Optimizing Returnable Transport Items Reposition in a Global Supply Chain

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Motivation / Background

Reduce logistics cost and environmental impact by enhancing RTI introduction

Expendable

- One-time use
- No return is required
- Less initial investment

Returnable Transport Items (RTI)

- Reusable
- Large initial investment
- Proper logistics flow is required

Key Questions

Do **network re-design** and **RTIs introduction** reduce logistics costs and CO2 emissions?

How many RTIs should be introduced to each logistics node and **where and how many** they should be shipped?

Relevant Literature

Zhang, Y., Chea, A., & Chu, F. (2020) Improved model and efficient method for bi-objective closed-loop food supply chain problem with returnable transport items

Akabane, G., Pozo, H., & Galhardi, A. C. (2018, September). Returnable packaging as a sustainability factor in the automotive chain: a case study.

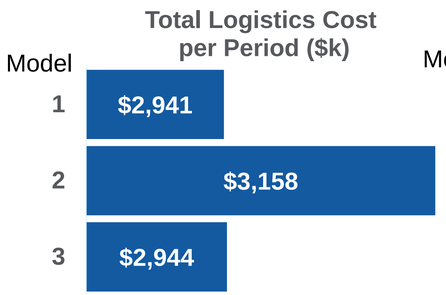
(Source Image : HedgeThink, 2019.)

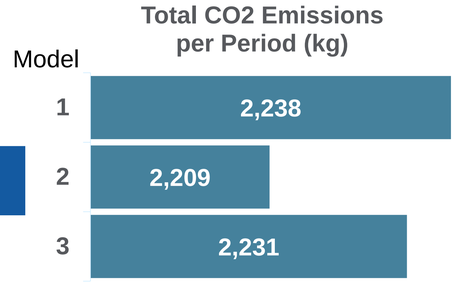
Problem/Methodology

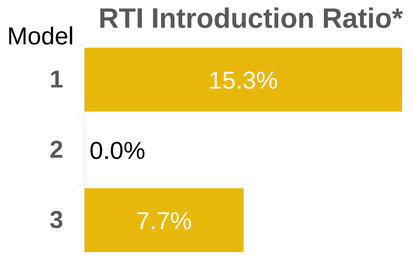
- The current network only implements RTIs in **selected round trip routes**.
- **Network re-design** is required to introduce more RTIs
- Three different models are introduced

			Model
Mixed Integer Linear Programming (MILP)	Single Objectives	Cost	1
		CO2 emissions	2
Goal Programming	Multiple Objectives	Cost & CO2 emissions	3

Results







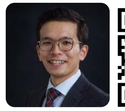
*Number of RTIs over the total packing required

- Introducing more RTI can contribute to more cost savings
- RTI introduction will increase shipping related CO_2 emissions.
- Minimizing both CO2 emissions and cost at the same time is infeasible.

Key insights

- There are tradeoffs between CO2 emissions and cost reduction.
- Company needs to prioritize the objectives based on their target.
- Additional opportunities must be analyzed to study the conflicting objectives.

Lisandro de Latorre



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