

New model paves the way towards cost-efficient, service-oriented sustainable transportation

Submitted by: BlueSky Education

Thursday, 1 October 2020

CO₂ and greenhouse gas emissions are one of the world's most pressing challenges. The transportation sector represents almost a quarter of Europe's greenhouse gas emissions, but shifting to more sustainable transportation is challenging. To combat this researchers from Rotterdam School of Management, Erasmus University (RSM) and from Tilburg School of Economics and Management have developed a new powerful customized algorithm providing cost-efficient operational decisions, encouraging the use of sustainable transportation, and helping businesses cope with customers who demand on-time deliveries.

Synchronizing rail and road shipments calls for the development of a new generation of algorithms that can deliver fast, cost-efficient support to decision makers. In their recent paper, Dr Ioannis Fragkos and Prof. Rob Zuidwijk from Rotterdam School of Management, Erasmus University (RSM) and Dr Joris Wagenaar from Tilburg School of Economics and Management develop a way to navigate this challenge.

"Transportation services need to deal with an increasing customer demand, stricter requirements for on-time delivery, disruptions and travel delays and an urge to become more sustainable. Companies try to address some of these requirements by taking kilometres off the road, thereby switching to more sustainable modes of transportation, for example rail, but such a transition has been slow and challenging," says Dr Ioannis Fragkos.

The researchers suggest a mathematical model that captures the complexity of these operations, taking into account travel disruptions, customer delivery requirements, scheduled rail and road shipments while minimizing the corresponding costs. The challenge could not be solved with existing approaches, so it's a state-of-the-art procedure.

They show that by having customers with varying levels of delivery requirements it is possible to accommodate requirements for timely deliveries. When such requirements are extremely strict, the inflexibility carries a disproportionate impact on the cost, as it calls for the deployment of more transportation resources.

The model is benchmarked against other conventional approaches and it generates significantly more cost-efficient alternatives.

Perhaps surprisingly, they found that having many customers with relatively strict on-time delivery requirements is not always a problem: their co-existence with more flexible customers gives the overall schedule an immunity over delayed deliveries. However, even a small number of extremely demanding customers can lead to a disproportionate increase of operational costs, because additional resources need to be committed for them in advance, in case major disruptions occur.

Third-party-logistics professionals manage complex operations that require disciplined day-to-day planning and mid-term capacity planning that carries significant costs. This research lays the methodological foundations for a new generation of decision support systems that will be able to accommodate complexities. The insights regarding the influence of on-time delivery requirements on cost

is invaluable for professionals who want to be as efficient as possible.

/ENDS

For more information, to speak to the researchers, or for the research paper, contact Kate Mowbray at BlueSky PR on Kate@bluesky-pr.com or call +44 (0) 1582 790701