FINANCING CITY LOGISTICS SOLUTIONS WITH FOCUS ON BELGRADE

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Abstract: *The paper analyzes the issues of financing City Logistics solutions pointing out the complexity of evaluation models due to the presence of multiple objectives and multiple stakeholders. Evaluation models of City Logistics require the application of cost benefit analysis and multidisciplinary approaches. The proposed City Logistics solutions for Beograd are given special attention, especially regarding their choices and methods of finance.*

Keywords: *City Logistics, economic and financial evaluation, main issues in financing City Logistics, financing City Logistics solutions for Belgrade.*

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1. INTRODUCTION

Transport and socio-economic development are closely related and mutually interdependent since the Industrial revolution in the 19th century up to the time of the current globalization of trade, supply chains and economic integration on a world scale. Transport systems enable and accelerate economic processes, however producing negative external effects such as congestion, accidents and mobility gaps. Finding optimal solutions from the point of view of further economic and social development and transport systems is one of the priorities of national and regional economic and transport policies of the last decades. These efforts have contributed to the formation of the strategy of sustainable development.

City Logistics have the goal of achieving the overall optimization of freight transportation. This means that it tends to attain an optimum from the socio-economic, transport, land use, customer satisfaction and environmental aspects or, in short, sustainable urban development. This is not an easy goal at all. This needs a multidisciplinary scientific approach in creating models of City Logistics.

In this paper we wish to point out the phases through which city logistics projects should pass in order to enable competent methods of choosing and deciding on projects from the aspect of their financing. The presence of multiple stakeholders is obvious.. Multiple goals and multiple stakeholders in City Logistics as compared to other transport infrastructure projects results in a complex evaluation process and a complicated procedure of adopting policies.

There are three important components relating to freight transport: (i) economic growth, (ii) demand for freight transport and (iii) impacts on congestion and environment [1]. Transportation of goods represents a vital factor of the economic and social being of the city both from the point of view of the citizen as users and the firms established within the city zone. Freight transportation is also a major distributing factor for urban life [2].

The support of freight as an urban activity relies on distribution strategies, including modal choice, that insure an adequate level of service, so that providers of City Logistics are able to meet the needs of their customers. The urban freight distribution center can be a neutral facility interfacing with a set of distribution centers, each being connected to their respective supply chains. In this way a wide array of supply chains connected to the city can achieve a better distributional efficiency within the central city. Each city represents a unique setting with its own prevalence of transport infrastructure and modal choice, therefore appears to be no single encompassing strategy to improve urban freight distribution, but a set of strategies reflecting challenges that are rather unique for each city.

2. MAIN ISSUES IN FINANCING CITY LOGISTICS

In 1992 Ogden pointed out that City Logistics has the overall objective to reduce the total social cost of urban goods movement. He further divides this overall objective in six specific objectives: (i) economic; (ii) efficiency; (iii) road-safety; (iv) environment; (v) infrastructure & management; and (vi) urban structure [3]. There are two different groups who are capable of changing the urban freight system. One is company-driven change where companies implement measures that will reduce the impact of their freight activities operating in a more environmentally or socially efficient manner. Second, changes implemented by governing bodies, i.e. the introduction of policies and measures that force companies to change their actions and thereby become more environmentally or socially efficient (e.g. changing the way in which they undertake certain activities).

The complexity of the City Logistics domain is also considerably due to its emergence phenomenon which appears when a number of stakeholders operates and forms complex behaviour as a collective.

The number of interactions between components of a system increases combinatorially with the number of stakeholders, thus potentially allowing for many new and subtle types of behaviour to emerge. Multiple actors' perspective refers to analyzing interactions of autonomous stakeholders with a view to assessing their effects on the system as a whole.

City Logistics initiatives are usually operated by private companies with varying degrees of support provided by the public sector. To put into effect the full potential of city logistics initiatives, it is, therefore, crucial that an effective partnership between both the private and public sector be developed and maintained. City Logistics concepts aim at the integration of different perspectives of particular stakeholders. The most important stakeholders are as follows [4]:

- Shippers who send goods to other companies or persons and receive goods from them. They tend to maximize their levels of service in terms of costs and reliability of transport.
- City Logistics service providers who deliver goods to customers. Their objective is the minimization of their costs by more efficient pickup and delivery tours. They are expected to provide a high level of service at low costs.
- Residents who live, work, and shop in the city. They suffer from nuisances resulting from urban freight movements near their residential and retail areas. However, residents also benefit from efficient and reliable delivery.
- City administrators who attempt to enhance city economic development. They are interested in the reduction of congestion and environmental nuisances as well as in increasing safety of road traffic. They observe urban transportation systems as a whole in order to resolve conflicts between the other stakeholders.

City Logistics services providers depend on the interaction of stakeholders presented above. One solution could be for administrators to influence planning procedures by setting complex certain time slots that permit or prohibit the entrance of freight vehicles in pedestrian areas. Residents and shippers react to customers of City Logistics service providers expecting an economic and reliable delivery service.

Considerable numbers of the modeling efforts are carried out from the point of view of an administrator as a sole stakeholder of the City Logistics domain. Most of the literature on urban freight modeling sum up as to how an administrator can create efficient urban freight transportation without considering inputs from other active stakeholders. There are only a few models available in which all stakeholders and their influence in the urban freight domain are included. It would be worthwhile to investigate and incorporate the specifics of using decision methods in urban freight modeling by other stakeholders as well (i.e. shipper, carrier, receiver etc.).

The framework with more generic factors such as the objective, stakeholders' involvement, clusters of their activities and means available for achieving objectives are more determinative for carrying out urban freight modeling. In this way the approach to urban freight policy which Visser has "Learning by doing", that is not effective many times, would be surpassed [5].

Models for providing finance for investment in City Logistics require a social and economic evaluation. In that respect Van Duin at the Fifth International Conference on City Logistics called the need for evaluation using cost benefit analysis (CBA) a "revival of the cost benefit analysis"[6]. CBA is a classical method for the evaluation of investment in transportation infrastructure because these projects have substantial external effects, i.e.

social effects. The Costs of these investments are considerable. The need to include a multistakeholder environment into CBA must be stressed. This is the way to find and optimal solution from the point of view of the stakeholders. As with all large investments a long term period should be used for the evaluation of City Logistics concepts. The evaluation of City Logistics projects using CBA is more complex and demanding as compared to transportation infrastructure investment.

Enhancing development of city logistics concepts contributes to the continuing enrichment of evaluation models. In other words, a financial feasibility study for City Logistics has to convince the investors of the financial efficiency of the project through adequate indicators: cost/benefit ratio, net present value, internal rate of return, recovery time, etc. An economic feasibility study for CL adds to the financial consequences the impact on customers, residents, society, that are not of direct interest to the private investor. Under conditions of uncertainty the preferences of the decision maker should be analyzed for a certain scenarios depending on his/her attitude towards risk [7]. The CBA can be complemented by a "cost efficacy analysis" (CEA) which reflects the manner in which the non-financial, social consequences of the project can be used to rank the decision scenarios. In sum, City Logistics projects require technical evaluation and also financial and economic evaluations. This means that an all encompassing evaluation procedures should be based on overall social costs and benefits.

Generally no major difficulties are encountered when it comes to the ranking of various technical solutions, but in the case of financial and more so the economic assessment of investment projects, controversies continue and stimulate debate between experts of different backgrounds (engineers, economists, sociologists, ecologists, lawyers). Although the two types of analysis (financial and economical) are based on different evaluations, they do have common elements. They both use the classical CBA. Even when the financial flows are determined, the calculation of the net present value (NPV) for a certain project is controversial. The controversies relate to the value of the discount rate (r) used in calculations and the length of the time period (T) over which the financial flows are summed [8].

3. FINANCING CITY LOGISTICS SOLUTIONS FOR BELGRADE

The existing problems of City Logistics, world experiences, demands for the alteration of urban plans primarily in the central city, property rights changes in economic system transitions and alterations in business plans, the vision of the role of Beograd in the logistics of the region, have all contributed to the defining of four concepts of City Logistics [9]:

CL1: Decentralized, a satellite system with the dominant role of road transport.
CL2: Centralized-decentralized system with the adoption of cargo trolley.
CL3: Core network with the adoption of cargo trolley and electrical vehicles.
CL4: Network system with intermodal transport.

Concept CL1 assumes a decentralized system of warehouses for goods on the rim of the city with a certain concentration of logistics systems in planned goods transport center (GTC) in Batajnica and the City Logistics terminal (CLT) in Ada Huja. Given the dominant role of road transport for the logistical needs of the central zone, satellite terminals with adequate infrastructure for cross-docking functions would be developed. The purpose of these terminals is the reloading of goods from larger to smaller delivery vehicles for supplying city zones. The Function of the CLT would be warehousing and distribution of goods by eco-vehicles mostly for the needs of the newly planned complex on the shore of the Danube. Aside of this the CLT would offer reverse logistics services and home delivery. The concept supports the development of small city terminals intended for a certain group of generators such as bars, restaurants and hotels or for certain location such as larger building sites. The aim is consolidated delivery, i.e. a smaller number of vehicles in the function of delivery.

Concept CL2 assumes the development of several CLTs on the rim of the central city zone. These centers aside of warehousing and consolidating the delivery of goods, would develop different VAL services, reverse logistics, home delivery, delivery to special zones for the delivery of goods (pickup points) etc. The transport of goods from farther locations GTC in Batajnica or warehouses on the rim of the central city zone to the closest CLTa would be by road transport, while cargo trolley would circulate between CLTs. The distribution of goods from the CLTs to the generator in the gravitational zone would be done primarily through the use of small and eco-supply vehicles.

Concept CL3 represents the beginning of a complex city logistics network with two GTCs on the rim of the city and four CLTs on the rim of the central city zone. The aim of the GTCs is the ceasation of long distance road flows, while the

purpose of the CLTs is the consolidated delivery of goods throughout the city. This concept assumes the use of railway transport between the GTCs and cargo trolley transport between the GTCs and corresponding CLTs. The system of cargo trolley is to be developed also within the central city zone but with the function of supplying delivery to special pickup points and reverse logistics. Between the cargo trolley stops and the generators, the flows would be carried out by pedestrian transport using roll pallets as transport units. In such a way the share of road cargo transport would be diminished in both the central city zone and the city as such.

Concept CL4 is aimed at the development and application of intermodal transport in CL. It assumes the formation of a network of different categories of logistical centers and heavier use of railroad transport in transport flows at the city level. At Ada Huja a CLT would be developed for the consolidated supply of generators in the gravitational zone along with a terminal for intermodal transport. These two systems have the possibility of connecting with other intermodal transport terminals at other locations by railroad with GTCs at the city rim by shuttle trains. This way a part of railroad infrastructure which passes through the central city zone would be retained but would strengthen the role of train transport in the efficient linking of city zones. From Ada Huja a circular cargo trolley line would be used for the flows between CLTs. The distribution of goods in the gravitational zone of CLTs would be done through the use of small supply eco-vehicles.

Each of the mentioned concepts has certain advantages and disadvantages and each requires the support of local governments in the planning and implementation and mostly of all in the defining of urban plans and regulation.

Financial structures and refunding mechanisms are wide subjects of research that have many direct applications and usages in urban transport, mainly in infrastructure and public transport planning. However, those subjects are much less common in urban logistics. This can be explained by the cohabitation and usually the conflicts between public planners and private operators. Public planners' aims are directly related to policy assessment, deployment and evaluation. Private operators goals deal mainly with carrier-based planning tactics and strategies. But, in any case, it is necessary to provide funds for investments, for both public and private entities.

There are four refunding approaches: (i) collective utility; (ii) users' refunding, and (iii) a wide variety of mixed approaches. Earlier it was considered that the first two approaches are in direct conflict, but the development of mixed approaches show that they can make a good combination and may improve the economic viability of a project [10].

Collective utility can be defined as the socio-economic interest that a project can bring to a society [11]. From the point of view of collective utility, the initial investments and operational costs are paid by public authorities. That means that financial resources have to come from the public through taxes, local or national, without any requested monetary return. To justify a public utility, an investment has to be approved as socio-economically viable. User's refunding strategies consist of making the user pay for benefiting from the system or the service, more precisely charging transport carriers, retailers and/or shippers a fee for using an urban logistics service.

In combined approaches in urban logistics, the main refunding systems are mixed because the investment costs are difficult to be refunded entirely. For that reason, public authorities accept to partially finance them, then to make them operational and economically viable.

The most common strategy is that of private funding with public intervention. In this case the public authority does not have an economic benefit with its financing contribution. Indeed, public bodies do not get refunded, but help private stakeholders to make the projects economically viable, assuming that the public utility justifies a partial collaboration in funding without asking for a return.

There are three main forms of public intervention [12]:

- Delegation is the way in which public authorities cover a part of the investments and give a private company the means to make a service. Sometimes, like in public transport, they cover a part of operational costs, in other cases they cover only the investments and give free usage of the structures, but the operational costs have to be covered by the private company.
- Subsidies represent economic assistance that does not need to be refunded. Such support can be direct or indirect. Direct subsidies are in general under public market regulations and follow a system of calls. Several public bodies propose direct subsidies: for example the European Commission via several support programs, each country national institutions, regional bodies, local bodies or non-governmental associations. Indirect

subsidies in indirect ways help to decrease some costs, for example price of real estate in the city central zone. Some experiences from several cities point out that this projects ceased operations once subsidies dried up.

- Public loans is the case of low interest credits to help the development of urban logistics systems. This economic assistance must be refunded back to the public authority but interests rate are in general indexed directly to inflation, so that they are more convenient that commercial loans.

Public Private Partnerships are popular in public transport. They are mentioned more and more in connection with City Logistics projects. A better and deeper knowledge of this financing model would dampen the scepticism regarding its application including in Beograd.

Only strong financial support, as for example a subsidy to cover investment costs, has a positive impact in stimulating system use and fee payment. In any case, such results need to be discussed with the concerned stakeholders, both public and private, in order to reach a consensus. To do this, further work to implement decision support tools will lead to the integration of multi-criteria methods into economic analysis.

4. CONCLUDING REMARKS

City logistics as an overall optimization process should be understood as one of the key components of urban sustainable development. Much work still has to be done on collecting the necessary data for acquiring the evaluation of models. City logistics solutions for Belgrade should discussed among all the involved stakeholders who are expected to find a "raison d'etre" to support, apply and finance them.

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