



Thesis project: Understanding Mode Choice in intercontinental rail freight: A Discrete Choice Modeling

Description

The growing emphasis on developing resilient and sustainable global supply chain networks has led to an increased focus on intercontinental rail freight transport, as railways are considered to be the most cost-effective and environment friendly mode of transport. This shift can contribute to reduced carbon emissions and a smaller ecological footprint, aligning with global efforts to combat climate change. The development of a rail freight system of this nature typically entails traversal through multiple border crossings. The intercontinental rail transport, such as Eurasian rail freight transport, which links China and Europe through different rail corridors (trans-Kazakhstan, trans-Mongolian, and trans-Siberian) witnessed dramatic increase in demand over the past decade. However, market dynamics and evolving user preferences require adaptable models that capture real-world complexities. Discrete Choice Models (DCMs) offer a powerful tool for quantifying how various factors (e.g., transport time, cost, reliability, and environmental attributes etc.) influence mode choice decisions.

Assignment

- Review existing literature on mode choice factors in freight transport.
- Construct a discrete choice model (using, for example, a multinomial logit framework) to quantify the critical factors influencing shippers' and logistics providers' decisions between maritime transport and intercontinental rail freight.
- Perform sensitivity analyses and scenario simulations to explore the potential effects of changes in operational parameters (e.g., price adjustments or service improvements) on modal shift.

Background

We are looking for a highly motivated student with excellent analytical skills. While a background in mathematics, transport economics, operations research, computer science, engineering, or related fields is helpful, it is not mandatory. Experience in programming is beneficial. This opportunity also offers the possibility of contributing to a publication. Please include your CV, transcript of records, and a brief motivation letter.

References

- Bergantino, A. S., Bierlaire, M., Catalano, M., Migliore, M., & Amoroso, S. (2013). Taste heterogeneity and latent preferences in the choice behaviour of freight transport operators. *Transport Policy*, 30, 77-91.
- Pacheco Paneque, Meritxell. A general framework for the integration of complex choice models into mixed integer optimization. Diss. EPFL, 2020.

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