

CITY LOGISTICS: CHANGING HOW WE SUPPLY

Ramokgopa, L.N.

CSIR Transportek, PO Box 395, Pretoria, 0001.

E-mail: lramokgopa@csir.co.za

ABSTRACT

Urban freight transport is an important activity in the context of urban life. It is fundamental to sustaining our lifestyle and serves industrial and trade activities essential to wealth generation. Efficient freight transport can play a significant role in the competitiveness of an urban area and is an important element of the urban economy, both in terms of the income it generates and the employment levels it supports.

However, freight transport is responsible for traffic and negative environmental impacts in urban areas such as congestion levels, pollution, noise and fossil fuel use. Freight transport is, therefore, an important factor in urban sustainability. The benefits of city logistics solutions and the disadvantages of urban freight transport should be compared to motivate the investment in city logistics.

The paper looks at factors contributing to a successful urban freight transport planning and its sustainability. The intention of the paper is to highlight and sensitize the stakeholders to the city logistics concept, its potential advantages and implications of implementation.

1. INTRODUCTION

The distribution of goods by light delivery vehicle or truck in city centers has been the norm for a long time and looking at its impact on the physical and social environment is relatively a new concept. A lively and accessible city center is vital to trade and culture growth, yet so far the distribution of goods has not been in accordance with the efficient use of city space and the environment. One way of addressing the issue of city space and congestion is sustainable city logistics.

City logistics is the concept or process of managing and optimizing urban freight, passenger transport and all other urban transport movements taking into account the impact those movements have on the environment, society and economic activity of that particular city.

Although city logistics includes both freight and passenger transport, this paper will concentrate on freight movements.

2. BACKGROUND

The rate of traffic growth is high within cities and leads to congestion due to limited space. From a transport planning perspective, it is obvious that there is a need for changing the current methods of moving goods and people in city centres. This paper seeks to highlight briefly the normality and need for such changes to the transport and logistics industry and the importance of city logistics as a tool in optimizing the use of city space, reducing congestion and improving the economic efficiency of cities.

City logistics involves setting up new partnerships and co-operation between those involved in delivering and receiving goods in city centers. These co-operations offer significant reduction in truck numbers, vehicle kilometers and delivery times to logistics companies while at the same time improving the air quality, less noise and reduction in road damage for city residents.

Examples of city logistics practices in Europe are route planning or truck dedicated routes, centralized distribution centers, eco-parks and direct deliveries (home deliveries). Route planning, where routes converging in to the city center are selected for use specifically by goods vehicle though not exclusive to them. Centralized distribution centers, though initially thought would increase costs by forwarders because of doubling, has proven to be successful because most other logistics costs have reduced. The distribution centre receives information on volumes electronically in advance, supplied with the products early in the morning, and distribution takes place the same day. Goods bound for the city are consolidated more efficiently and in most cases there is no decline in service quality compared to decentralized distribution. The benefit is that there are fewer trips into the city, which alleviates congestion and vehicle emissions.

3. CHALLENGES TO CITY LOGISTICS

The adverse impacts of high freight movements and congestion within city centers can be felt economically, socially, from a road safety perspective and environmentally.

3.1 Economic

The time delays caused by congestion translates to increased travel times for the service providers, increased inventory carrying costs, lengthy "time-to-market" delays and higher transport costs which can be translated into monetary value, because time is money. This can lead to the use of alternative routes, which might be longer and less safe, again increasing the transport costs and security risk, still translating to higher operational costs. To compensate for the extra cost of supplying the same goods to the same area, it will simply be passed down the supply chain and transferred to the consumer. With time, that will translate into general cost to society and might not be sustainable.

3.2 Social

Social impacts can relate to the way the activity affects and has effect on the society. As much as residents are customers and create demand for the movement and transport of goods, they also do not welcome the disruptions resulting from satisfying those demands. Apart from congestion and the perception of large vehicles being a nuisance, it is also perceived that truck-populated roads have higher accident occurrence, an increased demand on social services to clear them and repair of infrastructure.

3.3 Road Safety

A high incident rate has direct impact on the road safety issue. Road design, vehicle, design, traffic management and driver training are issues that are normally not kept in mind when deciding on a route for large vehicles. The lack of such knowledge makes it difficult for drivers to react accordingly and timeously in emergency situations that they would have generally been able to handle. This translates to fatality related accidents and damage to property and road infrastructure. The ideal would be to identify specific corridors that should be used by heavy vehicles to allow emergency response and other related services to be concentrated on those freight corridors.

3.4 Environmental

Environmental impact as a result of large traffic volumes begins with the high demand for fuel, thus depleting our natural resources at a faster rate than they are replenished. That further translates into increased emissions of harmful gases into the environment, noise pollution, high incident rate and possible complications with hazardous materials.

4. INDUSTRIAL ECOLOGY

The interaction between individual stakeholders and between stakeholders and their environment is of paramount importance, the stakeholders in this regard being the residents or customers, retailers, shippers, manufacturers and legislators.

Industrial ecology is the concept of continuously designing and redesigning industrial systems using nature as a basis.

Industries have gone through revolutionary developments and have evolved to greater extents and are still evolving. The evolution though is not a single step process; it involves activities where a single step translates into an incomplete puzzle picture that keeps changing as the conditions change. The oldest and popular example is of optimizing systems to use fewer resources to give greater output.

It is in this regard that like any other industry, the transport and logistics industries need to revisit the best way of getting greater output using the limited space available in cities. The challenge is to develop methods and tools in accordance with the carrying capacity of cities to get the desired and preferred change. The change though would have to be beneficial and nondisruptive to the social community, the city environment and the industries involved. A multidisciplinary approach would have to be adopted because of the complexity of the problem, the connection and cause-effect relations between the stakeholders and the environment.

There is also a need to understand the links between a profitable economic activity and environmental damage due to fuel emissions, the demand and supply patterns of consumers and producers. It is important to realize that the spatial factor is constant and the stakeholders' decisions and course of action then translates into measurable impacts. Of importance is also the life cycle, viability and sustainability of the system when designing and restructuring.

5. INFORMATION SOCIETY

The structure and maturity of the information society within industries also play a pivotal role in the ability of the industry to adjust to the changes as they occur. The single and biggest factor in the success of European countries implementation of the city logistics system can be attributed to the connectedness of their knowledge based society. Though a highly competitive industry and market, European businesses and policy makers have an open and forward-looking culture in opening and sharing information that allows them to be progressive. The use of information and communications technology has advanced processes and enabled accessibility of a wider range of solutions.

Information and communication technology (ICT) as an instrument can be extremely beneficial in transforming the way society functions at governmental, industrial, organizational and individual levels. Apart from just offering connectivity, the willingness of the community (policy makers, organizations and consumers) to openly engage in discussions over issues relating and facing them adds value to information hub. In such cases the culture of co-operation is adopted and all stakeholders get to benefit without necessarily losing their competitive edge.

South Africa, as is the case with a lot of developing countries, is still going through the process of building information societies and reliable and fresh databases in order to be able to keep up with local changes and demands influenced by the global trends. In having to keep up with those demands, the present state of urban freight transport in our cities will not be efficient and sustainable in the near future.

Up to so far the normality of change as a constant has been highlighted together with need for information hubs to be able to know how to address it.

6. CITY MOVEMENTS DYNAMICS

6.1 Nature of City Movements

City movements can be classified as external and internal. External movements are those through which goods leave, enter or pass through the city, while internal movements take place within the city boundaries. The classes of movements include modal choices, vehicle types and sizes and ranges of goods.

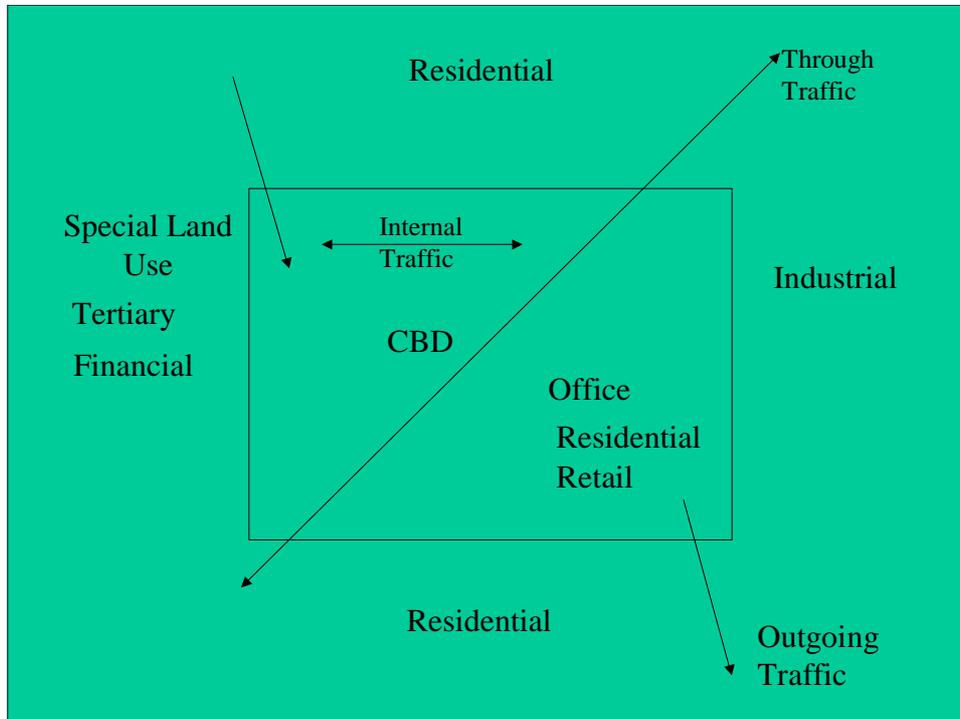


Figure 1. Schematic presentation of city movements.

6.2 Stakeholders

Any policy measures put in place to improve the distribution of urban freight, should take into account the interactions between the stakeholders and their interests. The following figure provides an indication of typical interests.

STAKEHOLDER	INTEREST
Resident/Customer	Products and services Negative environmental impact
Retailer	Competitiveness and profitability
Authorities and Public Service	Governance and legislation Negative environmental impact
Shipper	Market growth Profitability
Service Providers	Accessibility Congestion Cost effectiveness

Figure 2. The interests of stakeholders involved.

The urban goods framework is influenced by the interrelationship between the stakeholders and the transport resources available. The trends in movements and character of the goods influence decisions to be taken by stakeholder made individually or collectively, such as where investment in infrastructure should take place.

6.3 Supply Chain Bottlenecks

The development of "just-in-time" (JIT) and quick response has put a large amount of pressure on suppliers of goods because they are required to release product in a continuous stream to be transported to their customers. In addition, the increase in home delivery services associated with Internet based commerce has also contributed to urban congestion. This has put a large amount of pressure on infrastructure resources that were not designed for this increase in traffic.

Urban goods aspects to consider

- Total number of vehicles trips to retail premises
- Time/day of vehicle operations
- Channel structure
- Size/type of vehicle
- Vehicle loading/offloading time

Possible City Logistics Solutions

- Centralised distribution
- Vehicle route planning
- Tracking and tracing
- Environment friendly fuel
- Schedules delivery (fixed window periods)

6.4 Policy Formulation

The range of policy issues affecting sustainability of urban freight are wide and extend beyond national government jurisdiction, which is charged with issues such as improving the transport sector performance. Policies across sectors that are affected should be co-ordinated and integrated to achieve efficiency and sustainability.

At national level in South African, freight transport has to be planned for as required in the National Land Transport Transition (NLTTA) Act of 2000, National Land Transport Strategic Framework (NLTSF) and National Transport Act. Provincial and local governments are also required to set out a freight plan in the Provincial Land Transport Framework (PLTF) for a five-year period and also as part of local government's Integrated Transport Plans (ITPs).

The goals and objectives of freight policies at the three levels of government are to:

- Minimize constraints to the mobility of goods
- Optimize current capacity and promote environmental protection
- Develop a strong diverse, effective and competitive industry within the limits of sustainable transport infrastructure.

In attaining system efficiency, in terms of service levels and costs and limiting if not totally avoiding the negative impacts of market failures in transportation, policies should not necessarily be restrictive but can also be incentive driven in encouraging compliance.

7. CASE STUDIES

7.1 Kassel – Germany

7.1.1 Background and Objectives

The still ongoing project started in 1994. Seven forwarding companies are involved in a co-operation for delivering the inner city of Kassel. One neutral transport operator is employed to carry out the transport operations. Kassel has about 200 000 inhabitants. Main industrial sectors include automotive and transport industry, telematics and software development, environmental and energy technology and culture and tourism.

The implementation of an urban distribution centre was an integral part of the city logistics approach in Kassel initiated by the forwarding association and the chamber for industry and commerce in the city. Initially, a series of studies were carried out surveying the requirements, volumes and acceptance of a city logistics approach.

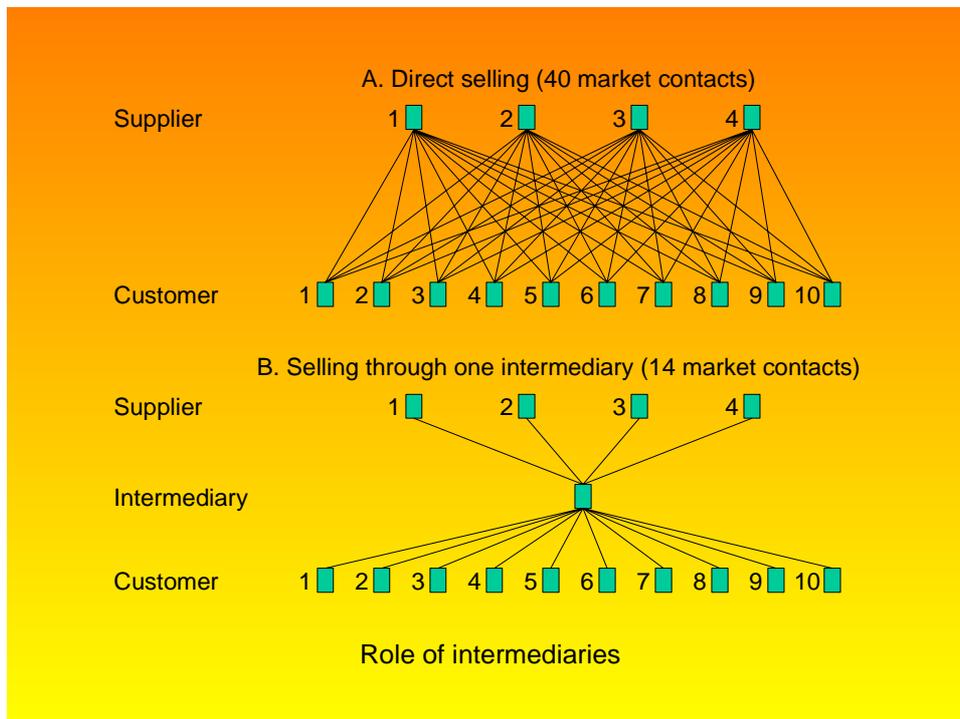


Figure 3. Kassel model of centralized distribution.

7.1.2 Basic Approach

A neutral city logistics operator delivers to the inner city on behalf of the forwarding companies involved. At 06:00 he starts the collection tour. About five vehicles are employed to collect the consignments delivered at the forwarders' depots during the night. At the urban distribution center the consignments are consolidated according to the address of the consignees as well as to specific street corridors. At about 10:00 the urban delivery starts with two to three 7,5 ton vehicles. Usually two tours are carried out per day (depending on the transport volumes).

7.1.3 Information and Communication

The city logistics operator receives information on the transport volumes in advance via e-mail and delivery takes place the same day. In case a delivery cannot take place the city logistics operator informs the respective forwarder (from whom he got the transport order) via telephone. Services from the neutral operator (transport and transshipment) are paid on the basis of a specific city logistics tariff. The operator invoices his services with each forwarder separately. According to statements and surveys carried out the approach shows no significant change on the cost side for the forwarding companies involved (neither benefit nor extra costs compared to the usual delivery services).

7.1.4 Results and Experiences

According to studies carried out the urban distribution center is seen as unavoidable if the goods bound for the city are to be bundled more efficiently, which is the main aim of the Kassel city logistics scheme. The consignees in the inner city do not state any differences in service quality compared to the former delivery scheme. The main success of the scheme is that the consignments can be bundled without any extra costs or inconveniences for the involved companies and the consignees.

On the other hand the public benefits from less trips, thus less vehicles and less emissions. The benefits of the involved transport operators and forwarders are intangibles: the image of being an innovative and responsible company. A success factor in the beginning of the scheme was the motivation of the partners involved.

7.2 South Africa

Numerous examples of the application of city logistics solutions exist in South Africa. Typical cases in the fast moving consumer industry include most of the large chain stores such as Pick 'n Pay and Checkers, who operate centralized distribution centers in and around Gauteng.

Similarly, manufacturers are increasing moving towards centralized distribution from plant warehouses.

8. RECOMMENDATIONS AND CONCLUSIONS

City logistics as a concept and a tool in urban freight planning is not limitless. There might be areas that it might not sufficiently offer solutions and as such should always be considered with other congestion relief strategies. The city environment is a complex one because it always attracts all kinds of activities, especially economic and financial and as such demand for city space will almost always be above its availability. It is thus essential for proper planning to take place and regulatory measures to be put in place to enforce those plans. Co-operation between residents, business organizations, policymakers and NGOs to create a favourable climate can lead to an easier process of implementing the changes needed.

All role players need to be sensitized to the changes needed before they can be implemented and the challenge is to turn business organizations' logistics functions from a short-term perspective to a long term one and to ensure supply chain competitiveness.

There is no clear understanding of the cost of externalities caused by goods movement in urban areas, which makes it difficult to develop techniques and systems for addressing those externalities. In changing how we supply to our city centres, certain actions have to be taken to start the change.

Possible actions to be taken:

- Development of freight plans.
- Development of strategies for logistics and related services.
- Collection of existing statistics and data on urban freight movement
- Identification of efficient existing measures and operations.
- Investigate the viability of HGV dedicated routes.
- Better use of incident management information.
- Development of ITS to improve access, safety and reduced congestion

City logistics is not new, but integrating all the elements as discussed in the paper, will ensure sustainability and improved competitiveness of cities.

9. REFERENCES

- [1] Boons, F.A.A and Baas, L.W. 1997 "Types of industrial ecology: The problem of coordination", Journal of Cleaner Production, Vol 5, no. 1 and 2, 1997.
- [2] Ehrenfeld, J.1997 "Industrial Ecology: A framework of product and process design". Journal of Cleaner Production, Vol 5, no. 1 and 2, 1997.
- [3] Eik, A. 1999 "Industrial ecology: A new paradigm?" Paper presented at Industrial ecology conference in Troyes, November 1999.
- [4] European Commission. 2000 "Good practice in freight transport. A sourcebook".

- [5] Kjærsgård, S. and Jensen, H.J. 2002 Sustainable City Logistics Solutions. The North Sea Commission Conference on sustainable transport.
- [6] Kuhn, T.1962. The structure of scientific revolutions. Chicago University Press, Chicago, IL, 1962.
- [7] Niles, J.2003. Trucks, Traffic and timely Transport: A regional freight logistics profile.
- [8] Woudsma, C. 1999 “Understanding the movement of goods not people: Issues, Evidence and Potential”. Urban Studies, Vol 38, no 13, 2001.

CITY LOGISTICS: CHANGING HOW WE SUPPLY

Ramokgopa, L.N.

CSIR Transportek, PO Box 395, Pretoria, 0001.

E-mail: lramokgopa@csir.co.za

BIOGRAPHY

Lucett Ramokgopa is a transportation researcher at CSIR Transportek. Since joining the CSIR in 1998, she has worked mainly in the public transport field in both the rail and road transport sectors. She has also worked on other transport project areas such as the congestion impacts of HGV's in urban areas as well as the transportation of people with mobility handicaps.

She has recently joined the Centre for Logistics and Decision Support – which was recently established within Transportek. In addition to her academic background in civil engineering, she is now also completing her Logistics Diploma at the Rand Afrikaans University.