

Sustainability Assessment of Food Delivery with Last-Mile Delivery Droids, A Case Study at the European Commission's JRC Ispra Site

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Abstract : This paper presents the outcomes of the sustainability assessment of food delivery with a last-mile delivery service introduced in a real-world case study. The methodology used in the sustainability assessment integrates multi-criteria decision-making analysis, sustainability pillars, and scenario analysis to best reflect the conflicting needs of stakeholders involved in the last mile delivery system. The case study provides an application of the framework to the food delivery system of the Joint Research Centre of the European Commission where three alternative solutions were analyzed I) the existent state in which individuals frequent the local canteen or pick up their food, using their preferred mode of transport II) the hypothetical scenario in which individuals can only order their food using the delivery droid system III) a scenario in which the food delivery droid based system is introduced as a supplement to the current system. The environmental indices are calculated using a simulation study in which decision regarding the food delivery is predicted using a multinomial logit model. The vehicle dynamics model is used to predict the fuel consumption of the regular combustion engines vehicles used by the canteen goers and the electricity consumption of the droid. The sustainability assessment allows for the evaluation of the economic, environmental, and social aspects of food delivery, making it an apt input for policymakers. Moreover, the assessment is one of the first studies to investigate automated delivery droids, which could become a frequent addition to the urban landscape in the near future.

Keywords : innovations in transportation technologies, behavioural change and mobility, urban freight logistics, innovative transportation systems

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