

City Logistics: Analyzing the impact of different public policies in the Oporto city

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ABSTRACT

This research aims to help in establishing new legislative directives by testing their impact both on the company profits and on the life of city residents. A case study is developed and conducted in collaboration with the city hall and with eight companies (four freight transport companies and four retailer companies). The impacts are computed by simulating the companies operation under the new legislation and the new routes are used to analyze the impacts on the city traffic, noise, and congestion.

Categories and Subject Descriptors

H.4.2 [Information systems applications]: Types of systems – Logistics.

General Terms

Management, Economics

Keywords

City Logistics, Urban Freight Transport, Transportation, Logistics.

1. INTRODUCTION

The transport of the goods and passengers into and from the cities is a major enabling factor for most economic and social activities that take place in the urban areas and it is reaching its capacity limit [3]. Due to the increase of traffic related to the transportation of passengers and goods, the levels of congestion, energy consumption, noise and pollution

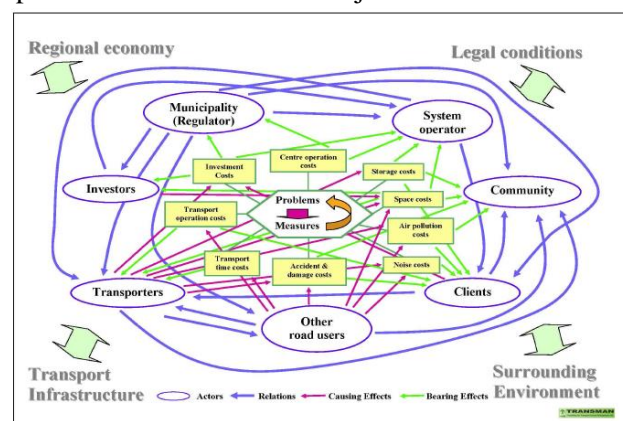
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in the urban areas are rising. The problems associated with such a situation are usually known as City Logistics (CL). The most common definition of CL, although several exist, is “the process for totally optimizing the logistics and transport activities by private companies in urban areas while considering the traffic environment, the traffic congestion and energy consumption within the framework of a market economy”[13].

2. LITERATURE REVIEW

Several studies have been performed in CL, in them many measures have been tried, mainly for the urban freight transport, aiming at reducing the negative effects produced by commercial vehicles moving within the urban and metropolitan area. Various initiatives have been implemented in different cities across the world, for example in London, Yokohama, Paris, Lyon, and La Rochelle. In here, and due to the space limitations we mention just a few.



Holguín-Veras [5] discuss a framework for comprehensive modeling freight movements, including the producer, the carrier, the customer, and the government. Crainic et al. [2] uses an

organizational and technological framework for the integrated management of urban freight transportation at the city of Rome.

The analysis of the impact of policy measures provides important information regarding the choice of policies to be implemented. Several measures have been tested, see e.g.[7]. Sathye et al. [12] studied the unintended effects, such as CO2 emissions resulting from load consolidation and changes in load factors. Russo and Comi [11] develop a model that allows for the simulation of possible choices of each decision-maker involved by assessing their impacts. Browne and Allen [1] illustrate the environmental impacts caused by freight in a large city, by studying the particular case of London. Taniguchi [14] discusses a cooperative delivery system with a consolidation centre that has been implemented in Motomachi Shopping Street (Yokohama).

Another study [9], this time in Utrecht, has experimented the following three ideas: low emission Zones; consolidation by means of city logistic services; new or alternative vehicle usage. The obtained results show that all of them have a positive impact on the quality of life of residents (CO2, noise) and in addition lead to cost savings. At Paris, Raimbault et al. [10] compares the spatial logics of three logistics locations in the region and concludes that controlling logistics locations is becoming an aim for spatial planning at the metropolitan scale.

The creation of an urban consolidation center (UCC) together with a cooperative freight transport is another measure that leads to traffic reduction within the city. Usually, these UCC are located outside the city. There are several studies using UCCs, see for example [8], where Nemoto presents a mathematical model that allows for the calculation of the costs and benefits to all parties involved, for the UCC in Tenjin. Kohler [6] analyzes a UCC facility in Kassel and concludes that although there is a reduction in the total traveled distance, the reduction within the central business district is marginal. Foster [4] studied the impact of the UCC implemented by the British Airports Authority at Heathrow Airport. The results

obtained indicate a reduction in the number of vehicles travelling to terminals and in the mileage traveled, faster deliveries, and thus potential cost savings.

Criteria	Objective	Indicator	Source	Measurement
Life quality	Emissions reduction	-noise -air quality -CO2 -traffic volume -accidents	-field study -local authority -police	-modeling, measurements -traffic counts -literature research
Economic development	Economic development	-Commercial floor space -number of visitors	-local authorities -offices, real state	-statistics -questionnaire study
Accessibility	Improving accessibility	-vehicle-km -travel time -number of obstacles	-carriers -drivers -field study -police	-questionnaire study -traffic counts
Transport efficiency	Improving vehicle load factors	-average load factor of vehicles -fuel consumption per unit	-operators	-study

3. METHODOLOGICAL APPROACH

3.1 Research model

We aim to help the legislator to develop in a more informed and collaborative way new legislation. In order to do so, the impact on the company's operation costs and on the quality of life (noise, traffic, pollution emission, etc.) in the city center will be analyzed for several different legislative. While the former will be measured within the companies and with their collaboration, the latter will be addressed in collaboration with the city hall. The initiatives to be considered come from the literature and also from the local authorities. Examples are: promoting/forcing a shared single carrier within the city limits; tighten pollution limits, impose further traffic or load factor constraints; special licenses (e.g. Express courier), promote pollution penalties/allowances.

Study, with the company's collaboration, alternatives courses of action to be taken in order to cope with possible future changes in legislation: acquire a central facility within the city center (UCC); cooperative freight transport; other possibilities will be discussed with the companies.

The impacts on the operating costs as well as on life quality measures will be computed by recalculating the needed vehicle fleet and well as its use. In order to do so, the software being used by the companies collaborating in this study will be used, as well as

their data, i.e. amounts to be delivered when and where.

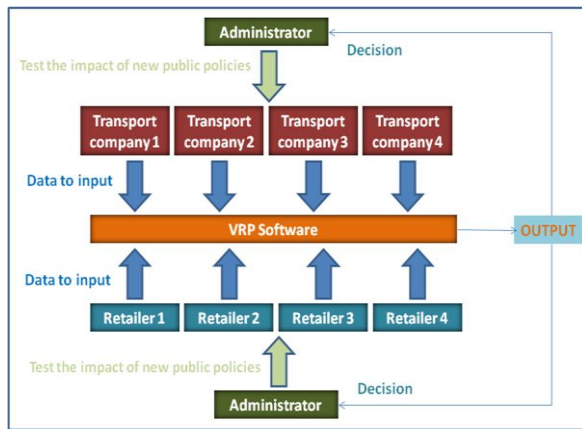


Figure 1. Methodology diagram.

Possible structural changes are the acquisition of a central facility within the city (UCC), the creation of a single carrier through the cooperative operation of the freight companies, possible acquisition of vehicles, amongst others.

Regarding the administrator, possible scenarios involve imposing new legislative directives or tightened existing ones, as well as imposing additional constraints to traffic within the city limits such as promoting/forcing a shared single carrier, forcing the use of commercial vehicles with low CO2 emissions; create load factor constraints for vehicles entering the city; special licenses, additional time limits for entering the city or parking for loading and unloading, pollution allowances, etc. In addition, we also explore possible benefits to be given to the companies, such as tax discounts.

4. CONCLUSION

We expect to contribute to knowledge in CL and particularly to the best practices of the city of Oporto. This is to be accomplished by contributing with new measures, policies and legislation and by analyzing their impact on the companies operations as well as on the quality of life of the population.

Thus, the main research questions to be addressed are:

RQ1: What are the most important issues to be addressed and how they can be fostered through new policies and legislation?

RQ2: What is the impact on the quality of life, mainly regarding pollution and traffic, due to new policies?

RQ3: What is the impact of such policies on the operations and profit of freight companies operating within the city?

RQ4: What freight transport companies (structural changes in their activity) do to minimize the impacts of new tightened public policies?

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