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Elaborating a city-logistic conception for the case of Budapest

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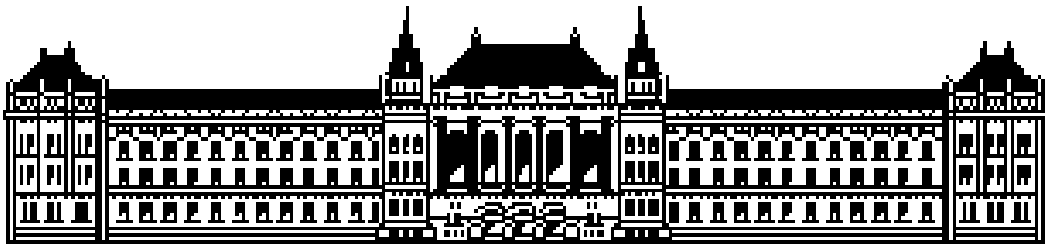
Abstract: *The volume of environment and life quality damaging road goods transport grows continuously in cities and in their surroundings all over Europe. The consequences, the more and more critical traffic and life conditions in urban regions make it unavoidable to develop and introduce new techniques when planning and organising supply chains in cities. This paper aims to give an overview of a possible city-logistic development strategy and the latest results of its practical application for the case of the Hungarian capital, Budapest.*

Key words: city-logistics, conceptual planning, logistic strategy

Section: Logistics and Economics in Transport and Telecommunications



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1. Methodology for establishing the city-logistic conception

According to the experiences of different national and international R&D programmes, pilot projects and testing procedures there aren't general/uniform solutions to solve the problems arising due to congestion and inappropriate traffic/transport organisation. However, there are many technical or organisational tools of city-logistics available, which – in the case of practical use – can be combined and adapted to the local specific conditions. It is notable, that implementing technical city-logistic innovations (e.g. new information systems or loading techniques, etc.) is less difficult than applying collateral organisational measures aiming at strengthening co-operation between the actors of supply chains. That's why local authorities – as the "hosts" of the cities – play a very important role in balancing the different interests and reaching consensus when allocating routes and resources.

The main working processes and milestones of the elaborated method for conceptual planning of the city-logistic system in Budapest are the followings:

1. high level analysis of the framework – international, national and regional economic and logistic trends, current practices in urban goods transport, etc.;
2. identifying the partners interested in improving city-logistics – local authorities, logistic service providers, forwarders, commercial and industrial organisations, inhabitants –, finding out their point of views and moreover the possible conflicts which can hinder the implementation proposed measures;
3. developing a methodology for getting information on current status of goods flows in the city; data gathering and processing by using the former methods;
4. organising the collected data, and based on this structured data bases typifying goods flows according to loading places, routes, time periods, frequencies, volumes, etc.;
5. identifying the bottlenecks in supply chains caused mainly by infrastructure scarcity and the lack of co-ordinated logistic planning in Budapest;
6. elaborating proposals (alternative or collateral techniques and organisational measures) aiming at removing bottlenecks and improving effectiveness of the logistic system of Budapest;
7. dissemination of the project results among the interest groups.

The following chapters give an overview of the preliminary results achieved during practical realisation of the former project plan.

2. International framework: actual trends in European logistic systems

Nowadays' logistic processes are characterised by

- shorter ordering cycles, deliveries with higher frequency and lower volumes;
- more reliable supply procedures;
- supply chains adapted to product life cycles;
- closer relationships between business partners;
- outsourcing of transportation and warehousing activities.

What are the main consequences of the former trends?

Due to deliveries of higher frequency and lower volumes the number of transportation activities is increasing more rapidly than the volume of transported goods. This fact leads to higher unit costs and at the same time more intensive environment polluting. Companies – mainly due to higher costs – are affected by these tendencies sensitively, so they make a lot of efforts to avoid the negative effects: e.g. they improve their information systems or use flexible route planning methods.

Improving reliability of deliveries is expensive because it requires extended capacities: reserve vehicles, reserve times during transportation, more distribution facilities closer to the customers, etc. This trend leads also to higher unit costs and results in the same responds as discussed before.

Supply chains adapted to production cycles lead to a great variety of logistic services. Synchronised and appropriately organised goods flows can help to prevent unmanageable traffic congestion caused by increasing demand on logistic activities. That's why it is vital that affected companies and authorities work together collaboratively on forming local and regional logistic systems meeting economic and also environmental requirements. Closer business relationships between suppliers and customers can also contribute to incorporate logistic considerations into marketing strategy, consolidate goods flows and facilitate investments aiming at improving efficiency of moving goods.

Outsourcing of logistic activities makes it possible to use professional transport organisation techniques and to consolidate different flows of goods. These tendencies lead to higher efficiency of transportation and logistics. But the latest experiences show that outsourcing of logistic functions is getting less and less accepted among industrial and commercial companies. This is caused by high prices of providers on the one hand, and the lower confidence of forwarders on the other hand (they are afraid of not having control on logistic processes any more). But supply management can be efficient – of course – without outsourcing as well. The important condition is to have at least one participant in the system who has all the relevant information and competence to be able to co-ordinate the whole supply chain.

3. National framework: deriving high level development goals of city-logistics from transport policy

The main objectives of Hungarian national transport policy can be summarised as follows:

- developing a sustainable transport system which contributes to improvement of competitiveness and to continuous grow of economy;
- building and maintenance of a national transport infrastructure network which ensures interoperable contacts to the European transport system and at the same time supports regional accessibility;
- ensuring that respects of life quality and environment protection are also considered when planning and organising transport infrastructure or traffic flows.

Forming a local transport policy is the task of local authorities/municipalities, but local transport policies have to fit into national transport policy as well. Local transport policies concentrate mainly on the appropriate organisation of passenger transport. However, it is important that conditions of effective planning of goods transport are also taken into consideration in local transport policies. The well organised local/regional supply chain and the integrated inter modal background transport infrastructure contribute to satisfy private and commercial demand on goods effectively and more environment friendly by making logistic facilities accessible and mitigating negative external effects.

The national transport policy emphasises the role of integrated supply chains containing inter and multimodal goods transport routes, terminals and regional logistic centres. City-logistic systems – as parts of local transport systems – have to be connected to the regional supply chains, which ensures interoperability of different tools and actors within the logistic service sector.

4. Methodology for analysing goods flows in Budapest

The analysis of goods flows in Budapest has been based on two types of data set. The origin of the first set of data was a general cross section traffic survey where the relevant information had been collected by interviewing the drivers of all the vehicles crossing the cordon points. The questionnaire used in this survey contained all kind of important characteristics and information regarding the delivery, like e.g. the type of goods (included into different predetermined clusters), category of the vehicle, time and frequency of the delivery, the method and place of loading/unloading, etc.

The source of the second data set was a detailed traffic survey that was limited only to the downtown area of Budapest but detected all the usual questions related to an O/D survey. The coded answers of the two types of questionnaire have been processed by the STATISTICA program package and all the relevant characteristics (range, arithmetical average, standard deviation, mode, median, etc.) of the goods flows have been calculated using the general transportation indicators of the city.

5. Evaluating the current position of logistics in Budapest (based on the latest surveys)

Changes taking place in the economy and commerce had a multi-part effect to the goods supply. As production became more dispersed and the number of small enterprises increased, it caused higher decentralisation of goods supply operations. At the same time some shopping centres have been built, particularly in the outskirts of the capital, which means a kind of concentration of supply operations. All together, today is represented by the continuous changing position of commerce and goods transport, having now an intermediate shape: beside the historical old methods there are examples of ordering systems using virtual communication and the world-wide web.

Supply methods and practices are rarely well organised, so the increased number of goods movements causes bigger and bigger traffic on the roads. The greatest part of commercial institutions are situated still in the city, that is why the traffic increasing effects of goods transport, loading and unloading cause the greatest problems in the most jammed part of the capital.

Shopping centres in the outskirts have a decreasing effect to the transports directed to the city, but that is balanced by other processes, so the volume of supply traffic have had only a small change during the past years. Shopping centres accommodated in the outskirts attract significant freight traffic with an average of 3000-3400 vehicles per month, which means about 100-140 vehicles a day. 54% of the whole transport needs is carried out by freight vehicles, the second biggest part belongs to smaller freight vans (42%), and only 4% to trucks.

As a result of the increasing number of shopping centres, the last part of the supply chain is carried out by customers and inhabitants, taking the goods from the shopping centres home by own cars. This part of freight transport can not be monitored by ordinary methods, at the same time that provides a significant surplus to road traffic.

30% of all loading and unloading processes in Budapest take place on the public roads, 67% of these processes use dedicated loading and unloading places. The traffic disturbing effect of freight transport and loading is increased by the fact that 90% of all freight transport is carried out during working hours. Receiving goods not during the opening hours reaches not more than 10 percent of all freight transport.

The whole weight transported within the city is 17% higher than the one transported from the country to the capital, at the same time, traffic performance (thanks to the three times longer transport routes) from the country to Budapest is two times higher than the traffic performance within the town. Average transport distance within the capital is 29 km while from the country to the capital is 77 km. Taking country data into account, transport distances within the capital are too long.

The percentage of empty running vans does not fluctuate during the year: this value is 45,5% within the city while coming from the country 33,4% as an average. It means a low average utilisation of vehicles within the capital.

6. Suggested development directions for improving the city-logistic system in Budapest

1. Improving logistic strategies of small and medium sized enterprises: SME-s on the demand side of logistic services in cities have in general no clear logistic strategies. Most of them plan their purchasing and distribution processes on an ad-hoc basis. They are not aware of the advantages – like lower unit costs – of integrated supply chains and the negative effects – like external costs – of congestion. Public organisations, among them local authorities, have to encourage initiatives making possible for SME-s to become familiar with state of the art city-logistic techniques.

2. Co-operative planning of city goods transport by analysing the nature of goods flows: city transport planning focuses traditionally on passenger flows rather than goods flows. Estimating demand for goods transport is more uncertain, because of the heterogeneous market structure and the lower willingness to give details on business information. A further difficulty is that actors in city supply chains don't harmonise their logistic plans and procedures. These tendencies lead to city-logistic systems characterised by isolated subsystems ignoring public interests, redundant capacities, overloaded infrastructures and environment.

That's why it is vital to

- make regular information surveys on actual and anticipated demand and supply of goods, furthermore on main routes and relations determining goods flows;
- analyse bottlenecks and barriers of current infrastructure/practices by including all relevant partners (not only authorities but logistic service providers and main forwarders as well) taking part in city transport;
- implement traffic organisational solutions that are able to cope with the identified problems and are acceptable for most of the interested parties.

3. Establishing and operating city transport alliances based on effective co-operation of relevant partners: city transport alliances are to be established by local authorities, logistic and transport service providers, as well as commercial and industrial organisations. The alliances are based on co-operative agreements, in which the interested parties undertake to plan and arrange their loading, transportation and storing processes in a harmonised way. For harmonising city logistic procedures it is reasonable to establish a joint venture company as well. This company has the tasks to assess demand on logistic services, co-ordinate and promote the supply side, elaborate and operate a unified tariff system, moreover to prepare infrastructure development plans.

All things considered, it is notable that transport alliances can be operated successfully only, if every partner meets its business goals:

- local authorities can make advantages by improved logistic services attracting more investors and mitigating environmental damages caused by transport;
- companies on demand side benefit from integrated high quality services and better information on available logistic facilities;
- more efficient planning and organisation of goods flows results in higher utilisation rate of capacities, which reduce the unit costs of logistic service providers; further advantages come from outsourcing marketing tasks.

Of course, this solution may cause short term profit losses for some of the partners, but the long term equilibrium ensures the common profit maximum of the involved parties.

4. Forming a chain of logistic terminals around the capital, in the agglomeration: a chain of multimodal logistic terminals has to be built in the outskirts of the capital to transform bigger incoming goods flows into smaller transportation units. This chain could be based mainly on available infrastructures. A possible solution for making transportation units smaller could be using so called logistic boxes. Logistic boxes are standardised load-forming tools (applied in pilot projects so far) which are smaller than the widely used containers.

5. Applying geographical information systems (GIS) to give city-logistics an exact planning-organisation basis: GIS based information technology tools support the efficient planning and monitoring of transportation or storing procedures. GIS solutions integrate basic data of goods, vehicles, plans and customers. They offer optimal routes by exploiting the information of integrated database. Moreover, they are able to receive and process also GPS data, so that the current position of vehicle fleet can be incorporated into monitoring facilities as well. Optimisation of goods flows can be carried out not only in the case of transportation, but also in larger warehouses, distribution centres.

The practical realisation of the proposed development paths contributes to a more rational city goods transport, which may result in saving external costs (coming from transport). A further consequence of improved city logistics is the higher quality of services, which increases local economic performances. The integrated organisation of goods flows leads to a dynamic social-economic equilibrium that maximises the common benefit of interested parties by actualising influencing parameters continuously.

As a main consequence of the research work completed so far can be stated that local authorities have a significant role in implementing city-logistic measures. Their main tasks include supervising the conceptual planning of city-logistic systems, monitoring demand and supply on logistic services and harmonising them, ensuring public funds to private-public financing of necessary infrastructure developments, facilitating co-operation between interested parties and initiating transport alliances.

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