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Freight Distribution into Large European Cities

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MARKS & SPENCER LEADING INNOVATION

MARKS & SPENCER

EUROPEAN
FREIGHT & LOGISTICS
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Freight Distribution into Large European Cities

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Summary of the Final Report presented to the F&L Annual General Meeting

15th November 1997 in Paris

by Mr. Beckett

Chairman of the Working Group

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With the terms of reference indicated by "F&L", Working Group Chairman Mr. Chris Beckett, two students:

- *Mr. Joachem Huijsmans from the Rotterdam University*

- *Mrs. Yvonne Wildeboer fron the Amsterdam University,*

were requested to develope a research on freight distribution into large European cities.

The two students were hosted for several months for account of F&L Club by one of its Dutch Members, T.M.I., whose Chairman, Mr. Wibo Aris, gave advice and support to the whole research.

The outcome of the research is the following document included in this booklet.

Report on Freight Distribution into Large European Cities

Cooperation between
F&L and Universities

by Jochem Huijsmans
and Yvonne Wildeboer

Foreword

This report has been prepared for the working group "Freight distribution into large European cities" of the European Freight & Logistics Leaders Club (F&L).
In May 1997 we were assigned to carry out research on freight distribution into large European cities. Five months later we have finished our assignment.
The final result is this report that describes current practices in urban freight distribution in eleven large European cities. Based on this analysis, recommendations are drawn up on policies to alleviate current problems relating to urban freight distribution.

We want to thank Mr. Aris, Chairman of Transport Management International and member of the F&L, for the opportunity he gave us to carry out this challenging research and for his inspiring support. We also want to thank Mr. Beckett, Mr. d'Orgeval, Mr. Nicotera, Mr. Osvald and Mrs. Cartledge for reading our draft report and commenting on it.

We hope the report contributes to the understanding of the complex issue of urban freight distribution.

Jochem Huijsmans
Yvonne Wildeboer

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Introduction

Many large European cities nowadays work on the protection of the quality of life and the accessibility of the city centre. City centres are being pedestrianised and the circulation of vehicles is being restricted. Especially heavy trucks that contribute substantially to congestion and pollution, are banned. Many projects are initiated that aim at the rationalisation of urban freight distribution.
The aim of this research was to make an inventory of local city initiatives regarding urban freight distribution and to draw up recommendations on the subject based on this analysis.
The terms of reference were:

- Identify the extent of local city initiatives in dealing with the problems relating to urban freight distribution.
- Define common themes of local city initiatives.
- Draw up recommendations on policies concerning urban freight distribution.

We have investigated urban freight distribution in eleven large European cities and determined conclusions on the success and failure fectors of policies on urban freight distribution.
Furthermore recommendations on the issue are given.
The first section of this report contains the most important findings, conclusions and recommendations. The description of local city initiatives is in the last section.

Definition of urban freight distribution

`All activiteis that are necessary for the efficient transfer and delivery of finished products from the edge of the city area to the business in the inner city and vice versa'.
(Stienstra, 1994, p. 3)

Problems

The presence of goods vehicles in the historical centres of European cities causes several problems. These problems can be divided into four categories:

- The quality of life in the city is affected by noise, emissions and road safety;
- The accessibility of delivery and collection points in the

inner city is threatened by congestion and by regulations of municipalities (for instance time windows);
- ❖ Delivery traffic causes physical hindrance for other road users in the city centre;
- ❖ Damage is done to the fabric and architecture of the inner city.

(Visser, 1993, p. 16)

European freight transport

The volume of European freight transport continues to grow rapidly ahead of economic growth.
Actual transport by road is developing at a faster rate than other modes of transport. The following table shows the volume of the EC freight transport in thousand million tonne-kilometers and the modal split of freight transport in the European community.

Table 1: European freight transport.

	1970	1980	1985	1990
Total EC freight transport	800	1000	1020	1200
Road	50.0%	60.0%	65.3%	69.0%
Rail	27.8%	20.2%	18.6%	15.4%
Inland waterways	13.6%	10.8%	9.8%	9.2%
Pipelines	8.0%	8.4%	6.3%	5.5%

Source: Kiriazidis, 1994, p.7.

It is estimated that about 50% of European freight transport by road takes place in urban areas.
10% of urban goods transport is carried out by heavy trucks.

Table 2: Urban part of total freight activities

Number of vehicles	70%-80%
Vehicles kilometers	50%
Vehicle kilometers covered by heavy trucks	10%
Costs	50%

Source: Dablanc, Savy, 1995, p.3.

Within the city most vehicle kilometers for urban freight distribution are covered by small trucks that weigh less than 3.5 tonnes. The large trucks are higly visible, but account for only a small proportion or urban goods movements.
(Dablanc, Savy, 1995, p.3)

Players

The most important players involved in urban freight distribution in cities can roughly be divided into three main sets based on their interests:

- transport operators (carriers, logistic operators etc.)
- transport users (manufactures, retailers etc.)
- local authorities

Public authorities can use a variety of instruments to influence urban freight distribution.
These include:

- traffic management
- time windows
- vehicle requirements
- urban planning
- support of projects in urban freight distribution

In general local authorities use these instruments to improve the quality of life and the accessibility of the city, because they want to retain or improve the typical economic and social functions of the city centres.
Carriers and logistic operators want to be able to carry out their job as efficently as possible.
Public regulation like time windows and vehicle requirements are in general in conflict with this objective. Freight transport users are afraid that measures by the local authorities will lead to a reduced service level or increased costs.

The complexity of the problems relating to freight distribution in cities is mainly caused by the high numbers o parties involved in transport and, in some cases, their conflicting priorities.
Therefore, finding acceptable solutions for the problems

caused by urban fright distribution is not an easy task. This is acknowledged by the writers of the English report "Freight in urban areas":

"A review of urban freight policy options available to planners and policymakers suggests that it will be very difficult, time consuming and expensive to arrive at a set of policies acceptable to all parties involved".

Working method

Eleven cities in eight different European countries have been selected for our research.
These cities are:

- London (United Kingdom)
- Paris (France)
- Amsterdam and Utrecht (The Nederlands)
- Breme and Munich (Germany)
- Basle and Zurich (Switzerland)
- Barcelona (Spain)
- Gothenburg (Sweden)
- Helsinki (Finland)

The selection of cities was based on the following criteria:
- Interesting initiatives.
- Different sizes of cities.
- Geographical spread of cities throughout Europe which provides for a good cross section of city types.

Utrecht and Amsterdam were visited.
The information about the other cities was obtained by mail and e-mail from scientists, public planners and other professionals in urban freight distribution.

In The Nederlands we interviewed people working for:
- Associations representing carriers and shippers
- Associations representing retailers
- Carriers
- Shippers
- Municipalities

The main purpose of these interviews was to gain insight into urban freight distribution by comparing the different points of view.

The gathering of information proved to be rather difficult. This was mainly caused by the lack of monitoring of goods flows and because in some cases no evaluation had taken place.

Most important findings

1 No standard European solution

Urban freight distribution is mainly an individual problem. The situation differs according to the size and physical structure of the city, the kind of businesses located in the city center and the characteristics of the local transport market. Therefore there is no single standard European solution for the problems relating to urban freight distribution.

2 Success and failure factors

There are a number of success and failure factors that arise from every project concerning urban freight distribution.

Succes factors:

- *Tailormade measures.*
  Tailormade measures are needed that take account of the specific characteristics of the city and of the various logistic systems that are operative in urban freight distribution.

- *Consultation between the involved parties.*
  Because of the complexity of the problems relating to urban freight distribution and the need for tailormade measures, regular consultation between the parties involved in urban freight distribution should take place.

- *Availability and analysis of data on urban freight movement.*
  Knowledge of the dinamic of urban freight movement is needed for the determination of the most effective measures.

Failure factors:

- *Monopolisation of urban distribution.*
  Local authorities should not intervene directly in the market structure throught the development of a logistic system for urban freight distribution that benefits certain transport operators. In Utrecht in The Netherlands and in Basle and Zurich in Switzerland urban distribution centers

were supported by the local authorithies throught licensing of carrirers and subsidisation of pilot-projects.
Thereby monopolistic organisations are created that can not meet market standards when it comes to costs and service levels. Free and fair competition should be ensured as much as possible.

- *Lack of enforcement of local laws.*
  Strict enforcement of local laws is needed for transport operators to comply with the regulations.
  In general they will try to evade certain measures that have a negative impact on the service level or the efficiency of their operations. This has been acknowledged in many projects, for instance in Amsterdam and Paris.

- *Lack of coordination between local authorities.*
  Local laws and policies concerning urban freight distribution should be coordinated with neighbouring communities. Account should be taken of the fact that on their journeys goods vehicles can pass throught several areas. They will either circumvent the restrictions or they will bypass some areas which gives rise to more vehicles kilometres.

The protection of the enviromental and the quality of life in cities is the major issue for local authorities **3**

Gotemburg in Sweden is the only city in this research that has introduced environmental zones where goods vehicles have to meet certain emission criteria. The aim of this measure is to improve the quality of life in the city center and to stimulate the development of more environmental friendly vehicles. Many other cities have plans to introduce these kinds of measures in the near future.
The protection of the environment is an issue that can be dealt with on a European level.

Conclusions

The following points are the key factors for implementing a successful policy to alleviate current problems relating to urban freight ditribution.

- **Formation of urban committees**
  A committee needs to be established at urban level with representatives of all interested parties to coordinate interests and to drive projects forward.

- **Data**
  Comprehensive data on the movement of freight into and of the city must be available to enable the determination of the most effective measures.

- **Technology and innovation**
  Attention should be paid to new techniques that improve the efficiency and environmently friendliness of urban freight distribution.

- **Infrastucture and facilities**
  An assessment has to be made of the possibilities to improve the utilisation of existing infrastructure and facilities and the need for their creation.

- **Local laws**
  Local laws need to be established and enforced for the recommendations to succeed.

- **National / European laws**
  The protection of the environment should be dealt with at a European level.
  Emission and noise standards for goods vehicles should be harmonised.

- **Plan**
  A plan for urban freight policy needs to be drawn up and agreed upon by the urban committee.
  It has to include tailormade measures based on consultation and monitoring.
  A balance has to be found between the most important interests of the transport operators and users and the protection of the environment.

Recommendations

❖ **Formation of urban comittees**

In the urban committee transport operators, shippers, warehouse, retailers and the municipality should be represented. Given the importance of the enforcement of local laws the police might be introduced as another party in the committee. This committee should drive projects forward, discuss developments in freight distribution and evaluate measures.

The overriding authority should be with the municipality because they have the powers to act and because they are supposed to take account of the interests of all parties.

❖ **Data**

Compprehensive surveys on urban goods flows should be carried out regularly to gain insight into the dynamic of urban freight distribution and its specific problems.

Data need to be obtained about:

- goods flows: types of cargo, origins and destinations of shipments, frequency of deliveries, number of shipments per journey, average lenght of trips etc.;
- types of vehicles: weight, dimensions, noise and emission levels;
- types of involved business.

❖ **Technology and innovation**

- The development of environmently friendly urban goods veicles should be stimulated throught coordination and financial support of research in this field
- Traffic management systems, like the Global Positioning System in Växjö in Sweden, have to be developed and applied. These kinds of telematic systems can improve the efficiency of transport operations and thereby reduce the levels of emissions, noise and congenstion.
- New techniques should be developed that allow urban freight distribution to take place at night. Research has to be carried out to develop systems for silent loading and unloading and safe deliveries.
- Transhipment has to be facilitated through the standardisation of packages and the development of new transhipment systems. This will improve the effi-

ciency of operations and will stimulate the modal shift towards rail and water.

❖ **Infrastructure and facilities**

- The feasibility of the establishment of multi-modal transport centers, like the GVZ in Bremen, should be assessed. The creation of a European network of these centers would improve the efficiency of transport operations and stimulate the use of environmently friendly transoport modes (rail and water).
- Existing urban distribution centers can be used for consolidation of shipments of different transport operators.
- Research should be carried out to determine the feasibility of the use of underground metro-systems for urban deliveries at night when this infrastructure is not used for pubblic transport.
- In certain urban areas freight clearways and loading and unloading facilities should be created to alleviate congestion problems and to improve the efficiency of transport operations.

❖ **Local laws**

- Local laws concerning the weight and dimensions of goods vehicles need to be established and enforced to protect the environment and quality of life in city centres.
- Restrictions on the movement of goods vehicles that meet the vehicle requirements can be alleviated. This includes the allowance of nightly deliveries and the widening of time windows.

❖ **National / European laws**

- A European standard for emissions and levels of goods vehicles in cities should be established. This facilitates the adjustement of the logistic systems of transport operators and stymulates the development of environmetly friendly urban goods vehicles.
- Tax tariffs that are based on the environmently friendliness of vehicles should be imposed to make gas and electric vehicles more attractive for transport operators.

❖ **Plan**

The plan of the urban committee needs to include:

- Allowance for city geograpy.
- Local laws and their enforcement.
- Use of exsisting facilities and facilities that might be created.
- Cooperation and consolidation.

The parties in the urban committee should assess the possibilities for consolidation of shipments and coordination of transport to reduce the number of vehicle kilometers and movements in the city.
It should be kept in mind that the striving for efficiency by transport operators in general leads to a maximization of capacity utilisation and a minimisation of the number of vehicle kilometers. This market-led mechanism for the protection of the environment should not be obstructed too much by policies on urban freight distribution.
Determination of the strictness of regulations concerning environmental protection is not an easy task because there is no linear trade-off between the environment and the economic vitality of the city centre.
Protection of the environment throught stricter regulations will increase the costs of urban distribution and thereby the attractiveness of the city centre for businesses decrease. But at the same time the quality of life is improved which increases the attractiveness of the city centre.
Absence of regulation or very strict regulation will either result in a deterioration of the quality of life or too high costs of distribution.
Therefore a compromise has to be determined. The growing importance attached to the protection of the environment will be an incentive for stricter regulation in the future.

An example of a plan that can be developed is the Green Zones plan that will be described in the next section.

❖ **Green Zones**

We have developed a plan for the European-wide introduction of Green Zones in the centers of large European

cities to takle the environmental problems relating to urban freight distribution.
It is an attempt to produce a model for urban freight distribution that is based on the success and failure factors that flow from the local city initiatives.

The most prominent features of Green Zones:

- Located at the centers of large European cities
- Strict European standard for vehicle requrements regarding emissions and noise in these zones for goods vehicles from 3.5 tonnes.
- All existing distribution centers at the edge of the cities have to be open for unloading of vehicles that do not meet the requirements. The shipments are consolidated and transported to the city centre by the owner of the distribution center.
- A limited number of exemptions permits from weight and dimension requirements will have to be granted to certain lines of business based on the load factor of vehicles or special circumstances.

The concept of Green Zones is partially based on the idea of environmental zones in Gothenburg in Sweden and on the urban distribution project in Amsterdam in The Netherlands.
In Gothenburg heavy goods vehicles that weigh more than 3.5 tonnes have to meet certain emission and noise standards.

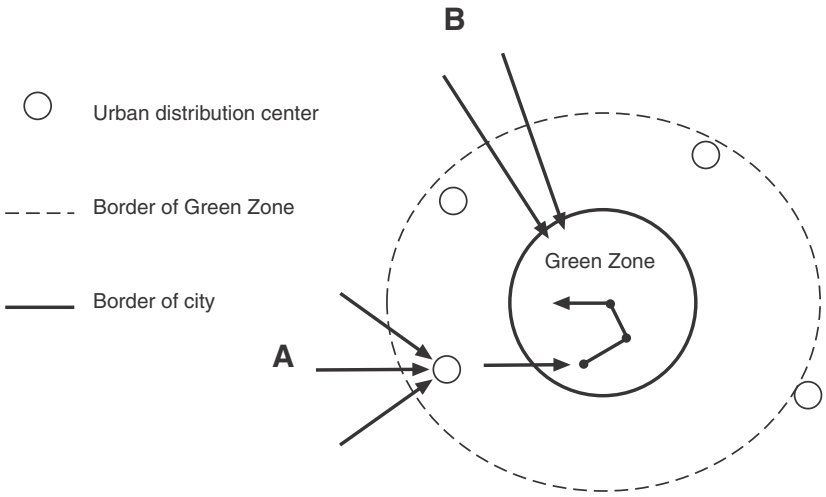
In Amsterdam a weight restriction of 7.5 tonnes has been imposed in the city center and existing urban distribution centers offer facilitis for transhipment.

A goods vehicle that is allowed to enter the Green Zone:

- Meets European emission and noise requirements and meets local weight and dimension requirements.
- Or has an exemption permit from weight and dimension requirements based on the load factor ot the vehicle or special circumstances.

Other goods vehicles have to unload at one of the distribution centers at the edge or the city. At these cen-

ters the shipments are consolidated and transported to the city with environmently friendly vehicles.



A - distribution into Green Zone via urban distribution center.
B - direct distribution into Green Zone.

Figure1: Freight movement into Green Zone.

For the implementation of a Green Zone the urban committee has to develop a plan that includes the determination of:

- Exact location and size of the Green Zone.
  If large areas are designated as Green Zone it might be necessary to determine transit-routes throught the zone.
  The requirements should not be operative on these routes.
- Vehicle requirements within the zone regarding size and weight.
- Objective criteria for participation of distribution centers.
  The operators of the distribution centers (UDC) will have to meet a number of requirements:
  - UDC must be within a certain maximum distance from the Green Zone.
  - Availability of facilities to receive any goods vehicle from 3.5 tonnes.
  - Sufficient warehousing facilities.
  - UDC is open during most of the day, preferably 24 hours a day.

- Most effective inspection method.
- Regulation for exemption permits.
- Other measures like time windows and traffic management and facilities for loading and unloading.

Environmental effects of Green Zones:

The negative impact of freight ditribution on the urban environment will decrease because of the strict requirements concerning emissions and noise for goods vehicles that weight more than 3.5 tonnes. Based on our data the estimation is that on average about 40% of vehicle movements takes place with this kind of vehicles. The consolidation of shipments will lead to a reduction of the number of movements in the Green Zone. A policy specifically aimed at the protection of the environment of city centers can be justified by the fact that these areas are more sensitive than others because of the high density of people and businesses.

Economic effects of Green Zones:

It is very likely that the costs of urban freight distribution will rise in the short run. More expensive vehicles are needed because of stricter requirements. Costs savings resulting from the consolidation of shipments will not be able to compensate for the extra costs of transhipment at the urban distribution centers. The economic potential of the city center will rise because of the improved quality of life.
In the long run the specialisation of a number of operators in urban distribution might lead to economies of scale, better service and lower costs.

We hope that the idea of Green Zone is regarded as an interesting option for the alleviation or current problems relating to urban freight distribution.
More research is needed to determine the effects and feasibility of this concept.

London

The background of the city 1

London is the capital and the largest city of the United Kingdom.
The Greater London area, of about 2025 km^2, has 7 million inhabitants. The population density is 3456.8 inhabitants per square kilometre. Inner London has 2.7 million inhabitants and the surface is 515 km^2 which is about one fourth of Greater London. The population density is 5242.7 inhabitants per square kilometre.
London's size and population mirror its economic importance. The city is one of the world's leading financial and insurance centres, as well as an important industrial city.
London is a manufacturing centre, dominated by light and consumer-goods industries. For instance, food processing, electronics, light metals, pharmaceuticals and printing are important. Most branches of heavy industry are located to the east, near the docks. Heavy industry in London mainly concerns petroleum refining and metalworking. Every year millions of people visit London. This makes tourism a major contributor to the economy of the city.
London is characterized by an efficient subway-system and a complex system of bus routes. Furthermore, there are four airports in London. The most important airport is Heathrow, 26 kilometres to the west of the centre. The others are Gatwick, to the south, Stansted to the north and London City to the east.

Volume and characteristics of traffic 2

Table 1: Millions of tonnes of goods transported in the London Area per modality.

	Within London	To London	From London	Total	
By road	48.0	91.0	80.0	219.0	(96.0%)
By rail	0.3	4.4	1.6	6.3	(2.8%)
By water	2.8	-	-	2.8	(1.2%)
Total	51.1	95.4	81.6	228.1	

Source: Transport statistics for London, 1995.

This table clearly shows the dominance of road in freight transport in London. The use of rail for goods transport within London is limited to the postal services.

Table 2: Goods transport in the London area by vehicle size and type in thousands of tonne- kilometres

Gross vehicle weight	Within London	From London	To London
Rigid Trucks			
up to 7.5 tonnes	212411	119764	187305
7.5-17 tonnes	465302	276593	332668
17-25 tonnes	64526	47898	116889
Over 25 tonnes	305377	343486	283944
All rigid trucks	1047616	787740	920807
Articulated trucks			
up to 33 tonnes	181284	541587	847958
Over 33 tonnes	234702	2753711	3454747
All articulated trucks	415986	3295298	4302705
All Trucks			
up to 25 tonnes	746283	453436	652382
25-35 tonnes	486026	903813	1130151
Over 35 tonnes	231294	2725789	3440979
Total	1463603	4083038	5223512

Source: Lewis, 1997, p.18.

More than 50 percent of the total number of tonne kilometres takes place with goods vehicles weighing over 35 tonnes.
The average speed of traffic in London is estimated to be about 15 kilometres per hour throughout much of the day.

Transport market
The transport market in the UK has been deregulated for over 25 years and since then it has become increasingly sophisticated. Compared to other European countries, transport costs are relatively low. The British transport market has specialized in third party logistic services (Whiteing, 1997).

The large retailers in particular are known for their efficient dedicated supply chains operated by third parties.

In London the logistic operators are located on the periphery of the area due to the very high land prices in the centre. Vehicles used for urban freight distribution are relatively large, but there are relatively few deliveries per day and the vehicles have a high load factor.

Regulations/policy 3

Lorry ban

In London a lorry ban has been introduced. The purpose of the lorry ban is to protect residential areas against the noise, pollution and disruption which may be caused by heavy lorries travelling into London at night and at weekends. The lorry ban is operative during the following hours:

Weekdays:	21.00 - 7.00
Weekend:	midnight till Saturday 7.00
	Saturday 13.00 - Monday 7.00

Lorries in excess of 16.5 tonnes require exemption permits to travel into London during these times. Motorways and trunk roads are excluded. In practice almost all applicants receive an exemption permit.

Public authorities

In the UK, especially in the metropolitan areas, the municipal authorities are weaker than in other European countries. Transport operations are less restricted.
In London time windows and vehicle requirements are determined at local council level.
In 1986 the Greater London Council was abolished and since then London has no single authority that is responsible for it's municipal services. Most of the tasks have been given to the 33 local councils.
The Secretary of State for Transport is responsible for approximately 300 kilometres of Trunk Roads on behalf of the Government. The local councils take care of their own 15000 kilometres of roads. In the 1960's traffic management measures have been imposed e.g. extensive one-way systems and parking bans. Later, in the 70's and 80's major road building programmes were implemented.

In 1989 a plan for a new traffic management system for

London called Red Routes was introduced by the National Government.
A Traffic Director for London was appointed in 1991. He is responsible for the implementation of traffic management measures on the most important roads in London which form the 500 kilometres of Priority (Red) Route Network. He produced a strategy document called 'The Network Plan'.

4 The project: 'The Network Plan'

Goals of the Network Plan:

- Improve conditions for all who use the Network so that people and goods can reach their destinations more quickly and reliably.
- Provide facilities to enable public service vehicles to move more efficiently.
- Reduce the impact of congestion on the local environment and provide better conditions for both cyclists and pedestrians.

Other features:

- Comprehensive review
  The development of Red Routes is based on a comprehensive review of all traffic requirements to make more use of the existing road space.

- Tailormade measures
  A detailed study of the requirements for each section of Red Route instead of the imposition of general rules.

- Consultation
  Stress on importance to inform the public and to organize consultations with interested parties.

- Coordination
  Of the 500 kilometres of Red Routes the local authorities are responsible for 200 kilometres, the other 300 kilometres are trunk roads for which the Government is responsible. So the Traffic Director has to work together with these local authorities. Regulator meetings are orga-

nized with local authorities to coordinate the plans, something that has been a problem since the abolition of the Greater London Council.

In 1991 a 12.5 kilometer stretch was used to test the proposed measures.
This included the introduction of:

- 620 new free, short duration parking spaces were introduced
- 1200 stopping places were introduced
- new/improved pedestrian crossing facilities were introduced

4.1 Results

Results of the Network Plan:

- the volume of traffic in London is barely increasing.
- the implementation of Red Routes is ahead of target and the Network is expected to be operational in the year 2000, as planned.
- a decrease in journey times from 26 to 20 minutes.
- road accident casualties decreased by 17% compared with 8% for other roads in the area.

Summary 5

The transport market in the United Kingdom is highly deregulated. The transport costs in the UK are relatively low compared to other European countries.
In London, mainly heavy trucks are used for urban freight distribution. To protect residential areas against the nuisance and pollution caused by heavy trucks, a lorry ban has been introduced. The lorry ban is not very successful, because in practice almost all applicants receive exemption permit.
Time windows and vehicle requirements are determined on local council level in London. This leads to many different regulations in different parts of the city.
In 1989 the Red Routes plan was introduced. This plan con-

cerned a new traffic management system for London. The Traffic Director for London developed 'The Network Plan'. The aim of this plan was to improve the accessibility of the city for all users of the Network and to improve the local environment by reducing congestion.

The background of the city 1

Paris

Paris is the capital of France. The city is located in the north of France, on the banks of the Seine river, 145 kilometres from the English Channel.
The Ile de France has about 11 million inhabitants and the surface area is 12012 km^2. This area is one of the largest metropolitan areas in Europe. The population density is 915.8 inhabitants per square kilometer.
The Ile de France can be divided in three parts: Paris, the core of the region, the Petit Couronne which is the circle around Paris and the area around the Petit Couronne which is called the Grand Couronne. Paris and Petit Couronne together have 6.2 million inhabitants and the surface of this area is 760 km^2. The population density is very high with 8158 inhabitants per square kilometer.
Paris is the business, residential, historic, intellectual, diplomatic, religious, educational, artistic and tourist centre of France. Small scale industry is dominating in the centre of Paris. Especially luxury goods are produced, such as perfumes, jewelry, etc. Furthermore, book printing and publishing are important activities in central Paris. Heavy industries (automobiles, machine tools, railroad rolling stock, electric/electronic products, chemicals, processed foods) are located in the suburbs. Construction and the production of building materials are also important. However, tourism is by far the largest source of income of the city.
The port of Paris is very important for the economy of the city. Paris is also a major rail, highway and air transportation hub. There are two international airports (Orly and Charles de Gaulle) and there is one airport for domestic flights (Le Bourget).

2 Volume and characteristics of traffic

Table 1: Freight tranport in 1994 in millions of tonnes in Ile de France.

	Internal	National	interna-tional	rest of Ile de France	Total
Petit Couronne	32.4	40.8	16.5	34.0	123.7
Grande Couronne	54.5	43.8	14.6	34.0	147.0
Ile de France	120.9	84.7	31.2	-	236.7

Source: Laplagne, 1996.

Table 2: National goods transport in Paris and Petit Couronne in millions of tonnes per modality in 1994.

	Paris		Petit Couronne and Paris	
Road	5.4	(66%)	27.6	(68%)
Water	1.9	(23%)	9.0	(22%)
Rail	0.9	(11%)	4.2	(10%)
Total	8.2	(100%)	40.8	(100%)

Source: Laplagne, 1996.

These statistics show a relatively high percentage of goods transported by water. The Paris region uses the waterways intensively for the transportation of bulk goods like building materials. The inclusion of internal traffic in the statistics would heighten the share of road since it took care of 94.4% of intraregional traffic in the Ile de France. For inter-regional traffic this was 78.1%.
The high density of people and businesses and the fact that Paris is a major hub in international traffic make it one of the most congested areas in Europe. The average speed of traffic in the Paris region is 12 kilometres per hour. (Distribution urbaine, 1993)

Another problem of freight transport in Paris is the fact that the land prices are too high for freight terminals and ware-houses to be located in the core of the region.

Regulations/policy 3

The core of the Ile de France consists of Paris and the Petit Couronne. In this area freight transport is highly regulated. In Paris the regulations regarding circulation and loading and unloading are based on the surface of the vehicle.

Table 3: Regulations in Paris

Surface of vehicle in square meters	(un-)loading and circulation allowed:
>20 m^2	21.30-7.30
16-20 m^2	21.30-13.00
12-16 m^2	21.30-17.30
<12 m^2	21.30-21.30

Source: Dablanc, 1997.

Exemptions exist for some categories like postal services and the transport of frozen goods.
The roads indicated as 'axe rouges' have their own regulations. These 'axe rouges' were introduced in 1991. On these 37 kilometres of trunk roads absolute priority is given to the circulation of vehicles. Severe restrictions on loading and unloading are part of the regulations that are operative on these roads.

In the Petit Couronne, 123 communities can determine their own regulations regarding freight transport. A study was carried out in 1996 that revealed variations in the regulations for the different communities (Lablanc, 1997).

Table 4: Percentage of communities in the Petit Couronne with regulations on road transport.

	Hauts-de-Seine (36 communities)	Seine-St.-Denis (40 communities)	Val-de-Marne (47 communities)	Total (123 communities)
Regulations regarding:				
Heavy vehicles	57.0%	60.0%	60.0%	59.0%
Loading / unloading	31.0%	18.0%	17.0%	21.0%
Exemptions	14.0%	13.0%	4.0%	10.0%
Unloading spaces	46.0%	25.0%	26.0%	31.5%
Transit-traffic	6.0%	15.0%	19.0%	14.0%
Dangerous goods	6.0%	0.0%	2.0%	2.5%

Source: Dablanc, 1997.

The survey also demonstrated the apparent lack of coordination of vehicle requirements and regulations by the communities.

Table 5: Cooperation between the communities

	Percentage knowing regulations of neighbouring communities	Percentage having contact with neighbouring communities about harmonization of regulations.
Val-de-Marne	11.0 %	20.0 %
Seine-Saint-Denis	12.5 %	15.0 %
Hauts-de-Seine	17.0 %	19.0 %
Total	13.5 %	18.0 %

The conclusions from this survey were the following:

- Half of the communities surveyed do not have any global ordinance or general plan relating to freight.
- Communities that have a plan show considerable differences from one area to another, even when they are adjacent. There is little integrated planning with neighbouring communities.

- Regulations show very diverse technical definitions to 'trucks'. The range of definition goes from 1.5 tonnes to 15 tonnes whereas the national codification says 3.5 tonnes.

- Some communities like the city of Paris restrict access of trucks on based on the surface of the vehicles.

- The city of Paris has a highly regulated system for deliveries with time windows, night deliveries, allocation of specified public space and strict definitions of trucks.

(source: Logistics and the city, international experience and the case of the Paris region by M. Savy and L. Dablanc)

Schéma Directeur d'Aménagement et d'Urbanisme

The regional planning in the Ile de France is the responsibility of the national state. The plans are outlined in the Schéma Directeur d'Aménagement et d'Urbanisme (SDAU).
In 1965 the first one was published. The second came in 1976. The third and most recent one (1994) contained for the first time a specific section dealing with freight transport.

Four objectives are stated in the SDAU:

- To make maximum use of rail and water for freight transportation
- Divert transit-traffic from the core of the region
- Rationalize freight transportation
- The establishment of a network of multi-modal logistic platforms

Three areas were identified around the city of Paris:

- Within the A86-ring road: area for urban distribution
- Between the A86-ring and la Francilienne: for medium and long term storage of goods; here the land prices are lower and the accessibility is better
- Outside of la Francilienne: for transit-traffic

4 Logistic platforms

Logistic platforms are multi-modal freight zones for transport and transport related activities. They provide warehouse and transhipment facilities and other services. Public platforms are open to all businesses involved in transport and logistics. The private ones are dedicated to one operator.
In 1967 the first two public logistic platforms were established, Rungis in the south of Paris, created by Sogaris, and Aulnay-sous-Bois by Garonor in the north. They are located at the border of the most dense area of the Ile-de-France. The initial aim was to create platforms where large trucks would unload their goods with destination Paris or Petit Couronne. From this platform urban freight distribution would be carried out by one specialized operator using small vehicles. Prohibition of circulation of large delivery vehicles was to support transhipment at the platform.
But the circulation was not prohibited and the carriers did not accept the monopolisation of urban freight distribution. The public platforms operated by Garonor and Sogaris were turned into multi-modal facilities for transhipment and warehousing. Since then many of these platforms have been established in the Paris region.

Characteristics of Garonor in Aulnay-sous-Bois:

- 80 hectares
- 380000 m2 of public warehouses
- 60000 m2 of office space
- 12 kilometres of roads
- 11 kilometres of railway tracks
- 300 companies including:
  - -150 transport companies and forwarding carriers
  - -70 industrial and trading warehouses
  - -80 service providers and others
- direct access to A1 and A3 motorways
- direct rail connection to SNCF railway network
- 10 km by road from Roissy-Charles de Gaulle airport
- private services: hotels, restaurants, shops, banks, service station etc.

The owner of Garonor lets the office space and warehouses to the businesses.

Advantages of public platforms:

- More efficient use of space because of concentration of activities using the same facilities.
- Negative external effects can be reduced because of cooperation with public authorities.
- The concentration of transport activities leads to economies of scale and an improved level of logistic services.
- Consolidation of goods is easier.

(Laplagne, 1997)

Some older platforms, e.g. Sogaris and Garonor, are no longer optimally located due to the increased congestion on the roads where they are sited.

Summary 5

Freight transport is highly regulated in the Ile de France, specifically in the Petit Couronne and Paris. In Paris, time windows based on the surface of vehicles have been introduced. Furthermore some roads in Paris have been given the name: 'axe rouge'. On these roads priority is given to the circulation of vehicles. Loading and unloading is highly restricted.
The 123 communities in the Petit Couronne all have their own regulations regarding freight transport. There seems to be a lack of coordination of regulations by the communities, which makes it difficult for carriers to distribute their goods efficiently.
The Schéma Directeur d'Aménagement et d'Urbanisme (SDAU) contains the regional planning in the Ile de France. The third SDAU (1994) included a specific section regarding freight transport.
The first logistic platforms were established in 1967. These platforms were developed for the transhipment of goods from heavy trucks into smaller vehicles. Urban distribution would be carried out by one specialised operator. To encourage the transhipment of goods, the circulation of large trucks in the city would be prohibited. However, this plan failed.
The main reasons for the failure were:

- The circulation of heavy trucks in the city was not prohibited.

- Carriers did not accept the monopolisation of urban freight distribution.

After the failure of the plan, the platforms were turned into multi-modal public logistic transport centers. Nowadays the Ile de France has many of these centers, some are dedicated to one operator and some are open for all businesses. These transport centers improve the efficiency of transport and stimulate the modal shift towards water and rail.

Utrecht

The background of the city 1

The city of Utrecht is located in the central Netherlands, 30 kilometres southeast of Amsterdam. The city has 231.231 inhabitants (1991) and is the fourth largest city of the country. Utrecht is crossed by canals, railroads and branches of the Rhine river. Because of these characteristics and because of its central location, Utrecht is a major transportation centre. The historic centre of Utrecht consists of narrow streets, canals and arched basements. Metal, wood, chemical and food products are manufactured in the city. Furthermore, Utrecht is a trade, financial and insurance centre, which also hosts international industrial fairs.

Volume and characteristics of traffic 2

Little data is available on freight distribution in Utrecht. In 1990 research was carried out that analysed the flow of goods in the city centre.

Table 1: Total number and volume of shipments per week in the city centre in 1990:

	Volume (m^3)	Number of shipments
Entering	2435	3110
Leaving	1180	1203
Total	3615	4313

Source: de Rijke, 1991.

Some facts and figures regarding goods transport into the inner city of Utrecht are:

- Almost 80% of the total number of shipments is smaller than 1 m3.
- The most important businesses in the city centre based on the number of shipments are the retailers in foodstuff, clothing and furniture, the department stores and the hotel and catering industry.

Regulations/policy 3

The following time windows have been introduced in Utrecht: Mon.-Sat. 6.00-11.00 and one hour after shops

close, which means from 18.00 to 19.00. On Thursdays this is from 21.00 to 22.00. Some strict vehicle-limitations have been imposed along the canals: the maximum vehicle weight is 1 tonne and the maximum width is 2.20 metres. For the remaining pedestrian area the maximum weight is 2 tonnes. The maximum vehicle length is 9 metres in the city centre.

The pedestrian area is closed by electronic poles in the road outside the time windows. Only vehicles that have an exemption permit can enter the area outside the time windows.

4 The project: 'Urban Distribution Centres'

In 1991 the municipality of Utrecht decided that the arched basements needed better protection from heavy vehicles and that the amenity and accessibility of the city centre had to be improved. A working group was established to develop a logistic plan for the city centre including the establishment of an urban distribution centre.

The proposals of the working group had to meet the following objectives:

- Reduction of the number of vehicle movements and kilometres.
- Stricter enforcement of the regulations concerning weight and dimensions of the vehicles to protect the arched basements.
- Increased efficiency of distribution.

The members of the working group were:

- Chamber of Commerce of Utrecht
- Three carriers (VGL, PTT and VCU)
- Associations of carriers and shippers
- Municipality
- Association of shopkeepers

At that time the Dutch Ministry of Transport, Public Works and Water Management had developed a plan for urban distribution centres and many Dutch cities like Maastricht

and Leiden started experiments.
An urban distribution centre can be defined as a centre for transhipment of goods with a destination in the city centre, located at the edge of the city with a good accessibility. Its main purpose is to achieve a high degree of consolidation of small shipments.
Large trucks with low load factors can leave their goods at the urban distribution centre where they are collected and sorted by destination. Smaller vehicles take care of the distribution to the city centre.

For the city of Utrecht a number of criteria for urban distribution centres were developed by the working group. The centres had to be easily accessible by road. Their location should be within 5 kilometers of a highway and within 10 kilometers of the city centre. They had to be open at least 16 hours a day from Monday to Friday. Every centre had to make at least 100 deliveries a day with a minimum of 25 deliveries per journey.

Two existing distribution centres were licensed as official urban distribution centres. One was operated by Vervoer Centrum Utrecht, the other by VGL and PTT. One UDC for the whole city was preferred by the municipality because it would improve consolidation.
But the associations of transport operators did not agree with this apparent monopolization of urban freight distribution.

The vehicles of the urban distribution centres have an exemption permit from the time windows. The vehicles have to be recognizable as belonging to the urban distribution project by their appearance and number plate.
The municipality considered allowing the participants in the project to use bus lanes, but this idea has not been implemented yet.
For urban distribution vehicles there are no special requirements regarding emissions or fuel consumption.

The most important part of the city centre is covered by urban distribution. This means the large pedestrian shopping area around and near the canals.
Urban distribution centres handle the following goods:

- one or more packages (max. weight per package is 30 kg)
- goods on pallets (max. 500 kg per pallet)
- goods on 'rollcontainers' (max. 300 kg per container)
- shipments able to be handled by one person.
- shipments that do not make up a whole load

They do not handle:
- fresh, dirty or indivisible loads
- bulk (e.g. sand or aggregates of foodstuffs)
- frozen goods or goods that require temperature control
- fuels or oils

The operators have the obligation to accept the approved cargoes. These are all easy to handle shipments that require no special treatment. The estimation was that about 80% of the total number of shipments could be distributed through urban distribution centres.

All parties in the working group considered good communication of vital importance for the succes of the project. The municipality made a communication plan to inform the carriers, shopkeepers, residents, shippers of the goals of the project.

Other projects in Utrecht:

Because of the weight-limit of 1 tonne on the roads above the arched basements it is impossible for the beer-producers to serve the pubs and restaurants along the canals with large vehicles. All of these pubs and restaurants are served by a so-called 'beerboat' that runs every day to distribute beer. This is a commercial initiative.

In Utrecht the bicycle is being used by two couriers to distribute small amounts of goods.

4.1 Results

Some results of the project in Utrecht are:

- The cooperation between VGL and PTT has ended. Now they organise urban distribution from their own centres and they do not consolidate their shipments anymore. The reason was the fact that many heavy

trucks entered the city centre disregarding the weight limitations. The inspection by the police wasn't strict enough.

- VGL and PTT kept their exemption permit from the time windows.

- The collection of goods at the urban distribution centres takes place on a very limited scale. Few carriers leave their cargo at the distribution centres.

One can say that the project has failed. The current situation is being evaluated and the municipality is making new plans for the future. Probably new measures will be introduced at the beginning of 1998. These include:

- Expansion of the area covered by urban distribution centres to the southern part of Utrecht and the area around the city centre which also has narrow streets and limited space for loading and unloading.

- Development of home delivery service for consumers buying in the city centre. The ordered goods will be delivered at their residences by urban distribution vehicles.

- Possibly, restrictions governing the environmently friendliness of vehicles will be introduced at the beginning of 1998. All public vehicles will change to gas to make a statement towards the carriers.

- The municipality is prepared to co-finance experiments in the field of urban distribution when there's a good chance that it will turn into a self-supporting business.

- For the public buses existing main roads will be turned into a dedicated bus-only corridor linking the city centre and the eastern part of the city. An extensive study is being carried out concerning the delivery of goods along the corridor and the connecting roads.

5 Summary

The city of Utrecht is a very special case because of the historic city centre that requires very strict vehicle requirements. The city centre is characterized by canals and arched basements.
In 1991 a working group was formed to develop a logistic plan for the city centre to improve the protection of the arched basements from heavy goods vehicles. This plan concerned, among other things, the establishment of urban distribution centres (UDC). Two existing distribution centres were appointed 'official urban distribution centre'. The vehicles used by the urban distribution centres were allowed to distribute goods outside the time windows.

The parties involved in the working group agreed that communication was very important for the success of the project. Therefore, a communication plan had been developed to inform all involved parties (carriers, merchants, residents and shippers) of the project. Despite the communication plan, the project in Utrecht failed, because:

- Heavy trucks still entered the city centre of Utrecht, disregarding the vehicle restrictions.
  The vehicles were hardly inspected by the police.
- The number of consignments transhipped at the UDC's was too low to make urban freight distribution profitable.

The municipality will probably introduce new measures in 1998.

Amsterdam

The background of the city 1

Amsterdam is the largest city of the Netherlands. The number of people living in the city centre is 720.000. When the total metropolitan area is included, this number is 1.400.000.
The harbour of Amsterdam and Schiphol Airport (8 kilometres to the southwest of the city) are economically vital for the Amsterdam region. But Amsterdam is also the financial centre of the Netherlands and a centre for transport, commercial services and cultural activities (Comtrac, 1997, p. 31). At this moment, the inner city of Amsterdam houses more than 11.000 businesses (Stadsdistributie A'dam, 1997).

The architecture of the merchants' houses of the 16th and 17th centuries in the old city, attracts visitors and has made Amsterdam a centre for tourism. The old city consists of concentric roads and canals on each side of the Amstel river near its junction with the little IJ-river.

Volume and characteristics of traffic 2

The space in the historical centre of Amsterdam is limited (narrow streets) and not suitable for heavy trucks. For the distribution of goods in the city centre, mainly diesel-trucks and vans are used.
The inner city of Amsterdam is often the last destination of a transport-route for (international) freight transport. This means that trucks are almost empty when they reach Amsterdam. Consequently, goods are distributed inefficiently into the inner city. The inefficient transportation of goods has negative effects on the environment and the amenity in the city centre. The lack of loading and unloading facilities causes problems too. Trucks are blocking the public roads when they are loaded or unloaded, which leads to congestion.

In 1994 the volume and characteristics of traffic in the city centre of Amsterdam were examined by the AGV (an advisory committee for traffic and transport matters). The following facts and figures were published in the AGV-report:

- Most of the goods are delivered between 8.30 am and 10.30 am.
- 72% of the carriers who deliver goods in Amsterdam are located in Amsterdam or in the Amsterdam region.
- 41% of the consignments are larger than 1 m2, 17% of the consignments are smaller than 0,5 m2.
- 38% of the vehicles do not only deliver goods, but also pick up return freight.
- 25% of the carriers make more than 10 delivery-stops per ride in the city centre.

Table 1: Vehicle-types used for urban freight distribution into Amsterdam.

Vehicle-type	Number of vehicles
Articulated trucks	48
Rigid trucks	168
Vans with a loading capacity up to 3,5 tonnes	133
Other vans	44
Other vehicles	13
Total	406

Source: AGV, 1994, p.9.

The different destinations of the consignments are shown in the next table.

Table 2: Destinations of consignments

	Percentages
Hotels, restaurants, pubs	30%
Non-food shops	16%
Supermarkets	4%
Other food shops	10%
Offices	6%
Private individuals	6%
Other businesses	14%
Unknown	14%

Source: AGV, 1994, p.18.

Regulations/policy 3

In Amsterdam carriers are only allowed to supply shops in the inner city during the hours (time windows) between 7 am and 11 am.

This measure has been introduced to reduce the noise nuisance for the inhabitants of the city centre and to reduce the physical hindrance to visitors of the city.
When the 'Urban Distribution project' started in 1996, more regulations concerning goods transport in the city centre were introduced. The 'Urban Distribution project' is described in the following paragraph.

The project: 'Urban Distribution' 4

The use of cars has been growing rapidly, which has caused problems concerning accessibility and the quality of life in the city centre. In 1994 a Traffic- and Structure plan (Verkeers- en Inrichtingsplan = VIP) was developed in Amsterdam to tackle these problems. One of the issues in the VIP is the reduction of car-use in the inner city (Commissie van Advies VMCM, 1997).
The VIP includes the 'Urban Distribution project'. The goal of this project is to improve the accessibility and the quality of life in the city centre. The initiative for the 'Urban Distribution project' has been instigated by the municipality of Amsterdam.

The project is a gradual process. The following parties are involved in the 'Urban Distribution project': the Ministry of Transport, Public Works and Water Management, the municipality of Amsterdam, carriers, transport-associations and the Chamber of Commerce. A working group for 'Urban Distribution' has been formed with representatives of these parties. These representatives often discuss the progress of the project with each-other. The collaboration between the involved parties forms the basis for the 'Urban Distribution project'.

The first phase of the project started on the first of October 1996 and will end in October 1998.
In this phase:

- Carriers are trying to collect goods in already existing distribution centres. In the beginning this only concerns small packages;
- Heavy trucks (over 7.5 tons) are banned from the city centre. This is called the 'filtering- system'. Heavy trucks are only allowed on the main roads, so that through-traffic is not hindered by the filtering-system.

The initial aim is to transport 20% of the total goods flow to the city centre by using 'Urban Distribution'. This does not concern fresh, 'dirty' or 'difficult' goods. An exemption from the weight-limitation is granted to the carriers of these goods. Furthermore, when heavy trucks (over 7,5 tonnes) have a load factor of 80% or more, they can also get an exemption. Until now 1500 exemptions have already been granted to carriers, but after the first phase the regulations will be tightened.

The plans for the second phase are:

- to use environmently friendly vehicles
- to give less exemptions for heavy trucks
- carriers that transport fresh, dirty and indivisible goods will also have to participate in 'Urban Distribution'
- to stimulate cooperation of transport companies

(Stadsdistributie A'dam, 1997)

Probably the following measures will also be introduced:

- a length-limitation for trucks; trucks that are longer than 9,5 metres (5,5 metres wheel-base) will not be allowed in the city centre. In some cases an exemption permit from this requirement can be given (to construction traffic, for instance).
- the Euro 2-standard, a European standard concerning the emissions of vehicles, will be made obligatory.

Consequently, if a carrier uses a truck that weighs over 7,5 tonnes and he wants to get an exemption in the new situation, he has to meet the Euro 2-standard, the truck has to be shorter than 9.5 metres (5,5 metres wheel-base) and the load factor of the truck has to be at least 80%.

'Urban Distribution' has the following consequences:
- goods that are transported by heavy trucks (over 7,5 tonnes), are transhipped at the edge of the city to smaller vehicles;
- smaller vehicles bring the goods to their destination in an efficient manner, with a high load factor;
- the goods flows are consolidated, which reduces the number of vehicles used and the number of transport movements in the city centre;
- less nuisance and a safer environment for the inhabitants of the city.

(Stadsdistributie A'dam, 1997)

The police will have to see to it that only trucks with an exemption, or trucks under 7.5 tonnes can get into the city centre. The police can use weighing systems to check whether a truck is under 7,5 tonnes. However, the police have rarely been inspecting the trucks due to a lack of resources. The municipality will discuss this problem with the police.

Until now the existing time windows have been maintained. Goods can only be delivered at the shops between 7 and 11 o'clock in the morning. The municipality first wanted to shorten the time windows for carriers who are not involved in the 'Urban Distribution project', but the other parties did not agree and the original time windows were maintained for all carriers.

It is seen as important for the success of the project to keep the involved parties informed about new plans and the latest results of the project, so that they will stay motivated to participate in 'Urban Distribution'.
Before the start of the project in October 1996, the municipality sent all 11.000 businesses a brochure in which the plans were explained. Almost all businesses formed a favourable opinion of the plans. In this way the municipality created a good basis for the implementation of the project.
Carriers and other parties involved in 'Urban Distribution' are very positive about the communication with the municipality of Amsterdam. They feel that the municipality does not only pay attention to the problems of the inhabi-

tants, but also to the problems that carriers and shopkeepers are faced with. The communication between the involved parties is probably the most important factor of success in the 'Urban Distribution' project.

The costs of the project for the period 1995-1996 were estimated at 275.000 Dutch Guilders. For the year 1997 the estimation was that the costs woulde be 150.000 Dutch Guilders.
This includes the costs of:

- traffic signs in the city centre, these signs are needed to mark the area of the filtering-system;
- physical measures to support the filtering-system;
- the municipal support of the project and the activities of the working group for 'Urban Distribution';
- unexpected costs.

4.1 Results

No reports containing results of the 'Urban Distribution project' in Amsterdam have been published yet. Some shopkeepers, carriers and inhabitants have been interviewed. Furthermore, discussions about the progress of 'Urban Distribution' between the municipality and all interested parties take place regularly. The results of these interviews and discussions confirm that the involved parties believe the situation in the inner city has improved since October 1996. Still, most of the parties agree that some changes are necessary. For instance:

- the regulations have to be tightened
- the inspection by the police should be improved, especially when the criteria for exemptions will be stricter.

(Detmar, 1997)
Even carriers want a more consistent application of the regulations. They think that every carrier should meet the same criteria. Therefore, the municipality will try to improve and increase the inspection of vehicles.

5 Summary

In 1994 the VIP-plan was developed to tackle the problems regarding accessibility and the quality of life in the city

centre of Amsterdam. This plan included the 'Urban Distribu-tion project', which started in October 1996. Goods vehicles weighing more than 7,5 tonnes have to transhipp their cargoes at one of the existing distribution centres at the edge of the city.

After consolidation, the shipments are distributed from the distribution centers into the city centre by smaller vehicles. In the near future, the regulations in the city centre will be tightened. For instance, a length-limitation will be introduced. Furthermore, the inspection of vehicles by the police will be improved. The 'Urban Distribution project' is quite successful. The main reason for the success of the project is the communication between the parties involved in the project. Discussions about the progress of the project and about new plans of the municipality take place regularly.

Basle

1 The background of the city

Basle is the capital of the half canton of 'Basel Stadt', in the north of Switzerland. The number of people living in the city of Basle is 175.500 (1993). The population of the Basle agglomeration is numbered 360.350. The city is located on the Rhine river, at the meeting point of three countries: Germany, France and Switzerland.
The city is a major industrial and transportation centre, and a centre for banking and finance. The chemical industry is the only industry in Basle that supplies more jobs than the transport sector. The inner city holds 2200 businesses and organizations. 32000 people are working in the city centre of Basle, mainly in retail trade and services.
International transport plays an important role in Basle. The city receives 50% of the total number of goods (in tonnes) entering and leaving Switzerland. Furthermore, Basle is a hub for intermodal transport (rail-road, rail-water, road-water).
The rail networks of SNCF (France), DB (Germany) and CFF (Switzerland) are working on the compatibility of their techniques. The international rail-transport has been improved, which had a positive influence on the economy of Basle.

2 Volume and characteristics of traffic

The following figures concern freight distribution into the city centre of Basle:

- On every working day some 2300 tonnes of goods are transported in the city centre.
- Every day 10000 trips are made to or from the city centre This represents about 65% of the total number of trips made in Basle.
- 83% of the goods with destinations in the inner city of Basle are distributed by vans.
- The average loading factor of the vans is 28%.
- Vans are responsible for 18 to 24% of the total traffic in the city centre.

(Savy, Stransky, 1997, p.43).

When these figures are reviewed, some kind of rationalisation of goods traffic seems possible.

A large number of transport companies are distributing goods into the inner city of Basle, but Umschlags AG located at the Wolfsbahnhof goods station to the southeast of the city is by far the most important distributor. Umschlags AG is responsible for 50% of the freight distribution into the city centre (Savy, Stransky, 1997, p.44). At their platform many (logistic) facilities are available, consequently the Umschlags AG platform is a suitable location for an urban distribution centre.

The project: 'Basel City Logistik' **3**

To solve the problems caused by freight distribution in Basle, an urban distribution centre has been established. The distribution centre is located at the nodal point of both international and national transport, 2 kilometres to the south of the city centre. What is quite remarkable about the UDC in Basle, is that the preparation of the operation has been executed by a private consultancy firm. The private consultancy firm investigated which types of cargoes would be suitable for handling by the UDC.
The main concern of the consultancy firm was the feasibility of the UDC. To investigate the feasibility, the firm interviewed parties that were interested in the project. One of the main issues in the interviews was the method of management of the UDC.

focussed on cooperation between carriers/shippers including the postal services. The principles of the project in Basle are the following:

- The 'Basel City Logistik' project is based on the usage of an urban distribution centre and on the usage of vehicles favourable to the environment.
- Because of The pilot project 'Basel City Logistik', started in September 1994. Basel City Logistik is the present structure of freight traffic flows, the Umschlags AG platform is a suitable location for an urban distribution centre.
- The priority is the reduction of commercial vehicle movements in the city centre, to reduce pollutant emissions, noise and energy consumption.
- The general regulation of traffic and parking must not be changed, in order to have the project accepted.

- Delivery services must remain the same as far as the businesses supplied are concerned.

(Savy, Stransky, 1997, p.45)

At the end of 1996 a home delivery service was introduced. Furthermore, BCL has been collecting recyclable polyethylene bottles since the beginning of 1997 (Savy, Stransky, 1997, p.48).

Parties involved in the BCL-project are:
- shippers
- carriers
- retailers
- the DIANE 6 organization
- the City of Basle
- organizations representing retailers ('Pro Innenstadt')
- the Chamber of Commerce and Industry

It is possible for carriers to participate in Basel City Logistik when they agree not to deliver goods in the inner city themselves. Instead they have to use the urban distribution centre.
Every participant in BCL remains independent and autonomous. However, the participants all use the BCL-logo and there is a joint information campaign. Goods are only distributed by BCL when they are destined for small shops and when the goods don't need special treatment.

The cooperation of several carriers started, as planned, at the Umschlags AG platform. The goods are distributed from this platform into the inner city of Basle. Basel City Logistik uses three vehicles for the transportation of goods:
- an eco-diesel vehicle
- a gas vehicle
- an electric vehicle

(DIANE 6, 1996, p.8)

The vehicles used before the start of Basel City Logistik (BCL) were more polluting than these vehicles. However, using electric or gas vehicles causes extra costs. These costs are financed by the DIANE-organization.
The fund of the DIANE-organization also covers the costs of the study project, management and coordination. These

costs amount to approximately 160000 SF/year. In the initial phase financial support is very important. But, eventually Basel City Logistik should be entirely self-supporting. The prices clients have to pay for distribution by BCL are based on the average tariff used by carriers. There are various tariffs depending on the total weight of the consignment, for each step of 100 kg the tariff changes (Savy, Stransky, 1997, p.47).

Results 4

Up to now the results of BCL have been somewhat disappointing. Although people were very positive about the idea of an urban distribution centre, this did not result in a large number of carriers using BCL. The number of participants in BCL has not grown since the start of the project (Savy, Stransky, 1997, p.48). Goals that have not been achieved so far, are:

- expansion of the number of participants;
- doubling of the volume of goods distributed by BCL;
- the effects of the consolidation, the reduction in energy consumption and the environmental effects are barely measurable because of the low level of support;
- it is still not certain whether BCL can be viable.

Logistik project in Basle. These positive results are shown in the following table: However, there are some positive results regarding the City

Table 1: Results of Basel City Logistik

		without BCL	with BCL
Load factor	in %	28	47
Number of consign-ments	per day, per vehicle	8	15
Average load per ride	in tonnes	0,28	0,52
Fuel consumption	per 100 km in litres	diesel: 17 petrol: 18,8	diesel: 15 petrol: 18,6

Source: DIANE 6, 1996, p.11,20.

Almost twice as many consignments are transported per vehicle, per day when BCL is used. This means that 45% less vehicles will be required for urban freight distribution. (DIANE 6, 1996, p.11).

The applied policy seems to be a success on a small scale. The participants and sponsors have decided to continue the project because of the following reasons:

The carriers have faith in the City Logistik system and think it can be viable in the medium-term;

- For carriers, urban distribution is a necessary evil. If BCL takes care of the urban distribution, carriers can focus on long distance haulage.
- The municipality supports the project because of the positive environmental effects and the increasing attractiveness of the city.
- For retailers the success of the City Logistik project is of vital importance. They realize that the attractiveness of the city can be improved by reducing the number of freight vehicles into the city centre.

(DIANE 6, 1996, p.16)

5 Summary

The Swiss government developed the 'Energie 2000 programme' to tackle the environmental problems in Switzerland. The 'DIANE 6 programme' is a sub-programme of Energie 2000 regarding freight transport. The 'Basel City Logistik project' is one of the projects initiated by DIANE 6.
Basel City Logistik (BCL) started in September 1994. The project is based on cooperation between carriers/shippers. The carriers and shippers bring their goods to the distribution centre of Umschlags AG. The goods are distributed into the city centre by environmently freindly vehicles of BCL.
During the first phase of the project Basel City Logistik receives financial support from the DIANE 6 organization. After this phase the financial support will stop.
The results of BCL are not very spectacular. The number of participating carriers is low, not many consignments are handled by BCL and therefore the positive effects on the environment are limited.

Still, the parties involved in the BCL-project have decided to go on with the project.

Some conclusions, based on the interim results of the BCL-project, were published in a report of the DIANE 6 organisation. These conclusions are:

- the local government should initiate projects and should introduce supporting measures;
- the project should be open to new participants and should not be monopolistic;
- City Logistik schemes will be most successful when they are introduced in as many cities and agglomerations as possible;
- retailers have to be made aware of the wider benefits of City Logistik;
- if the current freight transport policies are not changed, the City Logistik project cannot be self-supporting;
- by consolidating mail and recycling-materials, and initiating a home delivery service, the load factor of vehicles can be improved;
- using City Logistik will lead to a win-win situation for all involved parties.

(DIANE 6, 1996, p.17,18)

Zurich

1 The background of the city

The capital of the German-speaking part of Switzerland is Zurich. The city is the largest city in Switzerland and is located in the northern part of the country, at the north-west tip of the Zurich Lake. Zurich is situated at a height of 411 metres. The number of inhabitants in the city is 341.276 (1991). The fast-growing suburbs have brought the population of the metropolitan area to 838.700. Zurich is the economical and financial capital of this part of Switzerland.
There is considerable industrial and commercial activity in the city. Zurich's leading industries are tools, turbines, printing and publishing, textiles (clothing), and chocolate. Goods transport plays an important role in Zurich. However, in contrast to Basle, Zurich does not have a 'transport tradition'.
The city of Zurich is characterized by the presence of the river Limmat, that flows through the city. The river influences the way in which goods are distributed into the city centre.

2 Volume and characteristics of traffic

The growth in the number of vehicles on the roads in Zurich has led to congestion in the inner city. In Zurich road haulage has been increasing faster than rail-transport. Road haulage is responsible for more than 90% of the total goods transported in the city. Although both road and rail transport are of great importance for the city, a rail-road transhipment platform is still lacking.
Commercial transport does not play an important role in the city, 90% of goods transportation in Zurich is carried out by own-account transport. The 'own-account carriers' mainly use light vehicles (vans). In general, the 'commercial (public) carriers' operate heavy vehicles. These vehicles can carry more goods and are consequently overall more efficient (Savy, Stransky, 1997, p.50).

The following figures concern freight distribution into the city centre of Zurich:

- Goods flow: in 1988 13,5 million tonnes of goods were transported in the Zurich area.

- Construction materials are responsible for 34,8% of the goods flow (in tonnes).
- Food stuffs make up for 16,3% of the goods flow (in tonnes).
- Approximately 180 million kilometres were covered in the city of Zurich by commercial traffic in 1988.
- Commercial traffic is responsible for about 12% of total traffic in the city of Zurich.

(DIANE 6, 1996, p.5)

Regulations/policy **3**

Zurich is not as 'freight transport and logistics-minded' as Basel. Still, the plans concerning goods transport in Zurich were quite ambitious and comprehensive. The plans involved:

- Urban distribution (Oerlikon Cargo UDC and the supplying of the central station shopping centre).
- Paying more attention to general logistics, including international, and urban transport (through developing a multi-modal transhipment platform close to the centre).
- Influencing the modal split of freight traffic through promoting the use of railways.

(Savy, Stransky, 1997, p.41)

Measures that are being proposed in Zurich are:

- the establishment of a multimodal, rail-road, transhipment platform near the city centre, suitable for urban freight distribution.
- the stimulation of cooperation and deliberation between carriers, shippers and consignees. Specifically the contact between the owners of the local distribution platforms, MIGROS and COOP, is important.
- changing the current regulations, imposed by the local government, on traffic circulation and parking (for instance, changing the delivery times)

(Savy, Stransky, 1997, p.51)

Goals of the local government are to improve the delivery density, to reduce private car usage and to stimulate the usage of electric vans for urban freight distribution.

The aim of improving the delivery density carries a series of

major obstacles:
- production conditions (cut in storage space, flexible deliveries)
- delivery conditions (special customer wishes, just-in-time service, flexibility)
- freight (avoidance of damage in transit, minimum use of packaging, bulky goods, expert unloading)
- legal provisions (dangerous goods, foodstuffs regulation)
- own-account transport (inefficiency)

(Dietrich, p.3)

The policy of the local government of Zurich includes a 'clean air'- programme. Freight transport is one of the subjects in this programme.

Measures that have been taken, concerning freight transport, are:
- integration of freight in the regional planning and development proposals
- actions in favour of rail transport (wagonloads, complete trains)
- actions in favour of combined transport
- specific taxes on heavy vehicles
- incentives for the optimisation of road transport
- incentives for switching the transport of fuels from road to rail

(Savy, Stransky, 1997, p.53)

Much attention is being paid to the promotion of rail-transport in order to improve the environmental situation. Although the plans concerning combined transport in Switzerland are quite ambitious, little has happened to realize them.

4 The Oerlikon Cargo project

The Oerlikon area is located in the north of the Zurich agglomeration and is near the airport. The importance of industrial, commercial and logistic activities is growing in this area.
On the first of October 1994 the Oerlikon Cargo project started. The costs of the development and organization of

the project were 190000 SF (DIANE 6, 1996, p.V). The project was focussed on 7 retailers in Zurich (Oerlike Cargo, 1995, p.1). Their goods were consolidated at the Oerlikon Cargo terminal in order to reduce the number of deliveries and consequently to improve the accessibility and quality of life in the city centre. The transportation from the terminal to the shops was executed by one single carrier (Zingg Transporte AG). The distribution was carried out by means of a truck weighing 3,5 tonnes (DIANE 6, 1996, p.III). By picking up return freight the carrier could offset the costs of the extra transhipment.
The project tried to arrange cooperation between shippers and the receivers of the goods (the retailers). The goal of this was to raise the interest of shippers and receivers in urban freight distribution.
The intention was that Oerlikon Cargo would be self-supporting. The project was partly funded by MIGROS and COOP, two big distributors in Zurich. Although these companies were not directly involved in the project themselves, (because they had an efficient logistic organization of their own) they were interested in the Oerlikon project. The reason why these distributors were interested in the project was that they were planning to contract out their transport requirements (to the Oerlikon Cargo centre).

4.1. Results

Although the parties involved in Oerlikon Cargo were quite positive about the project, the project was not very successful. Not enough retailers were involved in the Oerlikon Cargo project. Consequently, the volume of goods that had to be distributed was too small and therefore, Oerlikon Cargo was not able to operate at competitive prices.

Because of all of this, the number of transport-movements was hardly reduced and the energy-savings in the Oerlikon area were not very significant.
It became clear that Oerlikon Cargo could not be self-supporting, therefore it was decided that it would be better to stop the project.
The three main reasons to stop the project were:

- Oerlikon Cargo had not been able to attract new participants.

- ❖ The costs of transportation and transhipment were too high. The participants would not have been willing to pay the full costs of distribution by Oerlikon Cargo. Thanks to the financial support at the starting phase, participation was reasonably attractive at the beginning of the project.
- ❖ Only subsidies could have prevented the failure of the project, but subsidizing would definitely have led to protests of carriers not participating in Oerlikon Cargo.

The exact reasons why most retailers were not interested in participation in Oerlikon Cargo (OC) are shown in the following table:

Table 1: Reasons for not participating in Oerlikon Cargo.

	special transport demands	number of deliveries per week by CL is too low	logistics system of the company already is efficient	higher costs	number of companies involved in the inquiry
independent retailers	38%	33%	9%	22%	45
retailers affiliated to a chain store	50%	40%	50%	10%	10
multiple store	21%	11%	79%	26%	19
other shopkeepers	41%	33%	10%	33%	39
Branche food stuffs	72%	45%	17%	10%	29
retail trade (goods of little value)	0%	31%	44%	44%	16
retail trade (valuable goods)	37%	19%	15%	11%	27
textile, clothing, shoes	31%	31%	77%	39%	13
Service companies	25%	25%	7%	39%	28

Source: DIANE 6, 1996, p.26.

The reasons why shippers and carriers in Zurich were not interested in participation in Oerlikon Cargo were also examined. 13 shippers and carriers were asked why they were not willing to participate in the project. They mentioned the following reasons:

- it is uncertain whether Oerlikon Cargo is able to offer the same service-level as the current logistics system;
- the prices of Oerlikon Cargo services are too high;
- the fear of losing customers;
- the good relationship with the current forwarder;
- no savings-potential.

4.2 *Underground deliveries to the central station*

A large number of shops (covering 8000 m^2) have been established in the old central station in Zurich. Every day 300000 people visit this shopping centre. During the peak periods 750 pallets an hour are unloaded in the centre. A business centre is also located in the station.
In 1995 it became possible to supply the entire shopping centre by underground deliveries. By delivering goods underground the negative effects on the quality of life caused by the loading and unloading of trucks is avoided. The costs of the project were SF 40 million. The Swiss railway company, CFF, financed three-quarters of this amount. CFF owns the premises and manages the project. The municipality takes care of the remaining quarter of the costs.
Up to now, the project seems to be a real success. (Savy, Stransky, 1997, p.52)

Summary 5

The Oerlikon Cargo project started in October 1994. One carrier (Zingg Transporte AG) was responsible for the distribution of freight from the Oerlikon Cargo platform to retailers in the city centre. The volume of cargo handled by Oerlikon Cargo was very limited. It could not offer competitive services. The parties involved in the project decided to end the project in July 1995.

After the evaluation of the Oerlikon Cargo-project, the DIANE 6 organization drew some conclusions and published the following recommendations for other City-Logistik projects:

- By making the parties, involved in urban freight distribution, aware of the problems in the inner city, they can be motivated to participate in a City Logistik programme.
- More attention has to be paid to the costs of City Logistik. When the costs of distribution increase due to City Logistik, companies will not be interested in the project.
- To make distribution through City Logistik attractive, added value services must be offered (stock-keeping and a home delivery service, for instance).
- Supporting measures should be introduced to 'push' carriers to participate in the project. However, these measures should not lead to inefficiency or monopolization.
- To maximize the effects of City Logistik, consolidation by shippers, or the establishment of more urban distribution centres could be considered.
- If wholesalers, shippers and carriers would participate in City Logistik along with small retailers, the number of consigments would rise and the project would become more successful.

(DIANE 6, 1996, p.VII)

The background of the city 1

Bremen

Bremen is a city in the Niedersachsen-area in northern Germany. It is located on the banks of the Weser river, about 70 kilometres from the North Sea. The number of people living in the Niedersachsen-area is 1.143.600. The city of Bremen covers 326,77 km^2 and the number of inhabitants in the city is 552.000 (Hautau et al, 1995, p.10). In the 'Altstadt Bremen' (the city centre) 3183 people are living.
The Altstadt covers 1,18 km^2 and is characterized by retail trade, banks, restaurants and tourist attractions (Hautau et al, 1995, p.12). A quarter of the total number of jobs in Bremen are in manufacturing. Trade also plays an important role in this area. A considerable trade in cotton, grain and tobacco takes place in Bremen. The main industries of Bremen are shipbuilding and the production of iron and steel, automobiles, electrical equipment and machinery.
The port, which is not only accessible by inland waterways but also by sea, is important for the economy of the city. In 1830 'Bremerhaven' was opened to take care of ships that were too large to sail up to Bremen itself.

Volume and characteristics of traffic 2

Bremen is a multimodal nodal point, the city is accessible by air, road, rail, river and sea (Neustädter Hafen). Many carriers and a large number of logistics service industries are present in the Bremen area. In short, Bremen is a logistics centre.

In 1995 the daily goods flow in the city centre of Bremen was 128 tonnes on an average. It is estimated that the daily goods flow will be 189 tonnes in the year 2005. Urban freight distribution in Bremen is mainly carried out by means of trucks. The following table shows exactly which vehicles are being used for urban distribution in the Bremen area:

Table 1: Vehicle types used in the Bremen area.

cars/vans	13,2%
Trucks < 3,5 tonnes	41,7%
Trucks between 3,5 and 7,5 tonnes	31%
Trucks > 7,5 tonnes	14,1%
Total	100%

Source: Hautau et al, 1995, p.26.

Some facts and figures regarding goods transport into the inner city of Bremen:

- Most deliveries are destined for food retailers (44,5%), followed by the hotel/restaurant-sector (29,1%).
- Carriers often have to unload their trucks 100 metres away from the shops because there is a lack of loading/unloading facilities in the streets.
- The largest part of the total amount of goods is brought to the city centre by wholesalers (28,8%).
- The largest number of deliveries per ride are executed by parcel- and by postal-services (73 and 58 deliveries per ride respectively).

The following table shows the weekly delivery schedule.

Table 2: Weekly deliveries in Bremen.

Monday	16,6%
Tuesday	18,6%
Wednesday	18,4%
Thursday	18,0%
Friday	23,9%
Saturday	4,4%

Source: Hautau et al, 1995, p.30.

- During a day, deliveries are concentrated in the morning hours. Most shops are supplied between 7 am and 11 am. Between 9 am and 10 am in particular. Before 9 am 28% of the deliveries are carried out. At 11 am 70% of the deliveries have been completed.
- In most cases, the large department-stores and the

food retailers can be supplied before opening-times (9 am). Other retailers have more difficulty in receiving the goods before 9 am, because of the absence of personnel before opening-times. Therefore, these retailers are supplied later.
(Hautau et al, 1995)

Regulations/policy **3**

In the pedestrian-zones in Bremen, time windows have been imposed. However, for a city of the size and structure of Bremen, there are relatively few pedestrian-zones. Carriers are allowed to deliver between 7 pm and 11 am in these zones (Hautau et al, 1995, P.19). Still, in many cases it is possible to deliver at the backdoor of shops outside the time windows. In the rest of the city of Bremen, eleven different time windows are applied.

The project: 'City-Logistik' **4**

The 'Güterverkehrszentrum Bremen'

In 1984 the 'GVZ-Entwicklungsgesellschaft' (the GVZ development organization) was established. This organization is responsible for the development of the 'Güterverkehrszentrum (GVZ) Bremen'. A 'Güterverkehrszentrum' (Freight Transport Centre) can be defined as follows:

'A GVZ is a site appointed for logistic activities, where the systematic establishment of transport companies and related service industries takes place.'
(Langhorst, 1993, p.1)

The GVZ is a logistic centre for multimodal transport where synergy-effects between logistic service industries can easily arise. Synergy-effects emerge because many logistics service industries are located at one specific site. This results in reduced distribution costs. This gives transport operators located at the GVZ an advantage over their competitors.
The total size of the GVZ-site in Bremen, on which forty companies are located, is 200 hectares. When the GVZ was established, 2000 people were working for the GVZ-companies.

Each month 500 tonnes of goods are transhipped at the GVZ.
Goods that are transhipped, are for instance: food-stuffs, textile, car-parts and fresh products. The City of Bremen and the GVZ-companies have both invested 250 million DM in the GVZ. Every year each company located at the GVZ pays a contribution of 3000 to 5000 DM.
Near the GVZ, the industrial area 'Niedervieland II' is situated. Many manufacturers have decided to settle there, because of the proximity to the GVZ.

The main reason for the success of the GVZ Bremen is that the transport companies cooperate voluntarily. The GVZ-companies cooperate in many projects and many bilateral commitments are made. Bremen is seen as an example for other cities, because of the success of the GVZ.

The 'GVZ-Entwicklungsgesellschaft' (GVZE)

The 'GVZ-Entwicklungsgesellschaft' is a neutral platform installed to coordinate and discuss the different interests of the parties involved in goods transport (the municipality, carriers, several organizations and citizens). The GVZE is financed by the carriers of the GVZ, other GVZ-companies and the City of Bremen.

Many companies are interested in a site at the GVZ. The decision to allow a company to the GVZ is made by the GVZE, a political committee and an organization concerned with the economy of the city of Bremen ('Wirtschaftsförderungsgesell-schaft Bremen'). Before these three parties make a decision, they check whether or not the interested company fits into the GVZ. The GVZE is not only concerned with the management of the GVZ, but also with the management of the 'City-Logistik' project.

City-Logistik

At the GVZ-site, attention is not only being paid to international, multimodal transport but also to urban freight distribution. The 'City-Logistik' project is concerned with freight distribution into the inner city of Bremen. The essence of the 'City-Logistik' project is that goods destined for differ-

ent shops in the city centre are consolidated at the GVZ.
The advantages of 'City-Logistik' are:
* that the vehicles used for urban freight distribution are used more efficiently;
* that less journeys into the inner city are needed;
* that less environmental damage is done.

Consequently, both the accessibility and the quality of life in the city centre are improved when 'City-Logistik' is applied.
The initiative for the 'City-Logistik' project was taken by the neutral GVZE. Companies located at the GVZ-site voluntarily cooperate in this project. To make 'City-Logistik' a success, cooperation between carriers is a must. This means carriers have to give up a part of their individuality. Furthermore, retail traders have to accept that their goods are being consolidated. It takes a lot of effort to achieve cooperation between carriers and retailers, because carriers and retailers have to be convinced of the advantages of 'City- Logistik'.

4.1 Results

It took 7 years before 'City-Logistik' became a success in Bremen. The number of journeys into the city centre of Bremen decreased by 12,7% and the load factor of the trucks increased by 28%, thanks to 'City-Logistik'. It is expected that 'City-Logistik' will lead to even better results in the future.

Table 3: Results of City Logistik

	Status quo	Scenario 2005 without City-Logistik	Scenario 2005 with City-Logistik
Transportvolume in tonnes, per day	128	189	189
Number of journeys, per day	106	157	109
Number of vehicles used, per day	40	59	23
Number of driving-hours	167	247	84

Source: Ambrosi, Biendara (1996, p.6).

5 Summary

In Bremen, the 'Güterverkehrszentrum-Entwicklungsgesellschaft' (GVZE) was founded in 1984. The 'Güterverkehrszentrum (GVZ) Bremen' was established by this organization. The aims of the GVZ were:

- to create a logistic centre for multimodal transport
- to create an environment in which synergy-effects between logistic service industries can arise
- to reduce environmental problems
- to create a scheme for freight distribution into the inner city (City-Logistik)

The productivity of goods traffic in Bremen has increased since the GVZ is operative. At the GVZ-site shipments for different shops in the city centre are consolidated, this is called 'City-Logistik'.
The main reasons for the success of the 'City-Logistik project' are:

- Carriers located on the GVZ-site cooperate voluntarily.
- The GVZE. This is a neutral platform that coordinates and discusses the different interests of all parties involved in urban freight distribution into Bremen.

The example of Bremen shows the importance of urban planning for efficient and environmently friendly freight distribution. The establishment of a multi-modal transport center has improved the efficiency of transport and stimulates the modal shift towards rail and water. Furthermore, the concentration of transport activities facilitates cooperation between transport operators.

The background of the city 1

Munich

Munich is the capital of the German state of Bavaria. It is the third largest city in Germany, after Berlin and Hamburg. The city is situated in the southern part of the country, in the valley of the Isar river. The city area covers 310 km2. The number of people living in Munich is 1.229.026 (1991).
Munich is the seat of the Bavarian state government and a major transportation, commercial and industrial centre. The city is famous for its beer, but machinery, automobiles, furniture, clothing, optical instruments, and electronic equipment are more significant manufacturing industries. Other industrial activities in Munich are glass staining, wood carving, and silver and bronze founding. Publishing and filmmaking are important, as well as the fashion and high technology industries. Munich is also one of Europe's leading financial and wholesale trade centres. Tourism is another major source of income.

Volume and characteristics of traffic 2

The transport of goods in the city of Munich has been growing rapidly the last couple of years, because of the positive economic development in the city. Consequently, the nuisance (noise, pollution, accidents) caused by delivery traffic has increased. In Munich, 8 to 10% of the total number of vehicles are engaged in goods transport.
It has been estimated that the goods transport in German cities will be doubled in the year 2010. Goods transport is responsible for 20 to 30% of total traffic in Germany. If goods distribution could be organized more efficiently, traffic nuisance would be reduced.

The following figures concern freight distribution into the city centre of Munich:

- Every day some 3200 tonnes of goods are distributed in the city of Munich.
- The largest part (42,4%) of the total tonnage is transported to the grocery retailers.
- Another large part (8,6%) is brought to clothing shops.
- The daily number of deliveries in Munich is 14470.
- 26% of the deliveries are carried out by postal- or parcel services.

- The sectors that are supplied most frequently are: the pharmaceutical industry (19,6%) and the grocery retailers (16,1%).

(Berg, 1996, p.9)

The table on the next page shows which vehicles are used for goods transport in the Munich area by wholesale trade and by transport-companies.

Table 1: Vehicle types used in Munich.

	Vehicles used by wholesale trade	Vehicles used by transport-companies
small trucks / vans < 2,8 tonnes	9%	21%
trucks > 2,8 and < 7,5 tonnes	73%	54%
heavy trucks > 7,5 tonnes	2%	23%
other vehicles	16%	2%

Source: Berg, 1996, p.10.

- Wholesale traders use on average 62.5% of the loading capacity of their vehicles.The capacity utilisation of the goods vehicles of transport operators is about 77,6%.
- The wholesale traders visit 15,4 delivery-stations per ride. Transport-companies make on average 10,7 stops for deliveries on one journey.
- The average speed of transport by wholesalers in the city of Munich is 16,7 km/h. For transport companies this is 21,6 km/h.

(Berg, 1996, p.10)

3 The project: 'City-Logistik'

A feasibility study concerning 'City-Logistik' has been carried out by the Institute for Logistics- and Information-management at the University of the Bundeswehr Munich under the heading of Prof. Dr. Berg. The Bayern state government for economics, traffic and technology supported this study financially. Furthermore, shippers, carriers,

retail trade and some economical organizations participate in the project.

The goal of the 'City-Logistik' project in Munich is to maximize the utilisation of the loading capacity of goods vehicles and to reduce the number of deliveries through consolidation of shipments of some specific lines of industry.

The City Logistik project in Munich includes:

- The development of existing distribution centers into freight distribution centres for consolidation of shipments of cooperating shippers, logistic service providers and retail trade.
- The creation of telematic networks between the freight distribution centres.
- The development of efficient systems for the transhipment of cargo that reduce the transhipment time.
- Testing and usage of environmently friendly vehicles.

Cooperation between the parties involved in goods transport will be essential for the City Logistik project. At first, the model of City Logistik in Munich was pointed at cooperation between shippers. Since the 1st of April 1997, the City Logistik project has been extended and attention is being paid to the possibility of goods consolidation and cooperation by retailers.

The total costs of the project are approximately 800000 DM.
The 'Bayerischen Staatsministerium für Wirtschaft, Verkehr und Technologie' (The state ministry for economics, traffic and technology) invested 250000 DM at the start of the project. Other financers of the project are:

- Shippers
- Carriers
- Retailers
- Organizations representing carriers and wholesalers
- The Chamber of Commerce of Munich
- Institute for logistics and information-management of the University of Munich.

Several delivery-cooperations have been established be-

tween shippers in the same line of industry. Potential lines of industry for consolidation of shipments are:

- body-care, detergents
- paper and writing-materials
- food-stuffs
- home-appliances
- clothing
- building industry

A simulation-model of the project in Munich showed, that the following could be achieved:

- Cost-savings of 18 to 25%.
- By consolidating the goods the total number of deliveries will decrease on average by about 29,2%.
- Per ride about 2 delivery-stops could be saved. This means, a savings-potential of about 18,2%.
- Thanks to the reduction in the number of stops, delivery-times will be reduced by about 31 minutes per ride.
- The consolidation of goods is responsible for a reduction in total delivery-time of 75 minutes per ride.
- By consolidating the goods, the load factor of the vehicles could rise from 70 to 81%.
- When the City Logistik project is implemented, pollution could be reduced by about 29% in the city centre.

(Berg, 1996, p.13,14,17,18)

Some advantages of the consolidation of shipments for the involved parties:

Shippers:

- Because the shippers are working on solutions to reduce the nuisance caused by delivery traffic, their image will be improved.

Retail trade:

- The accessibility of the shops will be improved, deliveries can be carried out more quickly.
- Customers will be less bothered by the delivery traffic.

Logistics service providers:

- The loading capacity of the vehicles is better utilized.
- A reduction in the number of stops during a ride.
- New marketniches.

Some disadvantages of the consolidation of shipments for the involved parties:

Shippers:
- Costs will possibly rise, because telematic tracking- and tracing-systems have to be adjusted to the consolidation-system and because standardization of packings is required to make the system work (investments in new packings are necessary).

Retail trade:
- Shops are less often supplied, therefore they have to increase their inventory which leads to higher costs.

Logistics service providers:
- When extra transhipment is required, costs will rise.

Results 4

Up to now, the results of the 'City-Logistik' project are not known. The project will be evaluated in 1999.

Summary 5

To improve the efficiency of urban goods transport in Munich, a 'City-Logistik' project was introduced. The Institute for Logistics- and Informationmanagement of the University of the Bundeswehr Munich carried out a feasibility study concerning City-Logistik in Munich.

The aims of City-Logistik in Munich are:

- to collect goods flows for some specific lines of business
- to maximise the utilisation of the loading capacity of goods vehicles.
- to reduce the number of deliveries

A simulation-model of the City-Logistik project showed that City-Logistik can lead to cost-savings, a lower number of deliveries in the city centre, a higher load factor of vehicles and less pollution.

The cooperation between shippers is of vital importance for the success of the City-Logistik project in Munich. In 1999 the project will be evaluated.

Gothenburg

1 The background of the city

Gothenburg is the second largest city in Sweden. The city is located in south-western Sweden and is accessible by truck, train, boat and aeroplane. Gothenburg has 433.811 inhabitants (1993). Most people in Gothenburg are working in the service sector, but there is also a considerable amount of employment in the industrial and transport sector.
Industry and international transport are of vital importance for the economy of Gothenburg. The port of Gothenburg, which has direct access to the Atlantic, is very important for the transport sector in the city.
The shipbuilding activities in Gothenburg are the largest in the country. Other industries in the city produce textiles, office machines, foodstuffs, paper, leather and wood products. The main businesses in the industrial sector in Gothenburg are the car industry (VOLVO) and the medical/chemical industry (Astra, Hessle)

2 Volume and characteristics of traffic

A case study concerning urban freight distribution in the Linné-district has been carried out by Kristiansson and Pettersson. Linnéstaden is a reasonably old part of the inner city of Gothenburg. In this area 65.000 people are living and there is a lot of commercial activity. The area is characterized by a rigid structure of streets and buildings.
The case study gives some insight into the volume and characteristics of traffic in the Linné-district. In the case study Kristiansson and Pettersson attempted to answer the following questions (1996, p.1):

- Who carries out the distribution in the Linné-district and what does this involve?
- How is distribution carried out, and what is the scope and form of the distribution to food stores?
- What factors determine the form of the distribution?

The results of the case study are described as follows:

- The players involved in the distribution of food-stuffs are the shopkeepers, the food-stuffs suppliers and the forwarding companies.

- In the Linnéstaden-district about 40 foodstuff-retailers of varying size are located. They are supplied by about 80 companies.
- 94% of the deliveries in this area are carried out by small and medium-sized companies with their own distribution system. These companies are responsible for the delivery of 53% of amount of goods.
- The average food-stuff retailer in the Linné-district is supplied about 70 times a week.
- Bread is delivered most frequently, it is responsible for 40% of the deliveries. Dairy products make up for 14% and vegetables and meat products each make up for 11% of the deliveries.
- Before 11 am distributors have finished 70% of the deliveries.

In general, shops order the goods the day before delivery, but sometimes the shopkeepers order goods on the same day. This might have consequences for the transport costs that have to be paid by the shopkeepers, because a common pricing policy does not exist anymore in Gothenburg (Kristiansson, Pettersson, 1996, p.3). Sometimes shopkeepers have to pay an extra amount when they place small orders. The transport costs are included in the total price that has to be paid by shopkeepers.

The form of distribution is determined by:

- Competition between suppliers; suppliers offer special services to attract customers.
- The special treatment that perishables require (for instance, daily delivery).
- Control; the suppliers want to control the entire chain (from production to the shop) and therefore have their own distribution system.
- Time windows and the structure of the area; for efficient distribution more vehicles are needed due to the time windows and the structure of the area (narrow streets etc.).

  This means that the vehicles will not be fully loaded.

(Kristiansson, Pettersson, 1996, p.3)

As a result of the case study of Kristiansson and Pettersson, it will be possible to:

- ❖ Identify the changes in the number of transport movements, energy consumption, pollution, noise and costs.
- ❖ Assess the potential for reducing the number of transport movements in the city centre.
- ❖ Stimulate various logistic alternatives.

(Savy, Stransky, 1995, p.39)

3 Regulations/policy

In a few streets in the central part of Gothenburg, a time window has been introduced. In these streets, shops can only be supplied between 24.00 and 11.00 am. On other streets in Gothenburg there are no time limits.

In the central areas of the three largest cities of Sweden (Gothenburg, Stockholm and Malmö) environmental zones have been introduced on the first of July 1996. This means that there are special regulations for diesel trucks with a total weight over 3,5 tonnes in the city centres (van Andel, Ohm, 1996). These trucks are banned from the inner city if they don't meet certain vehicle requirements concerning emissions and noise. The aim of the environmental zones is to improve the quality of life in the city centres and to stimulate the development of cleaner and quieter vehicles. It was estimated that the nuisance caused by trucks would be reduced by 30% after the implementation of the environmental zones (Environmental zones, 1996, p.1).

All vehicles have been given an environmental classification. There are three different environmental classes, in which class 1 is the cleanest and quietest one (Environmental zones, 1996, p.1). Since the first of July 1996, diesel vehicles with a weight over 3,5 tonnes, that do not belong to environmental class 3 do not have access to the inner city anymore.
In 1999 the standards will be increased. By then, all vehicles that weigh over 3,5 tonnes have to meet the standards of environmental class 1, or have to meet the Euro 2 emission criteria and the European noise pollution requirements, to get access to the city centre
(Environmental zones, 1996, p.1).
Until the year 2001, all vehicles that are under 8 years old

will be given dispensation and are allowed to drive in the environmental zones. The following table shows until the end of each year, vehicles that are allowed to operate in the city centre.

Table 1: Dispensations from vehicle requirements in environmental zones.

Year of model:	Allowed to operate until the end of the year:
1988	1996
1989	1997
1990	1998
1991	1999
1992	2000
1993 and later	2001

Source: Environmental zones, 1996, p.2.

In addition, special dispensation can be given to vehicles older than 8 years.

The project: 'Coordinated Distribution' 4

In 1991 a project was launched concerning coordinated distribution of everyday goods (food-stuffs) into the inner city of Gothenburg. The project was focussed on the Linnéstaden-district. In April 1995 the coordinated distribution project restarted, because it became clear that the 1991-project was focussed on the wrong sector (the wholesalers). The 1995-project concentrated on the carriers and on distribution not-coordinated by wholesalers (Kristiansson, Pettersson, 1997, p.3). Although wholesalers deliver 47% of the goods, they are only responsible for 6% of the number of deliveries (Kristiansson, Pettersson, 1997, p.4). In short, the distribution of goods by wholesalers is already carried out efficiently and consequently they don't have to be involved in the coordinated distribution project.

Eventually, the first experiments with coordinated distribution started in September 1996 (Savy,
Stransky, 1995, p.37). The project is financially supported by the local government, the Communication Research Board and Volvo.

The aim of the project is to reduce the number of vehicles required for the distribution of food-stuffs and consequently to reduce the nuisance in the inner city (pollution, noise, etc.). The basis for the project is cooperation between companies. Participation in the project takes place voluntarily. The project should lead to a change in the behaviour of the parties involved in distribution, the development of a new distribution system and the cooperation of competitors.
When coordinated distribution is taking place, 'suppliers will purchase the transport from a forwarding company which sees to it that the goods are delivered to the right consignee at the right time.' (Savy, Stransky, 1995, p.37).

Because the suppliers have great influence on urban distribution, the incentives for suppliers to take part in the coordinated distribution project are very important for the success the project. These incentives are the following:

- Economic benefits; coordinated distribution should not be more expensive than the current system.
- Participation in coordinated distribution will give suppliers a good (environmently friendly) image.
- The 'environmental zone'; these zones can stimulate suppliers, who do not have at their disposal modern vehicles, to participate in coordinated distribution.

(Kristiansson, Pettersson, 1996, p.4)

Difficulties that can emerge when coordinated distribution is applied:

- A shopkeeper can only order goods one day before delivery, because the supplier needs time to determine his delivery route.
- Shopkeepers want to receive their goods in time. This probably means that several subsystems are required for coordinated distribution rather than one large system.
- The contact between the truck-driver and the shopkeeper will disappear. For some suppliers, however, this contact is very important. Consequently, the suppliers will have to find a solution for this problem.
- It will be difficult to achieve cooperation between competitors. Therefore, it might be necessary to found an independent 'third party' to take the initiative for coordinated distribution.

(Kristiansson, Pettersson, 1996, p.4)

4.1 Results

Up to now, five suppliers joined the coordinated distribution project, which means that coordinated distribution is only operative on a small scale. Results of the coordinated distribution project in Linnéstaden are not available yet.

Global Positioning System in Växjö 5

In Växjö in south-eastern Sweden the Global Positioning System is used for traffic management by BTL, a Swedish haulage company. Information is passed through by satellite between the drivers and the control center of the company. This system enables the company to determine the exact location of its trucks and it provides the drivers with the most accurate information. Truck operations can be adjusted more easily to incoming orders. This results in shorter routes.
An evaluation of the effects is presently carried out. According to the local management the system has resulted in a 10 to 15 percent increase in productivity. The improved efficiency of operations has reduced the contribution to emissions, noise and congestion levels.

Summary 6

In Stockholm, Malmö and Gothenburg, the three largest cities of Sweden, environmental zones have been introduced in July 1996. Trucks weighing over 3,5 tonnes are banned from the environmental zone (an area in the city centre) if they don't meet certain emission and noise requirements. By creating environmental zones, the municipalities want to improve the quality of life in the city centres and they want to stimulate the development of cleaner and quieter vehicles.

An experiment with coordinated distribution started in September 1996 in Gothenburg. This project focusses on the suppliers of food-stuffs in the Linné-district. The goal of coordinated distribution is to improve the quality of life in the district by reducing the number of vehicle-movements. The project is based on co-operation between competitive food-stuff suppliers. Companies can participate voluntarily in the project.

In Växjö the use of a GPS traffic management system by a road haulage company has resulted in substantial improvements of the efficiency of transport operations. Thereby it has contributed to a reduction of emission and noise levels.

Helsinki

The background of the city 1

Helsinki is the capital and the largest city of Finland. The city is located in the south of the country on the Gulf of Finland. The metropolitan area of Helsinki covers 740 km^2, the city 185 km^2 and the inner city 34 km^2 (City of Helsinki, 1995). In 1990, the number of people living in the metropolitan area of Helsinki was 1.009.000, this is about 20% of the total population of Finland. Early in 1994, the number of inhabitants of the city was 498.410. The population of the inner city numbered 154.597.
Helsinki is Finland's chief port and handles more than half of its foreign trade. It is also the country's manufacturing centre. Engineering and shipbuilding industries, food and timber processing are important activities in Helsinki. Furthermore, Helsinki is the cultural and educational centre of the country.
In 1993 the total number of jobs in Helsinki was 297.872 and there were 24024 sites of employment. According to the number of employment sites, wholesale and retail trade are the most important fields of business in Helsinki (Nummenpää, 1995, p.12,13.).

2 Volume and characteristics of traffic 2

The following figures concern freight transport in Helsinki in 1991:

- About 50 million tonnes of goods were transported through the Helsinki area.
- The internal goods flows of Helsinki were responsible for 536.000 tonnes (excluding the flows to and from the port).
- The port plays an important role in the goods transport in Helsinki. Goods transport from the port to Helsinki amounted to 2.413.000 tonnes. From Helsinki to the port this was 743.000 tonnes.

(Nummenpää, 1995, p.5,6)

Table 1: Number of vehicles required on weekdays for certain fields of business.

	Number of vehicles
Dairy products	80
Meat, sausages, etc.	110
Bakery	200
Brewery	140
Alko (state alcohol monopoly)	6
Mail	225
Letter mail	140
Courier services	150
General wholesale (trade central business)	150
Garbage disposal	240
Tank transport (oil products)	100
Professional general delivery (other than those above)	700

source: Nummenpää, 1995, p.8.

3 Regulations/policy

In the city centre of Helsinki a length-limitation of 12 metres has been imposed. The limitation is not valid for buses and coaches and some other vehicles are given an exemption.
The head of the traffic planning department is allowed to give exemptions. Exemptions can, for instance, be given to construction traffic.
In 1994, 109 carriers received an exemption. The number of exemptions with a duration of less than one week was 57, exemptions given for a period between one week and six months numbered 20 and consequently, the number of exemptions for a period longer than six months was 32. Only three times did the head of the traffic planning department refuse to give an exemption to a carrier.

Some advantages are given to the delivery traffic in Helsinki. For instance, delivery traffic is allowed to drive on the buslanes. However, this is only permitted at times when public passenger transport is not hindered by the presence of the delivery vehicles. Furthermore, delivery traffic is

given an exemption from some driving prohibitions, so that it will be easier for carriers to deliver their goods.

The project: 'The development program for goods transport' 4

The project in Helsinki involves a development program for goods transport. This development program has been published by the City of Helsinki and the Ministry of Transport and Communications of Finland in 1995. In the introduction of the 'development program report', the aim of the program is described as follows:

'Development of goods transport aims at transporting the goods from the producer to the point of arrival with an expedient means of transport through the shortest possible route with lowest possible costs in such a way, that the need of ground area as well as social and environmental costs remain optimally low. The more effective goods transport, the lower environmental adverse factors.'
(Nummenpää, 1997, p.1)

First of all the views of the business sector, the customers, the inhabitants, the transport companies, the City of Helsinki and other involved parties were mapped. A combination of these different points of view resulted in a development strategy for goods transport in Helsinki. This strategy contains the following objectives:

- Sufficient and reasonably priced transport services are guaranteed to the business sector.
- Goods transport facilities and the everyday environment of the local residents will be improved.
- Economy and effectiveness of transport will be improved.
- Necessary terminal capacity will be provided in the areas needed by the transport sector.
- Goods transport planning will be introduced as a permanent part of zoning and transport planning.
- Control systems improving the total logistics will be developed and cooperation will be increased between the interested parties.

(Nummenpää, 1995, p.13)

To put the development strategy into practice, several development measures have been prepared. These measures are:

- Forming of a goods transport planning unit.

Up to now, only a limited amount of statistical information concerning goods transport in the city centre of Helsinki has been available. However, this information is necessary before decisions can be taken. By establishing a goods transport planning unit this problem could be solved. This planning unit can collect information about goods transport in the city and can utilize this information for traffic planning and zoning. Furthermore, the unit can discuss problems and solutions with the business sector and transport organizations.

- Operational conditions of goods transport in the ports will be improved.

The terminal areas in the new Vuosaari harbour will be planned in such a way, that they form an integrated terminal belt with the new harbour facilities. The terminals and stores established at the harbour area or in its immediate proximity will reduce the necessity to transfer or reload goods. In addition, some measures will be taken to reduce the problems of the existing harbours.

- Conditions will be created for arranging open delivery and long-distance terminals in Helsinki. Stopping and-night parking sites for swap bodies and other transport equipment will be zoned.

Goods transport requires a lot of space. However, in the city area not much space is available. Therefore, the city authorities should appoint certain areas for goods transport in their real estate policy.

- A route map serving the needs of delivery route planning will be made for the Helsinki Metropolitan Area.

Route planning is essential for the efficiency and costs of transport. When route planning is applied in the right way,

it will be possible for carriers to choose the optimal equipment and use the equipment in an efficient way.
For choosing the right vehicles and for optimum planning, a route map is needed which shows driving times on different routes during different times of the day, alternative traffic routes, suitability of the streets for goods trucks of different sizes, parking, loading and unloading possibilities, driving limitations, preferable routes etc. Automatic route planning and optimization requires the map to be also in a digital form (Nummenpää, 1995, p.15).

- City's own-transport and the usage of equipment will be coordinated.

An office shall be founded, with the aim of coordinating and developing the internal and external transport in the city.

- Consolidated deliveries will be encouraged, resulting in reduced traffic volume and transport costs.

Consolidating deliveries can be achieved in many different ways, depending on the products, customers and manufacturers. For instance, 'goods transport buses' could be used, delivering according to timetables along regular routes.
When small consignments are consolidated into larger consignments, a delivery terminal is required. As the consign-ments reach the terminal, the address of their destination has to be available so that the consignments can be easily consolidated. Also, a comprehensive data system for collecting information is needed to manage the consolidation of the goods.

- Dialog procedure and cooperation in developing the operational requirements of goods transport shall be increased.

An organization should be formed to provide information, to act as a discussion platform and to find solutions. The transport section of the Trade and Business Advisory Committee may act as the co-ordinator for this data.

❖ Applications for construction permits require the real estate department to have a goods supply plan.

When someone is applying for a construction permit, a goods supply plan will be demanded. From this plan the possibility of goods transport inside the building, on the building site and in its close proximity should become clear. The plan should include a space reserved for garbage disposal and recycling.

❖ Practice of using loading and unloading squares shall be improved.

Because of incorrectly parked cars, trucks are sometimes unable to use the present loading and unloading squares. Therefore, the squares will be marked more prominently and the control of their usage will be improved.

❖ Use of environmently friendly 'city-vehicles' will be stimulated.

Delivery vehicles that meet certain criteria will get a quality marking. This marking will give them some advantages. For instance, they will be allowed to use certain traffic lanes and they will have special parking spaces at their disposal.

In September 1996 another development project, 'City and Regional Logistics', was prepared. The preparation-phase will be finished, and a report concerning the development project will be presented, by the end of 1997. The report will include a feasibility study and pilot projects. The parties that participated in this project are: customers for small deliveries, industrial and commercial enterprises, suppliers for data communication and logistic control, cities and regions in the Helsinki metropolitan area, the Ministry of Transport and the Ministry for Environment. These participants all supported the project financially. Some participants are represented in the working group that discusses the progress of the project every week.
This new project will lead to the implementation of new logistic functions, that will reduce the number of traffic movements and the nuisance in the city and region.
❖ The project will focus on:

- the concentration of goods flows;
- the filling of service gaps (new logistic services);
- the sustainable development of logistic networks (e.g. usage of environmently friendly vehicles, combined road-rail transport).

(Nummenpää, 1997, p.6)

One of the aims of this project is to consolidate the distribution of goods to customer groups and districts. Specifically attention will be paid to the 20 percent of the flow of goods that is responsible for 80 percent of the traffic. Small flows of goods will be consolidated, so that economies of scale can emerge. The project will concentrate on foods and perishables. However, the 'City and Regional Logistics' project will also pay attention to clothing, household appliances and furniture (Nummenpää, 1997, p.6).

4.1 Results

Unfortunately, nothing can be said about the results of the project in Helsinki, because the project is ongoing and will not be completed before the end of 1997. Up to now, it is impossible to draw conclusions, because of the absence of results.

Summary 5

In 1995 the City of Helsinki developed a plan to reduce the nuisance caused by goods transport. This plan is called 'The development programme of goods transport in Helsinki'.
The aim of this programme is to organize goods transport in an efficient way without damaging the environment ('the more effective goods transport, the lower environmental adverse factors'). A number of development measures are described in the development programme, for instance:

- the founding of an organization to gather information about volume and characteristics of urban traffic
- the founding of a discussion platform
- the consolidation of goods
- the usage of environmently friendly vehicles

The effects of these measures are not clear yet because the project has not been evaluated.

Barcelona

1 The background of the city

Barcelona is the capital of Catalonia. It is the second largest city in Spain and the fifth metropolitan area in Europe.
The city area covers 91 km^2. In 1991 the number of inhabitants of Barcelona was 1.650.000, the number of people living in the metropolitan area around Barcelona was 4.265.000.
The city is an important banking and financial centre. It is also the manufacturing centre of Spain, one fifth of all industrial production in the country takes place in Barcelona. Traditionally, the textile industry dominated in the Barcelona area. Recently, engineering industries (automobile industry and chemical industry, for instance) have been added.
The number employed in Barcelona is 650.000. 25% of these are in industrial jobs, 6% in the construction business and 69% in the tertiary sector. The tertiary sector includes transport and communication, which accounts for 5% of the number employed. Another large part of the tertiary sector is tourism. Barcelona is an attractive city for tourists. In 1994 2.670.000 people paid a visit to Barcelona (Savy, Stransky, 1997, p.34).

2 Volume and characteristics of traffic

Important access routes to Barcelona are:

- The highway network; 1125 km to Paris, 1500 km to London, 1284 km to Frankfurt.
- The railway network; RENFE, the Spanish railway network, is connected with the French SNCF network through Barcelona.
- The port of Barcelona; handled in 1992 13.000.000 tonnes of imports and 5.300.000 of exports.
- The airport of Barcelona.

3 Regulations/policy

Problems for delivery traffic exist particularly in the Exaimple district. In this district 17% of the total number of shops in Barcelona are located, it's surface is about 8% of the total surface of Barcelona and the number of people living in

the Exaimple district is about 6% of the total number of inhabitants of Barcelona (Savy, Stransky, 1997, p.35).
In the last ten years the authorities have carried out two initiatives in order to organize goods transport in the inner city of Barcelona for the Exaimple district. These initiatives are:

- To accord a delivery time with the retail sector
- To mark special parking places in the streets restricted (during delivery time) to delivery traffic.

(Savy, Stranksky, 1997, p.34)

However, it seems that in central areas of Barcelona delivery vehicles are not able to use the road space which is reserved for them, because other vehicles are using these spaces, disregarding the regulations. As a result, delivery vehicles are often double-parked.
This leads to inefficient delivery as well as increasing congestion for circulating traffic. The penalties for the illegal actions appear to be ineffective. A municipal study on the problems of lack of discipline reported in 1995 that 75% of the vehicles in central Barcelona are loading/unloading in illegal zones: the average duration of loading/unloading is longer for double-parked delivery vehicles (35 minutes) than for vehicles correctly parked (20 minutes).
(Comtrac, 1996, p.32)

To tackle the problems of goods transport in the city of Barcelona, the municipality is implementing a number of policies.
The measures being initiated by the Highways & Traffic Management Department form a key part of the overall policy which includes:

- The minimisation of heavy goods vehicle traffic mileage on the local road network, with encouragement of transfer to smaller vehicles and other modes at interchange points linked to the 30 km ringroad which opened in 1992.
- The promotion of measures to increase the efficiency of delivery by (smaller) vehicles on local roads taking into account the road space requirements of other vehicles (parking spaces/space needed for traffic circulation) and the need to improve the street amenity for pedestrians.

(Comtrac, 1996, p.32)

The problems related to goods transport can be classified into two types:

- Problems arising from the circulation of heavy vehicles.
  These problems have been reduced through the definition of traffic routes and selective time-of-day access restrictions, and promoting the implementation of transhipment centres in the external zone of the city. The construction of the ringroad in Barcelona has also led to a slight reduction in heavy vehicles traffic in the city centre.
- Problems arising from loading and unloading.
  This is one of the main causes of traffic problems in the city centre. Where parking is concerned, there is hardly any discipline. Double parking and illegal parking takes occurs often. This leads to congestion.

(Workshop Comtrac, 1996, p.15)

4 The project

In Barcelona a project started at the end of 1996. The main measures of the project are:

- Delivery time;
  The municipal authorities and a large logistic operator in the urban freight market made an agreement on delivery times and routing into the city. The effects of this agreement will be monitored and the result of this analysis will be applied in the definition of new measures.

- Reserved lanes;
  General traffic is not allowed to drive on a restricted lane in a busy shopping street during certain hours, in order to facilitate delivery traffic. The measure needed a special agreement with the owners of the shops.

- Automatic barriers in the parking lots for loading and unloading;
  This is a solution to avoid illegal parking in the loading/unloading places. Only the van and truck drivers with a magnetic identification card can open the barrier during delivery time. During the rest of the day,

the barriers remain open for free parking.
Telematics systems allow segregation of access in different time periods for different carriers thereby optimising zone performances.

❖ Type of vehicle;
The authorities would like to sign an agreement with van and truck producers in order to add criteria of easy and quick loading and unloading in the design of new vehicles.

❖ Small distribution parks for urban deliveries (micro-platforms)
The municipal authorities could promote small public warehouses in the city. These warehouses could operate like logistic platforms or like hubs with stocks to be distribu- ted. The objective of this measure would be to reduce the number of heavy vehicles in the area. These 'micro-platforms' are similar to urban distribution centres.
Using the platforms has the following benefits:
- improvement of the quality of life in the city
- storage alternative
- reduction of operating costs

Inconveniences are:
- possible delays in the delivery of goods
- loss of direct contact with clients
- increased stock levels

(Workshop Comtrac, 1996, p.15,16);

Another planned measure involves the design of loading and unloading facilities inside new commercial buildings and shopping centres. Several recent experiences (The IIIa Diagonal, Centre Comercial Glories) show that such a measure may be effective (Savy, Stransky, 1997, p.36).

Other proposed measures in Barcelona are:

❖ The promotion of night-distribution.
There are difficulties in getting traders and carriers to accept this measure, because of the high costs and safety problems.

- ❖ Tariff measures.
  Implementation of controlled parking zones, with tariffs that can differ for carriers and other users.

(Workshop Comtrac, 1996, p.15,16)

At the moment the municipality of Barcelona is particularly thinking of implementing micro-platforms in a pilot project. However, there is a budget problem which makes it impossible to start the project.

4.1 Results

Nothing can be said about the results of the projects in Barcelona, because thy have not been evaluated yet.

5 Summary

In Barcelona the Highways and Traffic Management developed a policy to:

- ❖ Reduce the number of heavy vehicles circulating on the local road network and stimulate the usage of smaller vehicles.
- ❖ Increase the efficiency of delivery operations.

A project started in 1996. The measures that were introduced concerned the following themes:

- ❖ delivery times and routing into the city.
- ❖ reserved lanes for goods vehicles in busy shopping streets during certain hours.
- ❖ automatic barriers in parking lots for loading/unloading.
- ❖ development of special vehicles that allow quick loading and unloading.
- ❖ development micro platforms for consolidation of shipments.

Furthermore, the municipality is thinking about the implementation of tariffs differing for carriers and other road users in the parking zones. Attention is also being paid to the possibility of freight distribution at night.

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