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## Evaluation of Urban Consolidation Centers: A Methodological Framework

Michael A. Gogas \*, Eftihia Nathanail

*University of Thessaly, Traffic Transportation and Logistics Laboratory (TLog) Pedion Areos, 38334, Volos, Greece*

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### Abstract

Over the last decade, the focus in the domain of freight transport has been set on the investigation of ways to eliminate time and cost in last mile delivery, while continuously upgrading the level of provided services, promoting a number of innovative logistics solutions. One of the most important issues is the optimization of the interconnection amongst the interurban and urban sections of the supply chain, where the role of the Freight Transport Interchanges (i.e. Freight Centers) has been fundamental. The key issue is three fold and the optimum solution lies between: a) the selection of the most appropriate location for the establishment of each facility, b) the identification of the facility's attributes that should match the interest area's needs and c) the evaluation of the concept as considered to be part of the local policies and measures promoted or planned for the area of interest. The answer to the afore mentioned issues is provided through a two level approach incorporating the development of two discrete, but successive decision making supportive evaluation tools: a methodological approach to provide a solution to the facility location problem for Freight Centers and an integrated evaluation framework used for the assessment of the operation of the specific Freight Center category, the Urban Consolidation Centers (UCC). Both methodological frameworks are based on selected performance indicators, incorporating divergent stakeholders' interests considering conflicting business models and operations.

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\* Corresponding author.

*E-mail address:* [mikegogas@uth.gr](mailto:mikegogas@uth.gr)

## 1. Introduction

The burdening of the urban environment is highlighted by the fact that over 50% of the world population lives in cities (in Europe it is more than 75%), with this percentage expected to reach 70% worldwide by 2050. The freight transport interchanges have been developing during the last five or six decades, with view to better coordinate the continuously increasing freight flows. Especially during the last two or three decades, there has been a considerable increase in the freight transport needs in both interurban and urban context, resulting in deep impact on human and natural environment. In most of the cases, the seamless movement of cargo throughout the whole supply chain and the interconnection of interurban and urban transportation networks are accomplished through the establishment and operation of intermodal freight transport interchanges, the Freight Centers or just hubs. Starting from France in the sixties as small warehouses, today they constitute integrated, multi-tasking, multi-modal and multi-stakeholder facilities. Through the years, the Freight Centers have evolved and been modified both as per their orientation, from local to regional, national, international or global and as per their type, incorporating freight transport activities together with commercial, socio-economic and business aspects (BESTUFS, 2008; European Commission, 2014; United Nations, 2014, Gogas *et al.*, 2010, Gogas *et al.*, 2014, Gogas *et al.*, 2016).

A great number of attempts towards the determination of Freight Center typology and categorization have been elaborated within the past two or three decades. Today, according to their operational profile and their location, the Freight Centers are classified in four (4) discrete categories (Visser *et al.*, 1999; Reform, 2005; IMONODE, 2005; Nathanail, 2007; Wisetjindawat, 2010): Business grouping development areas or City Terminals, Freight Villages, Industrial and logistics parks, Special logistics areas.

As far as the classification of Freight Centers according to their size (determined by the total space engaged by their infrastructure) is concerned, there are Freight Centers characterized as (Reform and IMONODE projects, 2005) small sized (up to 50 000m<sup>2</sup>), medium sized (from 50 000m<sup>2</sup> to 500 000m<sup>2</sup>) and big sized (over 500 000m<sup>2</sup>). The property status, administration, management and operation of the Freight Centers is either public issue (regional, public or national authorities, port authorities etc.) or private issue (transport companies or associations, logistics providers, infrastructure providers etc.), but within the last two decades, the model of Public Private Partnership seems to be prevailing. In any case, the performance of freight terminals relies on the performance of multiple processes that are undertaken within these areas. The role and performance of terminals that are located in the outskirts of the cities, such as city terminals, affect the performance of urban distribution to a large extent and consequently determine the structure of city logistics (Europlatforms, 2016).

This paper is focused on a specific category of Freight Centers, the Urban Consolidation Centers (UCCs), categorized as City Terminals, i.e. large facilities usually located within the suburban area of big cities and their role is the infrastructural, operational and service optimization of the interconnection of the interurban and urban sections of the supply chain. In UCCs the intercity cargo is assembled and appropriately grouped in order to be forwarded for last mile distribution. A UCC is best described as a logistics facility that is situated in relatively close proximity to the geographic area that it serves, be that a city center, an entire town or a specific site (e.g. shopping center), from which consolidated deliveries are carried out within that area. A range of other value-added logistics and retail services can also be provided at the UCC. Broadly speaking the key purpose identified for UCCs is the avoidance of the need for vehicles to deliver part loads into urban centers or other large developments. This objective can be achieved by providing facilities whereby deliveries can be consolidated for subsequent delivery into the area in an appropriate vehicle with a high level of load utilization (Browne *et al.*, 2005).

The UCCs play a key role with the supply chain, as they constitute the nodal points where the cargo assembled is transhipped from large and polluting heavy good vehicles (HGVs) and freight transport units, to smaller, cleaner – environmental friendly and more flexible ones performing the last mile distribution in urban areas, in order to protect urban and restricted areas from traffic congestion and impact on environment, safety and quality of life. Such city logistics techniques, although it may seem cost and time consuming, have been proved to be cost effective, traffic alleviating and environmental preserving (Grimm *et al.*, 2008; Janjevic *et al.*, 2013; Janjevic, 2015).

Incorporated within the most common Urban Freight Transport (UFT) policies and measures worldwide, the UCC is believed that it contributes to the upgrading of the local urban economy, mobility, sustainability and livability. The UCC concept is included amongst the most popular measures that have a consolidation aspect, i.e. the bundling of goods in order to increase the load factors and therefore decrease the number of necessary journeys

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