OTM 714 – Supply Chain Analytics

Schneider Tractor Balancing Problem

Team 3 :

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Problem Statement

- Schneider is a leading provider of truckload, logistics and intermodal services
- “Sweet spot” for age and mileage between tractors
  - 714,000 miles
  - 84 months old
- Problem:
  - How should Schneider implement a swapping policy between OneWay and Dedicated tractors to maximize the lifetime value and minimize potential lost value if tractors deviate from the sweet spot?

Tractor Retirement Inefficiencies

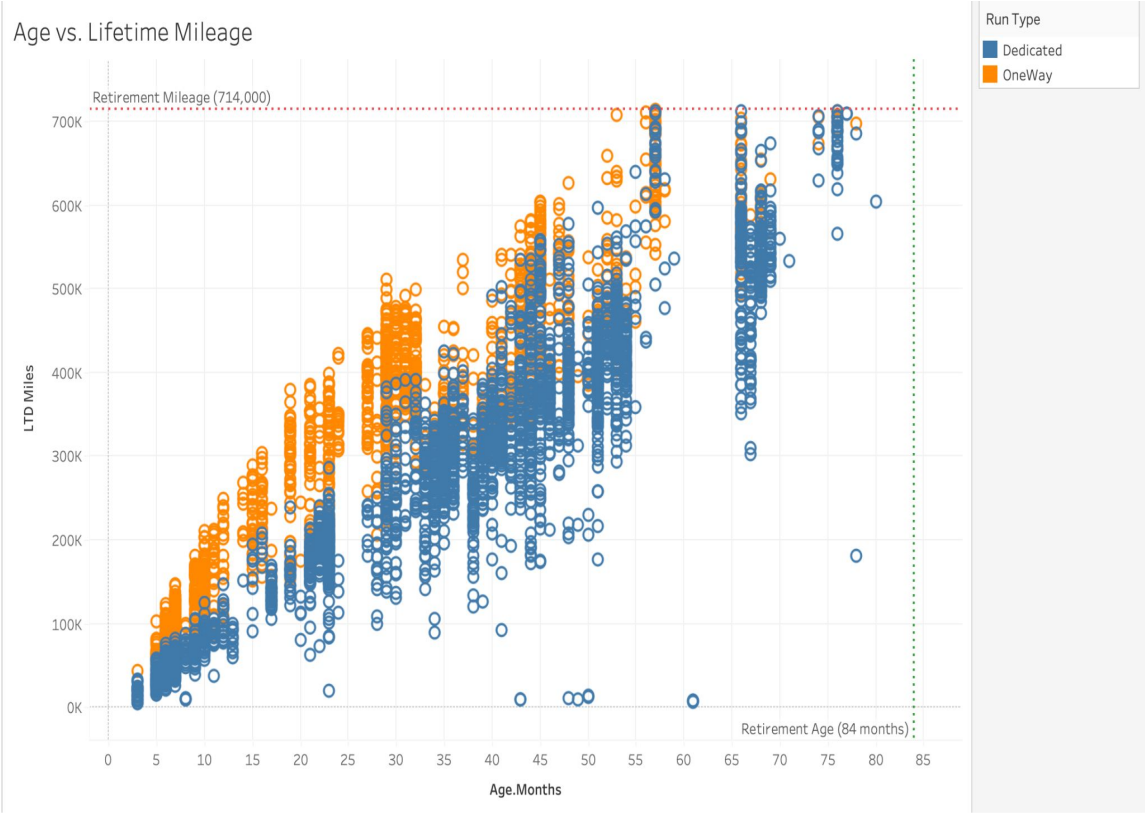
- Shows the relationship between tractor age (x-axis) and lifetime mileage (y-axis).

Inefficiencies observed:

- Some tractors exceed 714,000 miles prematurely (overutilized).
- Others fail to reach 714,000 miles by 84 months (underutilized).

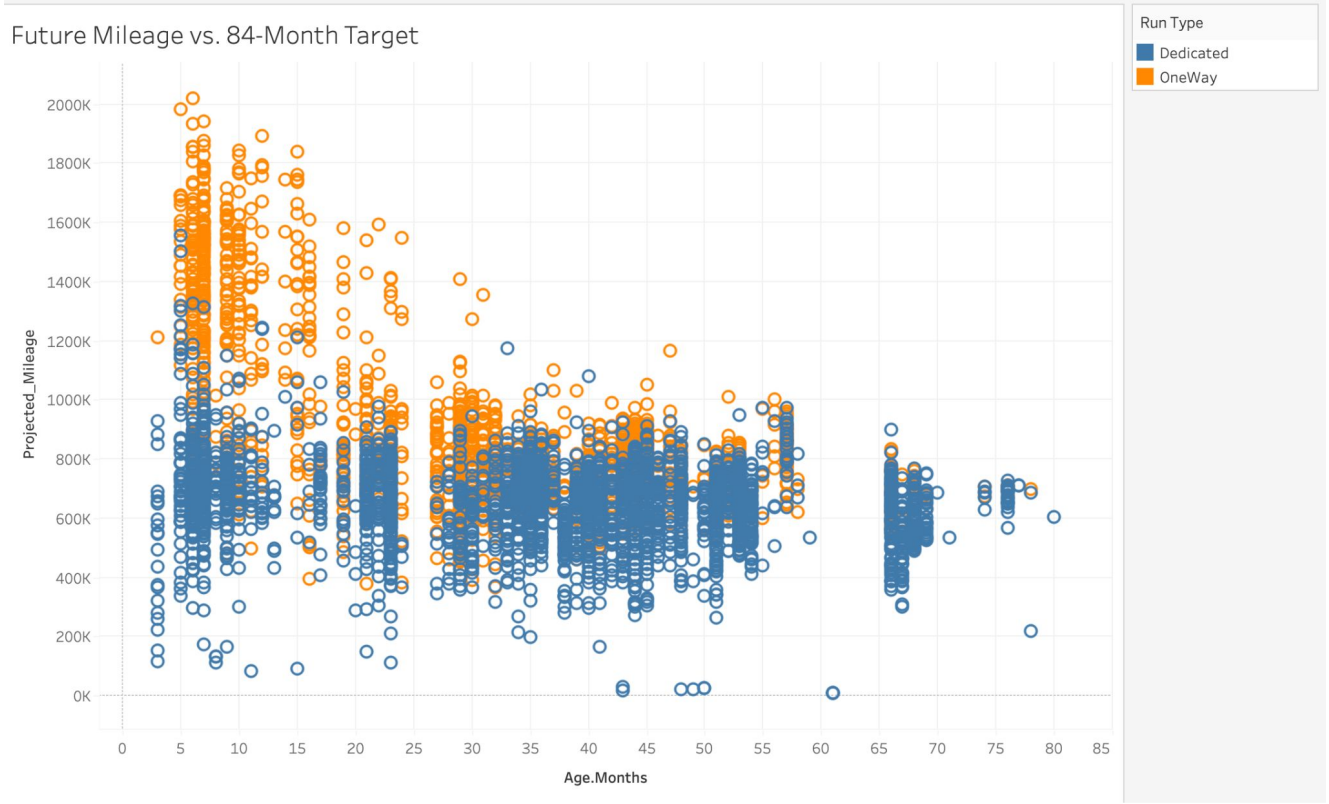
Highlights the financial impact:

- $0.02/mile for underutilization.
- $50/month for overutilization.



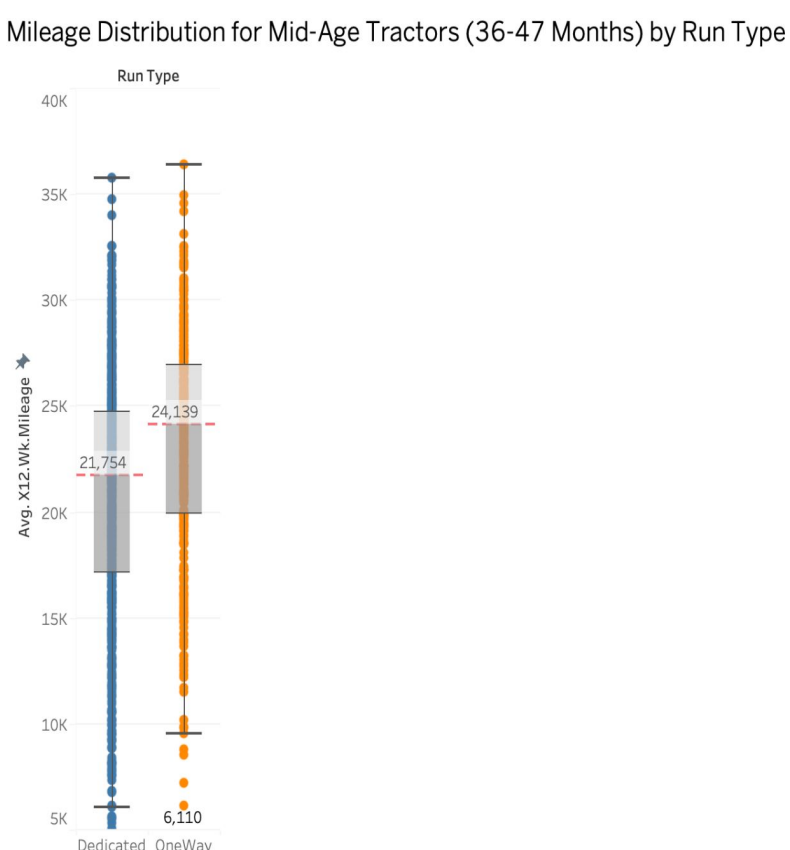
Projected Mileage Outcomes Without Swapping

- **"OneWay" tractors:**
  - Higher mileage accumulation.
  - Frequently exceed 714,000 miles before 84 months.
- **"Dedicated" tractors:**
  - Lower mileage accumulation.
  - Often fail to reach 714,000 miles by retirement.
- Shows the current imbalance in tractor utilization.



Dedicated vs. OneWay: Different Mileage Trends

- Box plot comparing average 12-week mileage for tractors aged 36–47 months.
- **"Dedicated" (blue):**
  - Lower median mileage (21,754 miles).
  - Narrower distribution (consistent usage).
- **"OneWay" (orange):**
  - Higher median mileage (24,139 miles).
  - Wider distribution (inconsistent usage).
- Highlights the need for balancing utilization between the two run types.



Proposed Swapping Policy

Swapping Strategy

- **Policy:**
  - Calculate the average monthly mileage for both Dedicated and OneWay tractors and compare it to the vehicle's remaining miles and expected lifetime to determine swap eligibility
- **When?**
  - Annually for tractors aged 36-47 months.
- **Which pairs?**
  - High-mileage **OneWay** → swap with low-mileage **Dedicated**
  - Prioritize swaps where projections show **excessive or insufficient mileage** at retirement
  - A swap is approved if the **expected savings per truck exceeds $500**, based on a **total projected savings of $1,000 per swap (two trucks)**
- **How many?**
  - **587** total swaps
    - **192 OneWay** trucks swapped
    - **395 Dedicated** trucks swapped

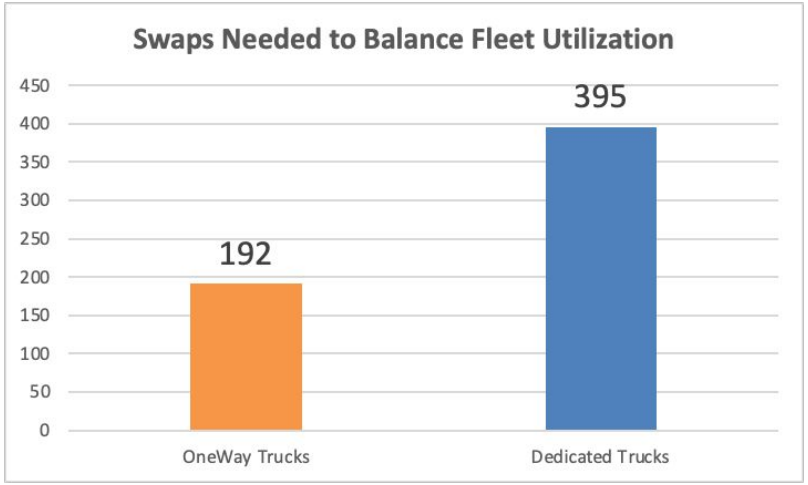
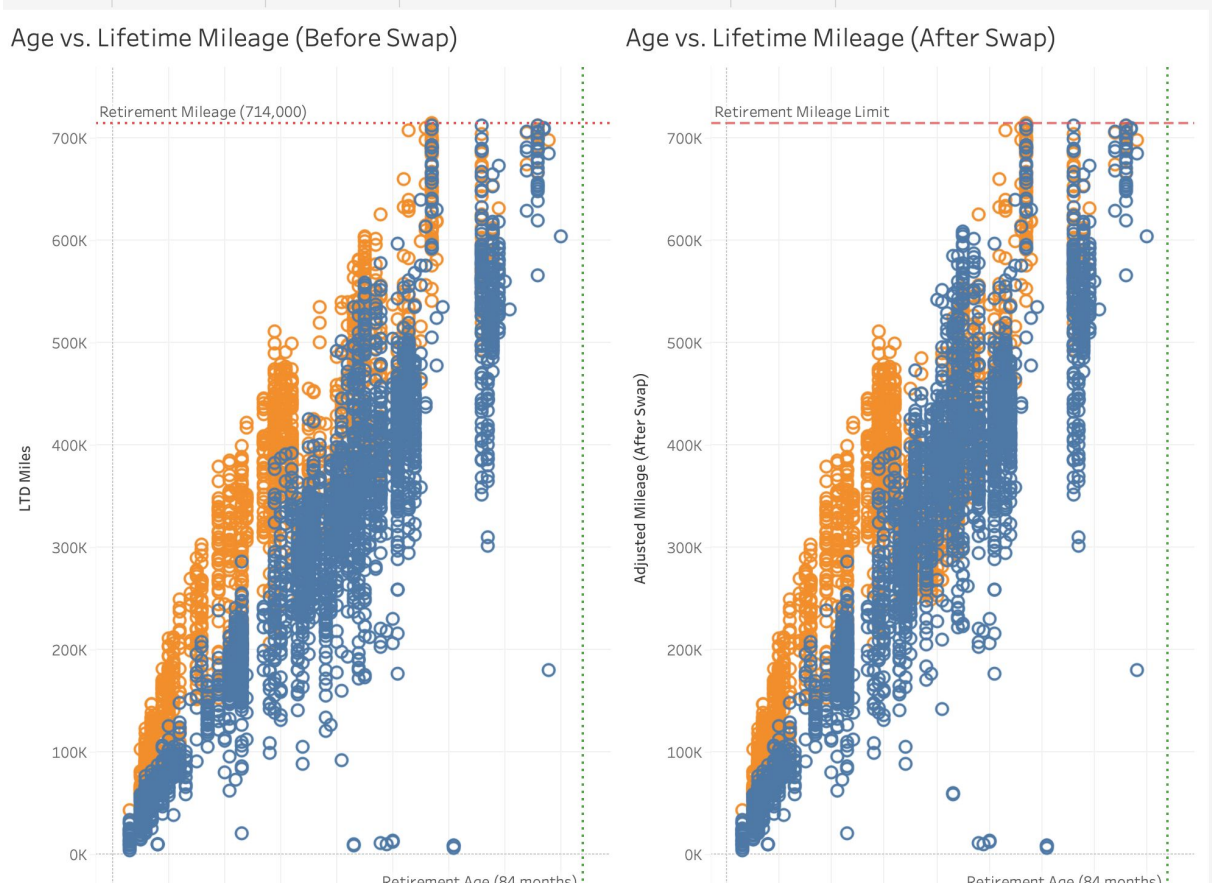


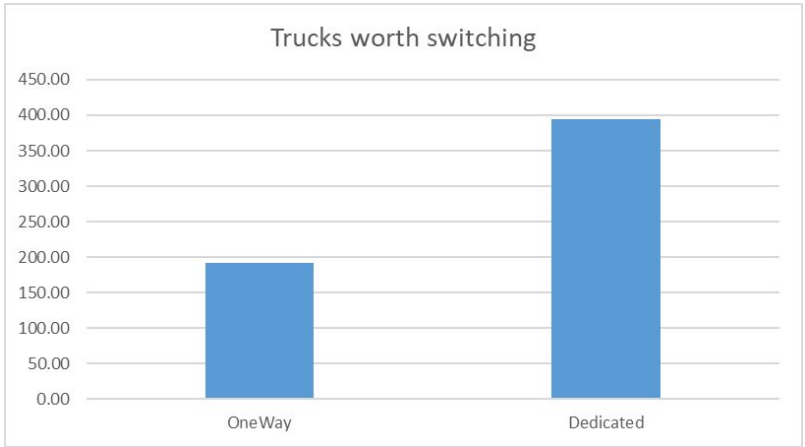
Illustration of How Swapping Affects Retirement: Before & After

- **Before swapping** (left scatter plot):
  - Many tractors deviate from the "sweet spot" of 714,000 miles at 84 months.
  - Imbalanced mileage usage between Dedicated and OneWay.
- **After swapping** (right scatter plot):
  - Improved alignment with retirement thresholds.
  - More tractors achieve the desired 714,000 miles at 84 months.
- **Cumulative mileage trends (line charts):**
  - Smoother trajectories after swapping.
  - Reduced deviations from retirement targets.



Projected Cost Savings from Swapping

- As can be seen from the bar charts, both total number and savings from trucks is greater for Dedicated than OneWay. This includes the **$1000** cost for swapping two trucks.
- "Dedicated" tractors: **395** trucks swapped for a total of **$371,072.**
- "OneWay" tractors: **192** trucks swapped for a total of **$29,520.**
- Total possible projected savings: more than **$400,000!**



Final Recommendation

- Implement the **swapping policy annually for tractors aged 36-47 months** to optimize fleet retirement.
- Regularly track **mileage distribution trends** to refine the policy over time.
- Ensure the strategy remains **cost-effective** by comparing projected vs. actual savings each year.

This structured conclusion effectively summarizes the insights from all graphs and reinforces the proposed solution.