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Urban freight terminals: A sustainability cross-case analysis

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Abstract

The purpose of this paper is to present a comparative analysis of two urban intermodal freight transport terminals focusing on last mile distribution; the port of Thessaloniki (ThPA) and Kuehne + Nagel (K+N) distribution center. The paper enables the pairwise comparison of different intermodal freight transport nodes acting as interchanges in a supply chain with a special focus on the last mile distribution. The final "product" of the analysis is the creation of an auxiliary or subsidiary tool to potential decision makers (e.g. shippers, forwarders, transport companies etc. users or customers of the two terminals within the supply chain). The evaluation of the terminals' performance is elaborated based on a tailored multi criteria key performance indicator KPI-based assessment framework, while the selection and significance (weight) of the incorporated criteria and KPI's is predetermined by the involved stakeholders imposing their point of view through an analytical hierarchy method. ThPA terminal ranked first according to its performance pertaining to the role of an intermodal interchange, however K+N terminal's performance index was slightly lower, while in several KPIs and criteria it seemed to perform better.

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1. Introduction

Taniguchi et al. (1999) define city logistics as "the process for totally optimizing the logistics and transport activities by private companies in urban areas while considering the traffic environment, the traffic congestion and energy consumption within the framework of a market economy".

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The first organized freight activities and related facilities focusing on city logistics were established in the context of urban areas in the 1960's. Due to urbanization trends prevailing during that time, the first freight and logistics terminals were set up as consolidation and distribution points inside the urban web in order to satisfy the continuously growing demand generated nearby. These patterns of increasing activity have been shaped since late 1970's and created significant demand for goods. During the next two or three decades, given the urban sprawl and the creation of metropolitan areas with increased congestion and spatial problems emerging, many of those facilities were established near or just outside cities. In the 2000's, the modernization of city distribution techniques, namely the on-line delivery, created the need for individual and personalized trips in the context of last mile delivery service, increasing the traffic and environmental burden. Lately, the economic recession and the continuously growing city's web attracting all business activities have reversed the decentralization efforts made from the side of the government and the local authorities favouring urbanism once again. Urban areas have been plagued by the impacts of the ongoing economic crisis to a great extent and this has resulted in changes in the urbanization trends.

Transport demand resilience for a given population and supply system depends on the level of provided services, which is correlated with the innovative, smart and integrated ICT and city logistics solutions used for freight assignment or during the diffusion of related data and information (BESTUFS, 2015). It is believed that the twenty-first century will be a century of urbanization, since growing cities attract people due to the fact that more educational and leisure activities take place and there are more opportunities in creating new jobs. To this end, the problem of the supply of goods within urban context gained importance and, in turn, city logistics have proven as a great challenge. That is why the European Commission's interest is focused on the promotion and funding of sustainable urban mobility plans incorporating all freight activities which coexist and co-act with passenger transport within the same transportation network, resulting mainly in traffic problems and environmental impact deteriorating the citizens' quality of life.

Cities face adverse impacts and so countermeasures have been introduced in order to improve the urban working and living environment. Noise nuisance, land use restrictions, increased freight trips and respective environmental impacts have caused the shifting of logistics facilities and the mitigation of their activities to exurban areas (Diziain et al., 2012). The issue of urban sprawl for economic activities and especially logistics is not new; historically, the location of logistics terminals was close to adjacent rail networks. Today, those terminals tend also to locate as close as possible to highway networks, airport areas (Rodrigue, 2004; Woudsma et al., 2007), and especially ports, the role of which is not restricted anymore only to the transhipment point for freight, but is extended to various roles within the supply chain (Mangan et al., 2008).

The performance of freight terminals relies on the performance of multiple processes that are undertaken within these areas. The role and performance of interurban freight terminals affect the performance of urban distribution to a great extent, most often determining the city logistics' system structure. Regarding freight terminals that are located in the suburban and interurban areas, they play a critical role in the goods' distribution to the nearby cities as well. The freight assignments are organized in freight terminals in order for the goods to be forwarded to regional destinations more efficiently. In consolidation centres different shippers and transport and logistics service providers co-operate and intermodal terminals exploit the benefits of long distance transportation (e.g. maritime, rail) and last mile delivery (trucks), in a seamless way. Higher load factor of trucks, less traffic congestion and less environmental emissions are achieved (De Souza et al, 2014).

2. The urban freight terminals

The aim of this paper is to develop and demonstrate the assessment of the performance of two intermodal freight and logistics terminals, using a multi-criteria approach which takes into account most parameters concerning the wider supply chain and facilitates the decision-making process in the optimum terminal selection. The methodology is implemented in two terminals in Greece, a privately operated rail-road freight terminal, and the Port of Thessaloniki. A short profile of the two freight terminals is given below:

1) The private terminal is an inland intermodal freight terminal, managed and operated by a logistics service provider and forwarding company (Kuehne+Nagel), which imports and exports goods to/from Greece using the railway network from South-Eastern Europe to Central Europe. The cargo that arrives at the freight terminal by train is then consolidated, organized and/or stored in the warehouse facility.

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