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CENTRE FOR TRANSPORTATION AND LOGISTICS

Quarterly Newsletter

► CTL Faculty Research Spotlight

Addressing EV fleet operational challenges

The global EV market is expected to grow over four-times to reach an estimated global market size of about one trillion U.S. dollars by 2026. While there are over 6.7 million plug-in light EV units in usage globally, the adoption is still believed to be at initial stages and several technical and infrastructural challenges such as limited range and durability of the vehicles, shortage of charging stations and unavailability of the reliable electricity, limits its usage.

CTL faculty Prof. Sriram Sankarnarayan has developed an optimization model to minimize the EV operational costs. The research project uses Bilevel conic optimization and multi-objective optimization to find a balance between the electricity cost and travel time. The projects provide an insight on the optimal routing and charging strategies of the electrified transportation fleet, and can support power networks to reduce nodal prices via demand response. The research provides a decision support system to evaluate the adoption of EV fleet and promotes faster electrification of transportation fleet along with reduced carbon emissions.



Find out more at [Click Here](#) [Click Here](#)

Locating facilities with risk considerations



The COVID-19 pandemic has highlighted the geopolitical risks as one of the major risks faced by the supply chain stakeholders. The geopolitical risks get exacerbated due to wars, civil unrest or due to protectionism policy of the countries involved in global supply chains. The location of the manufacturing facility and distribution hubs play a major role in mitigating the risk due to geopolitics. Other risks include exposure to natural disasters. Such risks can be mitigated using robust location of facilities and leveraging information flows in supply chain such as visibility to inventory positions and delivery status.

Our CTL faculty, Prof. Sachin Jayaswal, focuses on solving the facility location problem with economies and dis-economies of scale. The project explores bi-level formulations and their operation up to a point and dis-economies of scale beyond that point. The another critical part of any supply chain is the network of distribution centres and the hubs. These factors play a critical role in mitigating the risks involved in the value chain. The project investigates a hub network design problem arising in the context of a third-party logistics (3PL) service provider, which acts as an intermediary between shippers and carriers. Further, the model considers different classes of shipments that require different levels of service. One of the noteworthy discoveries of this study, which is counter-intuitive, is that providing priority service to a bigger part of the customer base does not always come at a cost. Instead, it could even lower the cost.

Vehicle routing with time considerations

Slotted e-commerce deliveries where multiple orders can be delivered in a time window is here to stay. The route optimization ensures that the company meets the promised delivery times with minimal delivery attempts, better vehicle utilization and hence, enhancing end consumer experience.

Our CTL faculty, Prof. Prahalad Venkateshan, focuses on the reverse logistics aspect of the last mile delivery using a symmetric vehicle routing formulation with simultaneous pickup and deliveries. The project has led to discovery of more effective and efficient solving difficult problems where vehicles are required to not only deliver items from a warehouse to different customers, but also pickup items from the same customer locations to bring back to the warehouse. These challenges are crucial to managing e-commerce returns, gas cylinder deliveries/pickups from a different client sites, bottled drinks deliveries/pickups from retail establishments, amongst others.



Find out more at [Click Here](#)

Managing congestion at ports



With trade imbalance and resource crisis at the ports, managing traffic at the landside of container ports has become a significant concern. Containers arriving or departing by trains, barges or trucks are handled on the landside of a container terminal. Multiple trains and several thousand external trucks are handled daily at the ports. One of the issues pertaining specifically to the Los Angeles Port was the service of external trucks which were subjected to significant delays. What leads to the container handling delays and how resource flexibility can be leveraged to mitigate delays?

Our CTL faculty, Prof. Debjit Roy leads projects to address the congestion at the container terminals (landside and seaside). These models can be adopted to analyse the terminal performance trade-offs rapidly. The insights gathered from this project reveals that at the landside, internal congestion could be accounted due to the shortage of chassis but also interaction and sharing of resources between train and external truck containers matter. Using a stochastic stylised semi-open queuing network model with bulk arrivals (of containers on trains), shared stack crane resources, and multi-class containers, the research examined the effects of container handling priority on such delays. The findings demonstrate that external truck container handling times at shared stack cranes may be greatly reduced when compared to linked versus decoupled transport vehicles.

Find out more at [Click Here](#)

Facilitating car-to-transit switches among aspirational urbanites

As planners and policymakers in cities around the world struggle to attract and retain public transit users, our CTL faculty, Prof. Sandip Chakrabarti explores strategies to promote transit adoption in contexts where the odds are stacked against transit. This study examines the preference for intra-urban (metro) rail over personal car for commute trips within a particular population sub-group that is rapidly adopting the personal car and leaving the transit market using travel behaviour data from India's National Capital Region, one of the world's most congested metropolitan areas that is experiencing unprecedented growth in personal vehicle ownership and plummeting transit ridership. The objective of this mode choice analysis that employs both logistic regression modeling and the propensity-score matching technique is to identify multi-modal service quality/performance factors that determine metro rail vs. car choice, and thereby recommend efficient and effective interventions for inducing car-to-transit switches in addition to retaining existing transit riders. According to the findings, metro rail may be preferred over a car in the study setting if its journey times are more competitive with those of a car (especially for long-distance commuters), it operates more frequently, it is safer, and the cost of parking at the destination is increased.



Find out more at [Click Here](#)

► Planned Events

Practitioner Webinar
The semiconductor Chip Shortage: What caused the supply crunch and how do firms navigate the situation?
5th July, 2022 4:00 P.M IST

Centre for Transportation and Logistics
Practitioner Webinar on
The Semiconductor Chip Shortage :
What caused the supply crunch and how do firms navigate the situation?
July 5, 2022 4:00 pm IST
Dr. Christian Schuh
Managing Director and Senior Partner
Boston Consulting Group, Vienna
CTL Lead Member
ICD's Operations and T&T Practice Area
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The semiconductor industry is going through a tough phase where chip shortages are expected to continue throughout 2022, especially for Analog, Logic and MEMS. Fabrication plants (fabs) already running at 100% capacity, so no supply increase expected until late 2022 and backlogs are increasing as part of the demand is unmet. BCG defines supply chain resilience as the capacity of a company to absorb stress, to recover critical functionality and to thrive in altered circumstances. At a high level, we see six factors driving resilience:

- Anticipate and prepare for worst case scenarios would require that you learn from the past
- Create different types of capabilities to respond to a crisis
- Connect with the broader system to provide external buffer
- Hold excess capacity and resources to buffer shocks
- Organize in loosely linked modules to isolate impact
- Build capability to respond quickly to changes

In the webinar, Dr Christian Schuh elaborated on various aspects of semiconductor chip shortage, and the resilience of firms to handle such a situation. He mentioned how to identify risks and what institutional framework is to be set up to systematically capture signs and ensure that actions are taken swiftly.

Dr Christian Schuh mentioned about 50+ points of high geographical concentration across the supply chain of semiconductor players focus on different node sizes and firms need to develop a decent understanding of node, applicability, and cost. Dr. Christian Schuh is a Managing Director and Senior Partner in the Vienna office of the Boston Consulting Group.

9th International Workshop on Sustainable Road Freight
12th-14th December 2022

The 9th International Workshop on Sustainable Road Freight will be held online from the 12th to the 14th of December 2022. The need for a swift switch to net zero freight transport networks is now widely acknowledged. However, it's yet unclear which of the competing low-carbon propulsion technologies would take the lead and how logistical strategies would need to change to support their widespread adoption. This year's workshop will focus on resilient transitions to net zero freight transport systems.



Download The Workshop Flyer Here

Find out more at [Click Here](#)

