Titolo: REVISE AND ENHANCE: WIN-WIN INSIGHTS FOR HOME DELIVERY SERVICES (REWIND)

Codice Progetto: 20229ZWC97

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Abstract del Progetto: The efficient transportation of goods is a major goal of Logistics Service Providers (LSPs). This is particularly evident in e-retail settings, which suffer from high last-mile delivery costs. The unprecedented growth of e-retail has amplified its transport-related negative externalities, e.g., emissions, traffic congestion, and noise. As a result, efficient and sustainable goods transportation is a central societal concern in urban areas.

Transport-related negative externalities are crucial in Attended Home Delivery (AHD) services (e.g., groceries and furniture delivery), where the LSP coordinates its visit to a customer within a time slot. In particular, when placing an order, the customer is offered aset of time slots and chooses one of them. Such coordination ensures serving the customer upon the first attempt, diminishes return visits, and enhances the customer's experience as orders are delivered at convenient moments. However, despite the active use of time slots in AHD, the same vehicle may have to visit the same street multiple times in a day to serve nearby customers who choose different time slots.

An ever-growing body of literature has been aiming at devising efficient vehicle distribution routes for time slot allocation and selection mechanisms. Several such contributions fall under the title of Dynamic Time Slot Management (DTSM). A key challenge of DTSM is offering a customer a set of time slots, in real-time, that are convenient for both the LSP and the customer. The complexity of such decisions is mainly due to not knowing the location and demand of future customers. Our project complements the DTSM setting by exploring two innovative concepts.

Due to its dynamic nature, most DTSM literature investigates dynamic optimization problems. These are geared by producing results within a limited time (a fraction of a second). However, a few minutes may pass between two consecutive orders in many applications. Thus, we argue that adding a layer of optimization procedures to be performed between the arrival of two consecutive orders may greatly enhance the DTSM decisional processes. We call this concept "optimize-in-between". Another major assumption made in the DTSM literature entails that, once agreed upon, a time slot is never altered. We argue that while customers choose a single time slot, this may not be the only feasible option for them. To this end, in this project, we explore the concept of revising time slot decisions of past orders through several incentive schemes. We call this concept "revise-the-past".

By developing models and effective solution methods, this project exploits the flexibility entailed by the "optimize-in-between" and "revise-the-past" concepts in DTSM. Ultimately, by revising and enhancing decisions in AHD, REWIND (Revise and Enhance: Win-win INsights for home Delivery services) aims at providing insights and creating win-win situations for LPSs and their customers.

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