Process Improvement Project

Tim Hulak - MBC 638

Units Delivered to their Destination Late!

Process Owner: Tim Hulak

Key Dates: **D** 06/01 | **M** 06/01 - 08/31 | **A** 09/01-11/30 | **I** 12/01 - 12/09 | **C** 12/09 and Beyond

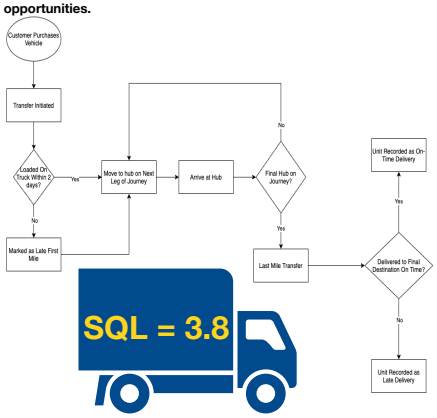
Define

***Data from June - August will be used. This is due to the lack of data available from January and February. As well as March, April, and May becoming huge outliers due to the effect of COVID-19 on our business.

Goal:
Reduce the number of late units, using the Dallas Hub Region as an example since it was responsible for approximately 20% of late units from June to August. Reduce lates/refunds by at least 25%

Business Impact:
This problem should be fixed to help repair and preserve our reputation as a reliable and professional vehicle delivery service. Further, if we can reduce our late units then we can avoid missing that revenue.

Each late unit is a refund between $500 - $1200 (an average of $700, depending on where in the country the transfer is originating and being delivered. If we can reduce that by any meaningful measure, we can save tens-of-thousands of dollars is missed revenue opportunities.



SQL = 3.8

Measure

The total number of late units from Jun - Aug was 7,868. Our goal is to identify the region in order to proceed. As seen below, the Dallas, TX region alone makes up nearly 20% of the late units.

REGION	LATES	PCT
Dallas	1438	18.28%

Center

Stat	Value
Mean	18.2
Median	14
Mode	16

Variability

Stat	Value
Range	90
StDev	15.891
Var	252.523

With a rounded average revenue of $700 per transfer, we are refunding over $1,000,000 from the Dallas region Alone, at an average of $12,740 refunded per day!

-$1,006,600

After analyzing the data from June - August, we have decided To redistribute resources to the stores that have been forecasted To need them most.

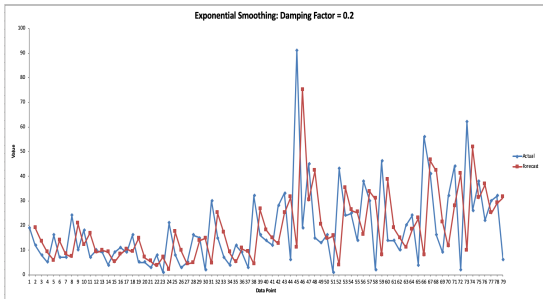
Analyze

We analyzed the top 3 locations in the Dallas Region. Below is a comparison of before and after implementing the change.

Baton Rouge and Jackson make sense, because they are out-of-state locations that feed to/from the Texas Hub. An interesting discovery Was the Austin, TX location, because it is located near the hub.

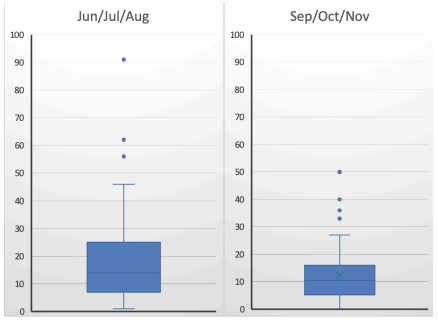
Store	Freq_Before	Pct_Before	Freq_After	Pct_After	Freq_Difference	Pct_Change
BATON ROUGE, LA	138	9.7%	76	7.6%	62	44.93%
JACKSON, MI	119	8.3%	78	7.8%	41	34.45%
AUSTIN, TX	102	7.1%	59	5.9%	43	42.16%

Exponential Smoothing!



After deploying the adequate amount of trucks to locations that we Forecasted, using Exponential Smoothing, we saw a reduction in late units. As shown in the above chart, the forecasts were not exactly dead on accurate , but close enough for us to allocate a good number of trucks to pick up and transport the units.

Improve



-$697,200

30.74% Reduction!

Control

Improve and Control are ongoing. The team has decided to run this analysis each quarter and continue to refine the process.

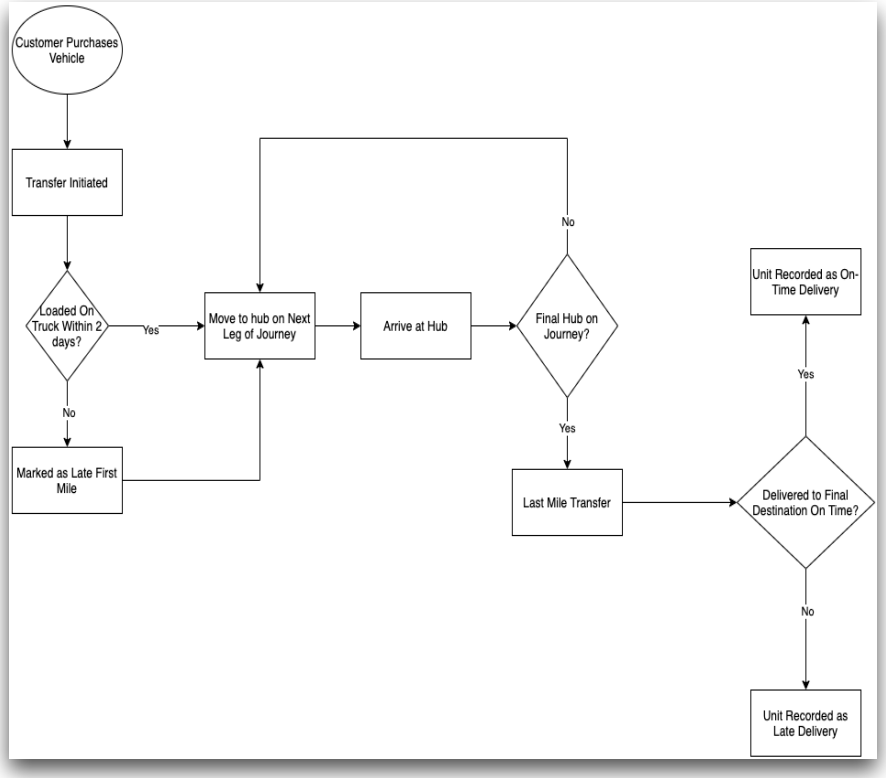
$697,200 is still a large Amount to refund, so We plan to continue To refine and improve

SQL = 4

Key Team Members: Transportation Sr. Manager, Sr. Logistics Analyst, 2 Logistics analysts, 4 Hub Managers

Define: Transportation Process

- Goal: Reduce the number of late units from the Dallas Hub Region, since it was responsible for approximately 20% of late units from June to August.
- We will consider this a success if we decrease the late units and the dollar amount refunded by 25%.
- The process we are trying to improve is delivering units on time, as seen in the process map.



Define: Sigma Quality Level

- **D** = 3; Possible defects:
  - Late from Origin to 1st Hub
  - Late from Hub to Hub
  - Late from Final Hub to Destination
- **U** = 633; We initiate ~633 transfers per day
- **D * U** = 1,899
- **A** = 19; on average, 19 units are late per day
- **DPO** = 1%
- **DPMO** = 10,005
- **SQL = 3.8**

DPMO	S.Q.L.	Yield
308,000	2	69.20%
274,000	2.1	72.60%
242,000	2.2	75.80%
212,000	2.3	78.80%
184,000	2.4	81.60%
158,000	2.5	84.20%
135,000	2.6	86.50%
115,000	2.7	88.50%
96,800	2.8	90.30%
80,800	2.9	91.90%
66,800	3	93.30%
54,800	3.1	94.50%
44,600	3.2	95.50%
35,900	3.3	96.40%
28,700	3.4	97.10%
22,700	3.5	97.70%
17,800	3.6	98.20%
13,900	3.7	98.60%
10,700	3.8	98.90%
8,190	3.9	99.20%

Measure

- 79 Samples were Taken; 79 Days from 06/03 - 08/31
- Primary data collected were counts of late units. While the data was mostly discrete data, this allowed me to measure it using continuous tools
- Data was collected by combining existing daily reports and cleaning the data for our purposes. I used a Python script to read in each report, shape the data, insert the data into a SQLite database, and export the cleaned data into one Excel file.

Measure: SQL

- **D** = 3; Possible defects:
  - Late from Origin to 1st Hub
  - Late from Hub to Hub
  - Late from Final Hub to Destination
- **U** = 633; We initiate ~633 transfers per day
- **D * U** = 1,899
- **A** = 12; on average, 12 units are late per day
- **DPO** = 0.6%
- **DPMO** = 6,319
- **SQL = 4**

DPMO	S.Q.L.	Yield
6,210	4	99.40%
4,660	4.1	99.50%
3,460	4.2	99.70%
2,550	4.3	99.75%
1,860	4.4	99.81%
1,350	4.5	99.87%
960	4.6	99.90%
680	4.7	99.93%
480	4.8	99.95%
330	4.9	99.97%
230	5	99.98%
150	5.1	99.99%
100	5.2	99.99%

Analyze

•The tools I used were (all seen in the storyboard):

1. Process Map
2. Measure of Center
3. Measure of Variability
4. Exponential Smoothing
5. Box and Whisker Plot

•The data told me that we had opportunities to shuffle our resources. For example, in the Dallas, TX region, 7.1% of the late units were being delivered to the Austin, TX location. This was being overlooked because Austin is not far from the Hub. It made sense to see that Baton Rouge, LA needed more resources because it is a further distance from the hub (making the delivery more likely to be late if First Mile or Hub-to-Hub delays occur). But finding that Austin needed additional resources was very interesting!

•SQL for Old Process: 3.8
•SQL for New Process: 4.0

Improve

- We proposed that we look at the last 3 months, identify which locations need more trucks, perform a rudimentary forecast, and reallocate trucks.

- The process was improved by 30.74%

- What we learned about the process is that it is fluid. The data was highly variable. Perhaps a week-by-week or month-by-month analysis and realignment may be needed to continue to improve. The issue with the old process was that we had trucks on static lanes. While this made making a schedule easy, it seemed to cause more cars to sit on the lot and wait to be picked up for First Mile transportation.

Control

•In order to “hold the gains” of our improvement process, or make the next round of improvement, we will likely shorten out time window for reevaluating the process and look into more sophisticated forecasting tools. We even discussed pulling historical data from our database, maybe even many years worth, and analyzing possible “seasons.” Overall, we plan to continue to collect and analyze the data to better allocate the trucks we have (and will have in the future).