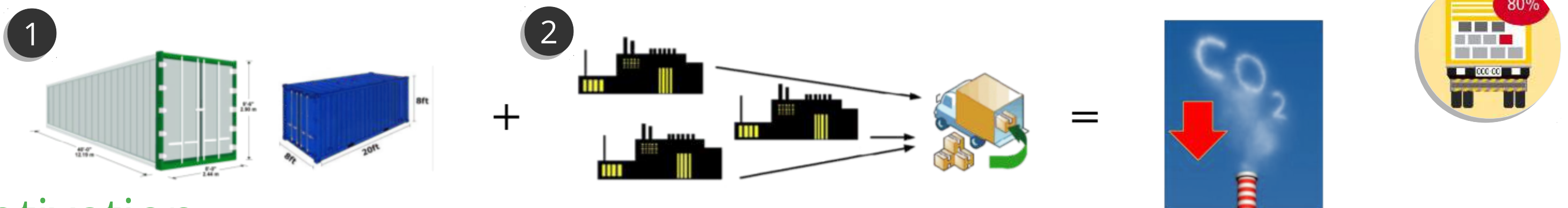


Container Size & Shipment Consolidation Optimization Modelling

Data
Analytics



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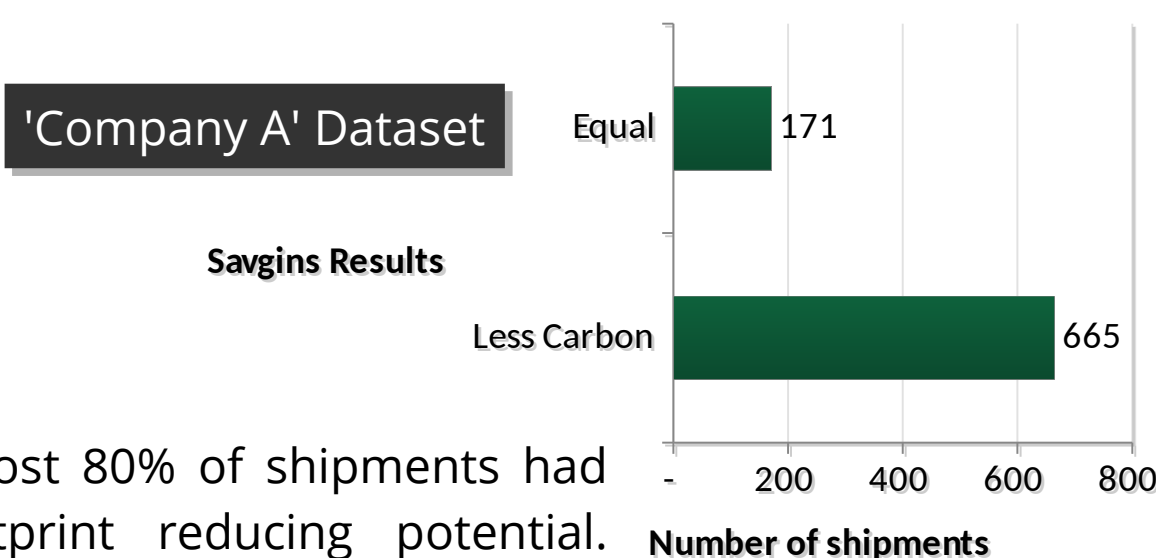


Motivation

Ocean freight contributes 4-5% of global carbon emissions. From a real-world dataset, we discovered there was a large number of full-container-load (FCL) shipments with less-than ideal container fill rate.

Approach

1. Selecting the appropriate **sizes of containers**
2. **Consolidating** shipments



Result: Almost 80% of shipments had carbon footprint reducing potential. This led to a 9% decrease in the overall container requirement and a reduction of 13.4% of their carbon footprint.

Container Size Optimization 1

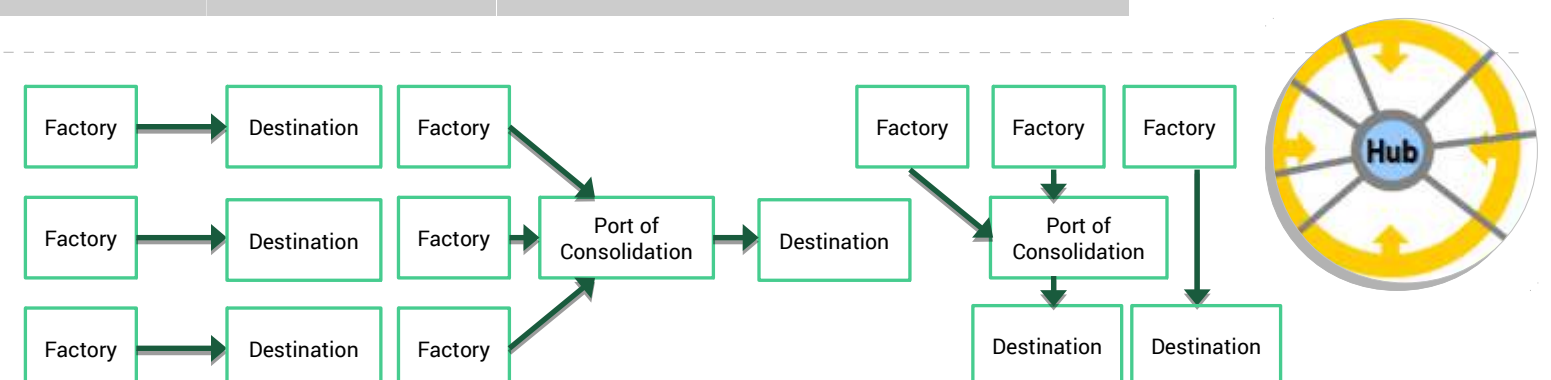
The container size optimization model makes use of 3 container types – 20 foot standard, 40 foot standard and 40 foot high cube. A carbon emission factor is assigned to each container types.

Objective: Minimize the total carbon emission for a shipping volume by selecting the best combination of containers with the maximum possible capacity fill rate.

	Original	Optimized	% Change
Carbon Footprint	5,680	5,006	-13.4%

Consolidation 2

The consolidation model is built around the concept that a customer has multiple suppliers within a particular country for delivery of goods to a few overseas ports. The goods can be trucked to a particular port for shipping instead of shipping from each individual supplier's city.



Objective: Minimize carbon emission from direct shipping + consolidation (consolidated shipping + trucking from each city)



Results

18.5% drop in container requirement

Container Size	Original	Optimized	% Change
20-foot standard	720	285	-60.4%
40-foot standard	638	489	-23.4%
40-foot high cube	492	734	49.2%
Total	1,850	1,508	-18.5%

CO₂ further reduced by 12.1%

Port of Discharge	Sum of Original Carbon Emissions	Sum of Optimized Carbon Emissions	Total % Change
Port D	15,454,364.44	13,440,729.98	-11.7%
Port A	12,736,442.30	11,086,992.43	-11.5%
Port C	5,287,460.03	4,216,647.81	-12.3%
Port B	848,984.38	634,536.57	-28.1%
Total	34,327,251.14	30,328,543.04	-12.1%