

# Uberization Effects on Freight Procurement

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**Topic Area:** Transportation, Strategy, Simulation

**Summary:** The research focuses on developing a behaviorally based conceptual model to analyze the effects of digital freight matching app on shipper's freight procurement method. In a more liquid market, a shipper will benefit from using the on-demand app to book freight, compared to obtaining the price and particular shipment lanes through a Long-Term Contract.



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## KEY INSIGHTS

1. 10% of freight under Long Term Contracts falls out and ends up in the spot market. Alas, a shipper pays 20% more for freight in spot market compared to what would be agreed upon in a Long-Term Contract.
2. An increase in the market liquidity will benefit both shippers and carriers by enabling more efficient freight transactions.
3. Digital Freight Matching benefits shipper in volatile market.

## Introduction

According to a report by A. T. Kearney, in 2016 the US business spent \$1,392.64B on logistics costs. 90% of transportation spending is procured in the form of Long Term Contracts. A Long-Term Contract drives long procurement cycles that can last over 6 months, which results in significant financial risk for both shippers and carriers. It is estimated that 10% of freight under Long Term Contracts falls out and ends up in the spot market due to low tender acceptance and market volatility. The spot market, on the other hand, can be highly dynamic. Typically, shipper pays 20% more for freight in spot market compared to what would be agreed upon in a

Long-Term Contract. Regardless of the freight procurement method, shippers are constantly faced with market volatility and are left scrambling to find a new carrier capacity when carrier fall off occurs.

Assuming that a shipper could book a truck instantly, how would their procurement strategy and supply chain network change? Our hypothesis is that there would be a financial benefit to all parties from faster, more liquid transportation transactions, through lower labor costs spent on freight procurement transaction and shorter planning cycles in transportation procurement.

We tested this concept by looking at the recent surge on technology platforms that matches a load with a nearby available carrier, commonly known as Digital Freight Matching.

## Methodology

To study shipper's behavior and changes in freight procurement, we conducted qualitative research with our sponsor company, Uber Freight. We conducted interviews with Uber Freight's team members to learn about the Uber Freight business model, different freight procurement methods in the market, freight procurement process through digital freight matching, as well as shippers' decision factors when selecting digital transportation partners.

Taking common industry knowledge, we identified shippers' decision factors in conducting freight procurement. Shipper considers different variables, both quantitative and qualitative variables, when designing and selecting their freight procurement method. We decided to use System Dynamics model to capture the different decision factors (variables) that affect shipper behavior throughout freight procurement transaction.

We started by creating causal loop diagrams using 37 different variables related to freight procurement processes. We determined initial values of the variables based on common approximations in the market with validation from industry partners. To perform a more detailed quantitative analysis, we transformed those causal loop diagrams into stock and flow diagrams that shows different freight procurement alternatives. We developed equations for some variables in our model and performed simulation and scenario analysis.

Before going into the simulation, we predicted that Shipper Density in Uber Freight will follow an S-shaped curve. Shippers will switch from using a combination of Long Term Contract and spot market to Uber Freight once they realize the cost benefits of using the app. The adoption rate increases quickly as the app gains higher efficiency and users become accustomed to booking via the app.

Since a Long Term Contract is renewed on annual basis, potential shipments are locked one year in advance. There will be a delay in realizing the change in procurement strategy. However, once materialized, freight procurement completed through the Uber Freight app will be more frequent, hence the sharp increase in its adoption. At one point, the adoption will become stagnant as it reaches the maximum number of available shipments in that particular lane at a particular time.

**System Dynamics Model**

We presented shippers' behavioral change in freight procurement process in our System Dynamics model. Market liquidity, the availability of a carrier capacity at a given time accompanied by instantaneous price quotation, fuels Digital Freight Matching adoption.

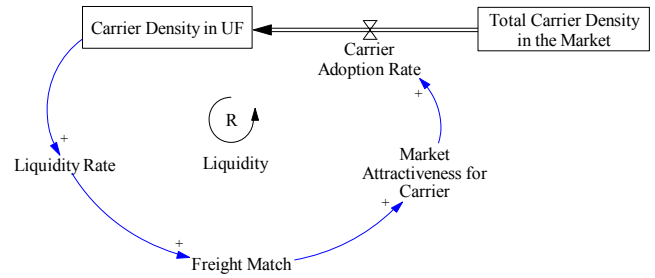


Figure 1: Liquidity

As shown in one of our stock and flow diagrams, Liquidity Rate will increase Freight Match through Uber Freight. An increase in Freight Match will reinforce Carrier Adoption Rate (Figure 1), thus increasing Carrier Density in Uber Freight (UF).

On the shipper's side, Market Liquidity increases Uber Freight attractiveness related to Long Term Contract. By reducing inefficiencies in procurement process and decreasing routing guide failure cost, Digital Freight Matching benefits shippers in offering lower freight rate.

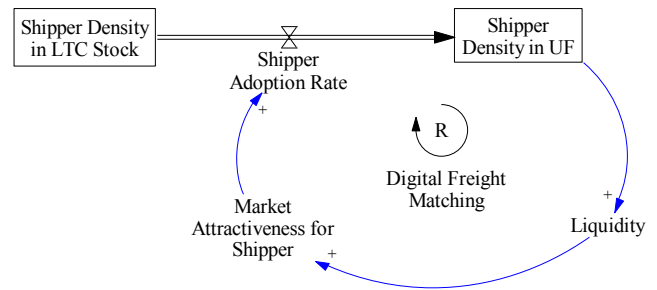


Figure 2: Digital Freight Matching Adoption

**Sensitivity and Scenario Analysis**

The real power of System Dynamics is utilized through model simulation. We conducted simulations over period of 10 years to analyze the impact of the main variables on the adoption of shippers and carriers in Uber Freight (UF).

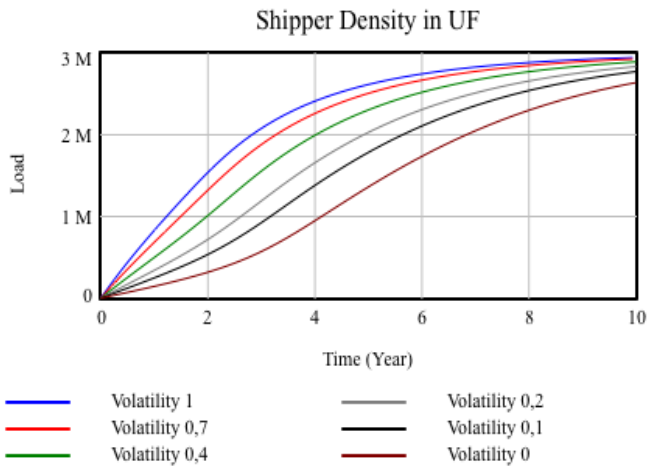


Figure 3: Market Volatility effect in shipper density creation in Uber Freight

**Market Volatility:** An increase in market volatility leads to a higher adoption rate of the UF model. This can be explained by the benefits provided by the Uber App at the time of finding matches in a volatile situation. In our model, 1 represents the highest volatility, while 0 is the lowest.

**App Efficiency:** App efficiency below 80% leads to very low adoption rate. A less efficient technology will be deemed to be impractical and equivalent to the traditional spot market.

**Average time to adopt UF for shippers and carriers:** A reduction in the number of years for a shipper and a carrier to adopt UF will increase the shipper and carrier density over the same period of time.

**Shipper Volatility Profile:** The shipper volatility profile measures the consistency of a shipper to provide loads to the carrier according to what has been agreed upon in the Long Term Contract. As the Shipper Volatility Profile increases, shipper's adoption of UF increases as well. This is explained by recalling that the main objective of having an LTC is to reduce the dependency on the spot

## Results

Out of the many variables affecting both shippers and carriers, price is certainly the most important factor in freight procurement. Our analysis yielded four main findings:

1. An increase in market volatility speeds up the adoption of digital freight matching. A 100% increase in market volatility (from 0.1 to 0.2) creates a 15% increase in shipper density by half of the time needed to achieve market saturation. A similar effect is noticed for the carrier density.

2. An increase of 10 basis points in the app efficiency (from 80% to 90%) reduces the total time to achieve the maximum carrier density by 30%. Considering that in the US 90% of trucking operators own 6 or less trucks, having the autonomy to select opportunities, schedules, and receive quick payment will significantly benefit these individual drivers.
3. The time it requires for shipper and carrier to join and utilize digital freight matching app determines the adoption rate of the app. The adoption time also affects market liquidity. Thus, it is important to create a balance between shipper and carrier density across time. A reduction of 50% of the carrier adoption time, from 1 to 0.5 year, will increase shipper density by 10% in half of the time required to achieve equilibrium in the shipper density.
4. A 100% increase in Shipper Volatility Profile, from 0.1 to 0.2, will reduce approximately by 30% the time it will take to achieve the equilibrium in carrier density. Uber Freight provides flexibility for shippers to secure capacity in a highly variable environment. Thus, we see opportunities for Uber Freight to attract shippers operating in a highly volatile environment or having limited transaction data.

## Conclusion

Given the option, a shipper would willingly switch to the lower cost faster alternative, abandoning the fixed Long Term Contract method. As a result, the shipper eliminates the long traditional procurement process, reduces administrative costs, and has fewer instances of over and under ordering truck capacity.

In a more liquid market, shipper will benefit from using the on-demand app to book freight, compared to locking down the price and particular shipment lanes through a Long Term Contract. We proved our hypothesis that there is financial benefit to all parties in a more liquid transportation market.

Our model visualizes changing shipper behavior in the presence of digital freight matching. It gives digital freight matching providers valuable information on different attributes adding to a shipper's total freight price, which becomes the most important consideration when contemplating switching to a different procurement method. In this manner, it proves the opportunity and potential of a digital freight matching app as an alternative to, and eventual replacement for, the traditional Long Term Contract method.