

Delivery Route Optimization

Team Drive Fast

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SUMMARY

The main scope of work for the Carrier Company with whom we collaborated on this project with is to take motorcycle products and parts from a manufacturer/distribution center and deliver those items to clients on a bi-daily basis. Due to the COVID-19 pandemic, the Carrier Company has had a number of issues with new drivers not knowing the routes and in turn taking too long to deliver the products. The delay in delivery has thus caused a loss in profits for the Carrier Company as they are having to pay their drivers for more hours, their vehicles are racking up more mileage, and their customers are becoming less satisfied with the delivery service. As a result, the Carrier Company asked Team Dive Fast to work on developing a program that optimizes the delivery of products on a certain route to see if shortening the delivery time will have any effect on company costs.

METHODOLOGY

We considered three types of problem solutions which included the Dijkstra's Algorithm, the Traveling Salesman Problem, and the Vehicle Routing Problem. In the end, we determined that the TSP was how we would be able to solve our problem. The reasoning why the TSP works best for our problem is because we have multiple stops in the total trip that need to be optimized. In comparison, the Dijkstra Algorithm is designed to simply optimize the travel distance between two points. We also chose the TSP because we only have one delivery driver for the routes whereas the Vehicle Routing Problem is designed around having multiple vehicles that can complete the delivery instead of just one.

FINDINGS

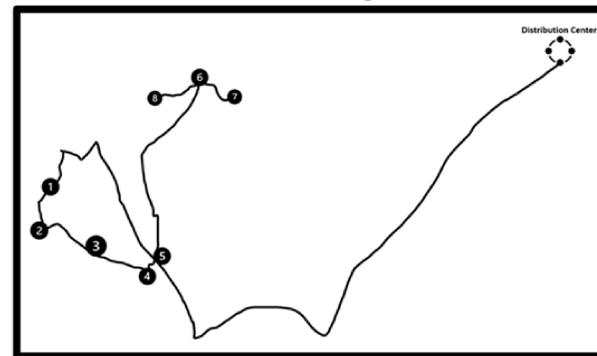
Our project was to minimize the time spent on deliveries for the Carrier Company. The company has had many issues with drivers taking too long to deliver the parts. The company would be able to save money if the drivers had an optimized route to take. We decided to solve the Traveling Salesman Problem in Microsoft Excel using the Solver add-in. The results of the program allowed us to be able to run an economic analysis comparing the expenses before and after the new program was implemented. We found that for this route alone a total annual savings of over \$5,000 is to be expected and if these calculations were to be applied to the other 38 routes, then the Carrier Company should expect to see a total annual savings of over \$200,000 companywide.

CONCLUSION

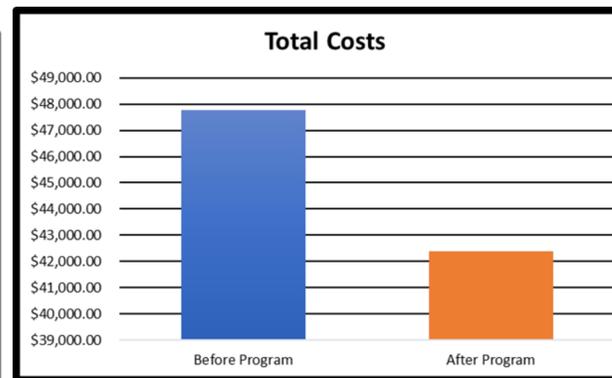
The results of the program allowed us to be able to run an economic analysis comparing the expenses before and after the new program was implemented. Our recommendation to the Carrier Company would be to implement the new optimized program into the remaining routes. Not only does the optimized program compute the fastest route for the drivers but it also delivers alternative route options that consider traffic, road construction, natural disaster, and any other emergencies that would result in delivery time delays. The total time saved on delivering products will cut costs on driver payouts, vehicle maintenance, and loss of clients. By delivering products to their clients quicker, the Carrier Service will not only be saving themselves money on delivery costs but will also be ensuring the satisfaction of their clients.

Morning				Afternoon			
Option	New Time	Original Time	Difference	Option	New Time	Original Time	Difference
1	167	192	25	1	184	213	29
2	178	203	25	2	200	221	21
3	183	208	25	3	195	230	35

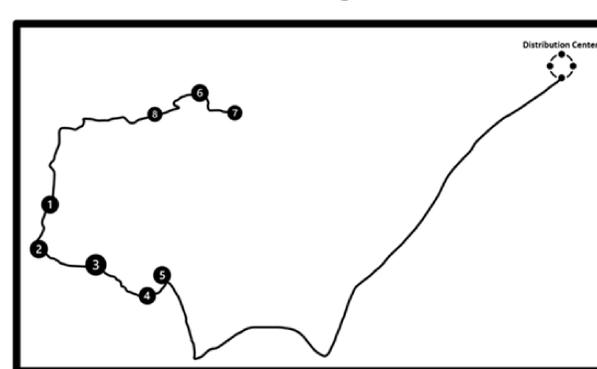
Before Program



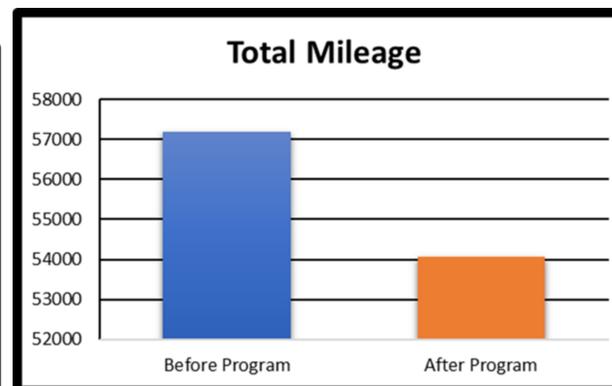
Total Costs



After Program



Total Mileage



Most Optimal Order

Distribution Center	5	4	3	2	1	8	7	6	Distribution Center
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