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METROFREIGHT
Volvo Center of Excellence

Improving Freight Efficiency with Load Matching Technology

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Load-Matching Technology

Load-matching technology, or digital freight matching (DFM), helps an inefficient and often fragmented local trucking market by eliminating non-revenue-generating trips. The basic idea of the technology is to provide a real-time, GPS-based connection between shippers and carriers, somewhat similar to how Uber and Lyft connect drivers and passengers.

There is reason to believe that the market for this kind of service will only grow; however, expansion will depend upon a combination of economic and political factors. The roll-out of load-matching services in Los Angeles will provide useful lessons for their adoption in other locations.

Problem Statement

Truckers that have space available in their trucks find it difficult to market that space in real time. Coordinating local trucking shipments by phone, fax, and email takes a lot of time. Digital freight matching serves as a solution to these inefficiencies of the trucking market. Analysis of one DFM company's shipment data can reveal patterns and point to strategies to further improve trucking efficiency.

Project Objective

The research seeks to investigate DFM shipment data to develop an econometric model relating shipment characteristics to acceptance rates and the likelihood of touring. The results can then be used to determine how the characteristics influence driver behavior which can suggest better pricing and timing strategies to be implemented to increase efficiency and reduce truck emissions.

Research Methodology

This research develops two models analyzing the data from a DFM company. Both models employ a binary logit model. The first uses a dependent dummy variable with value of 1

indicating the shipment was picked up by an owner-operator carrier and 0 indicating the platform failed and an owner-operator did not pick up the shipment, and the DFM company had to contract a driver to recoup the loss. The dependent variable in Model 2 is 1 if a shipment was linked into a trip of two or more shipments, and 0 if it was a standalone shipment. Independent variables for these models include shipment weight and distance, pickup and delivery timing characteristics, and payment offered per mile and per ton. Furthermore, the study descriptively analyzes the current trends in the market for this DFM company, such as the median shipment weights and the number of trips picked up as well as linked either by origin location, destination location, or both.

Results

The analysis performed in this research presents several conclusions on the preferences of drivers. These represent the ways they can be incentivized to pick up and link together shipments posted to the DFM platform in a manner than reduces the number of trucks on the road and thereby reduces emissions.

The results from Models 1 and 2 show that the importance of timing characteristics of shipments to drivers is important depending on whether the DFM company is looking to pick up shipments or link shipments. Timing flexibility (pickup and delivery windows and required same-day delivery) is only preferred as an incentive to have shipments picked up. Timing flexibility is undesirable when drivers seek to link shipments together. Interestingly, higher shipment payment per ton and per mile does not incentivize drivers to link. This is explained by drivers trying to capture higher profits by carrying multiple shipments at once rather than one high-paying individual shipment. Heavier shipments are viewed as an inconvenience to drivers when attempting to link shipments because they require more time to load and they may be constrained by the size of their trucks, which is why heavier packages decrease probability of shipment linking. From these results we can imply that drivers will generally opt for multiple shipments with less individual weight and shorter distances to capture higher pay.

Also, linking shipments by origin is associated with higher number of shipments per trip than destination and “super” linking. This is possibly because origin linking is logistically easier to manage for drivers. These numbers reveal that more can be done by DFM companies to make destination and “super” linking easier for drivers.

This analysis serves as a proof of concept that DFM platforms have the potential to alleviate congestion problems and deadhead miles. Inferences about driver behavior can be made to gain insights on how to improve DFM pricing strategies. However, more robust datasets would improve analyses and provide additional insights.