Insights for Enhancing Urban Freight Accessibility

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Logistics is a pivotal element for economic activities and life in metropolitan areas. Serving as a facilitator, freight transportation connects supply and demand in a dynamic market. However, this facilitation comes at cost, with freight transportation being one of the largest contributors of greenhouse gas emissions. Beyond the inherent features of logistical systems, other factors including escalating urbanization rates, the rise of e-commerce, and the demand for quicker deliveries, have substantially impacted carriers' business models. E-commerce has shifted the focus of freight trips from commercial establishments to households. This shift poses challenges for carriers to efficiently consolidate cargo, leading to additional freight trips and higher vehicle-kilometers traveled. Moreover, the rise of e-commerce poses challenges to traditional retail, which can impact accessibility to goods in urban areas. In this context, the goal of this presentation is to contribute to discussions surrounding logistics considerations within the framework of the 15-minute city concept.

Firstly, we would like to discuss accessibility within the supply chain. Supply chains are complex systems that encompass multiple levels, involving the transportation of goods from farms or manufacturing plants to warehouses and subsequently to retail businesses or to consumers households in the case of e-commerce. Each level, or echelon, entails interactions among three essential stakeholders: shippers, carriers, and receivers (Beckers et al., 2022). In the pursuit of sustainability, the concept of compact supply chains arises as a way of reducing the distance, time, and resources required to move goods between supply chain agents (Rivera-Gonzalez et al., 2023). In this context, the goal of this research is to foster more compact supply chains by presenting a freight accessibility framework that concentrates on capturing the dynamics within an echelon of the supply chain. Specifically, this research pioneers the analysis of urban freight accessibility from the perspective of shippers, quantifying accessibility metrics based on the opportunities—deliveries to receivers—available to them and the travel impedance—distance and time—required to reach these opportunities.

For that end, two accessibility metrics, isochrone-based accessibility (measuring deliveries within a set time window) and potential accessibility are used. Potential accessibility (Hansen, 1959) computes the accessibility of a zone *i* in relation to all zones within a study area. In this case, if a shipper is located on zone *i*, the metric measures their accessibility to delivery opportunities located across the other zones weighted by the impedance of travel to each zone. A study case in New York City sheds light into the importance of land use policies that consider freight needs, and into demand manage strategies that aim to shift the time of deliveries to avoid peak business hours congestion.

Secondly, we would like to discuss transport hubs as lever for accessibility and facilitators of logistics activities. Mobility hubs are a known strategy to promote accessibility by converging and

integrating different forms of passenger transportation. Transport hubs are a broader concept that integrate logistics activities into these facilities. For instance, beyond serving as passenger transportation purposes, transport hubs have the potential to serve as a logistical hub at the neighborhood level. They can serve as pick-up points, supported by the mobility infrastructure, and act as local transshipment points where other last-mile solutions can be implemented for the final segment of the journey. This way, carriers can concentrate efforts in a reduced network, increasing the opportunity for consolidation and decreasing the number of trips, thus fostering more compact supply chains. In essence, by integrating various transportation modes and extending their role to encompass logistics functions, these hubs emerge as vital components in enhancing freight accessibility within urban landscapes, promoting sustainability and efficiency.

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