Chapter 1
Sustainable Urban Logistics Planning for Izmir Through Comprehensive Analysis

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ABSTRACT

This study aims to develop urban logistics plan to increase its applicability by utilizing a sophisticated software tool which allowed one to effectively create urban logistic plan through testing alternative planning scenarios. The methodological contribution of the study becomes evident in the sections of establishing generation-attraction models with discrete data, scenario definition, and development of production-testing methods. The model is applied to develop the urban logistics model for İzmir. The main objective is to organize the logistics system operating in the base case of İzmir, to propose new systems and to develop applications that closely follow the technology. In line with this goal, comprehensive multidimensional studies covering the whole of İzmir have been carried out. The study may contribute to successful development of urban logistics plans by providing a real case study.

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INTRODUCTION

The aim of urban logistics is to globally optimize logistics systems in the urban area. While doing this, it considers the benefits and costs to the private sector as well as the public. Since there are different segments affected in urban freight movements, many criteria are considered when evaluating urban logistics initiatives. Minimization of the cost or maximization of the profit are typical criteria for freight carriers and shippers. Minimization of NOx or CO2 emissions, reduction of noise level, reduction of car accidents can be considered as the main criteria for managers and residents. Within the scope of the study, sustainable urban logistics plan and management for the city of İzmir is discussed with the aim to reduce operating costs, increase efficiency in logistics operations and reduce environmental impacts (Lauenstein and Schank, 2022). A systematic approach has been preferred during the stages of the project. First the problems related to urban logistics in the city of İzmir are defined followed by the determination of objectives and associated criteria. A large working group consisting of experts and urban logistics stakeholders in the focus areas has been formed. It is ensured that the resources and constraints were considered when generating alternatives and determining the appropriate level of data collection and modeling. The logistics demand model has been calibrated with the available real data. The results were used to estimate the performance of the alternatives generated and to determine the future logistics supply and demand, and effects on the performance measures. As a result, with the evaluation of alternatives and a comprehensive participation model, Sustainable Logistics Plan was developed for the city of İzmir.

Many studies have been developed on estimating the intercity freight demand and the mode of transportation to which this demand is sent (Morton, 1970). Then, the issue of freight transportation started to develop with its own theories by separating from passenger transportation principles. Regarding the cargo, the first logistical distinguishing factor is the product type. Each product class has its own mode of transportation, cost and time. Miklius, Cassavant and Garrod (1976) focused on the transportation supply-demand forecasting of agricultural products. In the study, the elasticity of which transportation system will be preferred by mass apple transportation has been revealed. Railroad and truck types have been compared in vectorial and cross-elasticity probability, railroad transportation fee, truck transportation fee, rail travel time, truck travel time, and expected delay costs for both types have been evaluated as model parameters. Logistics system modeling has its own dynamics, product diversity, macroeconomics, company management, etc. In this sense, the factors affecting freight transportation are divided into three main components by Roberts (1977). In the field of demand forecasting modeling, these factors are; The aggregation, which mentions that the effects of space-time, freight type and transport mode should be considered separately, is the reliability of the model with policy parameters such as waiting time, travel time, reliability, probability of loss and damage, minimum capacity, transportation fee and other fees for decision makers (Firdausiyah et al. 2019). Young et al. (1983) mentioned state elimination processes and general selection models in load bearing variant distinction. The general election model is divided into decision-making characteristics and system characteristics. After the elimination processes of the characteristic parameters, the possibility of selection is mentioned. The issues that operators need to optimize for freight transport are more detailed than passenger transport. These issues may be defined such as duration, reliability, capacity, frequency. A company may be ambitious about travel time, but unpretentious about pay. Or, while it is sufficient in terms of price, it may not be preferred in terms of reliability.

In urban freight mobility planning processes, developments such as “The introduction of the White Paper” (1977) have helped to achieve political goals in transportation (European Commission, 2011).