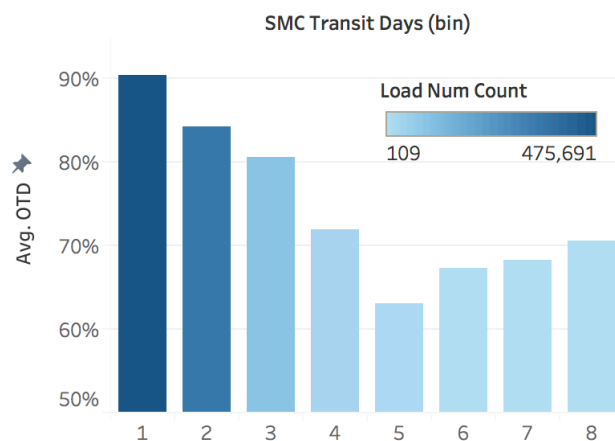


Figure 2: Published Transit Days & On-Time Delivery Performance

Leading Shipper Attributes

Size of the shippers (based on number of shipments) varied greatly in the data set. Two shippers accounted for over half of the loads. Both of these mega (>100,000 shipments) shippers experienced high levels of on-time pickup and delivery performance. However, the overall size of the shipper is not a major contributor to

performance. Small (<25,000 shipments) shippers can achieve high levels of performance as well. Although higher volumes can lead to more opportunity for operational excellence. Shipper performance, in general, comes down to the type of shipments a particular shipper has. Those shippers who achieve greater than 90% on-time pickup and delivery have, on average, more shipments of only one pallet traveling only one published transit days.

Looking at the performance that shippers obtain from carriers (Figure 3) also draws some interesting conclusions. The two mega shippers obtain high (>90%) levels of performance from both regional and national carriers. However, small carriers tend to get better performance from regional carriers while large carriers obtain better service from national carriers. This is likely due to small shippers having fewer customers, while large shippers are shipping to more and further destinations. The carrier performance seen by mega shippers may be due to their ability to better integrate with carriers due to their size.

| Carrier OTP Performance | | | | Carrier OTD Performance | | | |
|-------------------------|----------------|----------------|---------------|-------------------------|----------------|----------------|---------------|
| SCAC Type | Small Shippers | Large Shippers | Mega Shippers | SCAC Type | Small Shippers | Large Shippers | Mega Shippers |
| National | 89.9% | 82.4% | 97.4% | National | 79.7% | 84.8% | 91.1% |
| Regional | 90.0% | 78.7% | 98.8% | Regional | 84.6% | 72.6% | 94.7% |

Figure 3: Regional and National Carrier Performance

Industry Recommendations

This research has shown that on-time pickup and delivery are driven by different factors. As such, shippers need to understand the characteristics of their shipments so that they can optimize where possible and manage expectations where characteristics cannot be optimized. Since shipment size (weight and pallets) is a major influencer of on-time pickup, shippers should

ensure that they are capturing accurate data for these characteristics. Sharing more accurate data with carriers will help drive performance and consistency. When it comes to on-time delivery, shippers will have fewer opportunities to improve performance operationally since the primary drivers are length of the shipment (published transit days) and overall shipment volume to the destination. Understanding their shipment network, however, will allow shippers to better manage internal and external expectations about the performance of their LTL shipments in regards to on-time delivery.

Further Discussion and Conclusion

While the data evaluated was extensive, there are additional data points whose significance would be worth exploring for shippers. These include damage and shortage, invoicing accuracy, and carrier network configuration. Damage and loss data will allow shippers to understand additional costs and if in-transit damage results in shipment delays. Invoicing accuracy may also cause delays, but it could also be related to inaccurate shipment characteristic data. It would be important to capture the correlation between these. Finally, if shippers have a good understanding of their carriers' networks they will be able to relate this back to the factors influencing on-time performance such as terminal locations or number of terminals a shipment lane encounters.

In conclusion, there is an immense amount of on-time performance variability in LTL shipping. With the insight provided here shippers can begin to understand the factors influencing the performance of their shipments. They can use this to manage expectations and operational processes to optimize their LTL shipping.