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PUBLIC SECTOR GOVERNANCE OF URBAN FREIGHT TRANSPORT

PIARC Technical Committee B.4
Freight Transport and Inter-Modality

WORLD ROAD ASSOCIATION
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AIPCR PIARC

STATEMENTS

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CONTENTS

SUMMARY

The report consists of four main parts along the course of the urban freight transport management; 1) problem identification, 2) approaches to find solution, 3) implementation and 4) evaluation.

With respect to problem identification, we identified *"typical"* ones commonly seen in many cities throughout the world and categorized them by type. Congestion, environmental nuisance, road accidents, energy consumption, visual pollution, damage to infrastructure, often unsuitable infrastructures, drivers' stress and severely tested reliability are found in many cases, and we have categorized them as *"social problems"*. Lack of communication and information and other problems related to organization are identified as *"organizational problems"*.

For these identified problems, we provided several approaches and measures as a solution tool. Our work is unique in suggesting design of a desirable freight vehicle movement and a combination of approaches and measures for the city logistics problems instead of taking a single countermeasure so that thoughtful consideration is given and shortsighted action can be prevented. Importance of selecting the best combination is highlighted. Types of approaches include regulatory approach, logistical approach, co-operative approach, technology approach and behavioural approach.

In the *"implementation"* part, we provided an entire workflow of the freight vehicle traffic management. This includes 1) formation of RFTM (Road Freight Transport Management) partnership/Public Involvement ; 2) problem Identification ; 3) identifying causes of problems ; 4) goal setting ; 5) designing the desirable freight vehicle movement ; 6) selecting the best combination of approach and measures ; 7) identifying unexpected side effects ; 8) pilot program ; 9) implementation of the program and 10) evaluation of the program.

Among all steps of the workflow, we put particular emphasis on *"design of a desirable freight vehicle movement"*, because this step is a key to make the management successful by sharing the common ideal situation among all stakeholders. A successful freight vehicle movement should realize both economically-efficient and environmentally-friendly society that (i) minimizes the travel distance in the urban areas, (ii) uses arterial roads, (iii) chooses lower-emission vehicles and (iv) selects desirable time of day. The report provides further discussion regarding these requirements.

The workflow also works as a *"Plan-Do-Check-Act"* (PDCA) cycle in which freight measures will be improved and more efficient as each cycle ends. Naturally there should be a variety of cases for the application of the cycle.

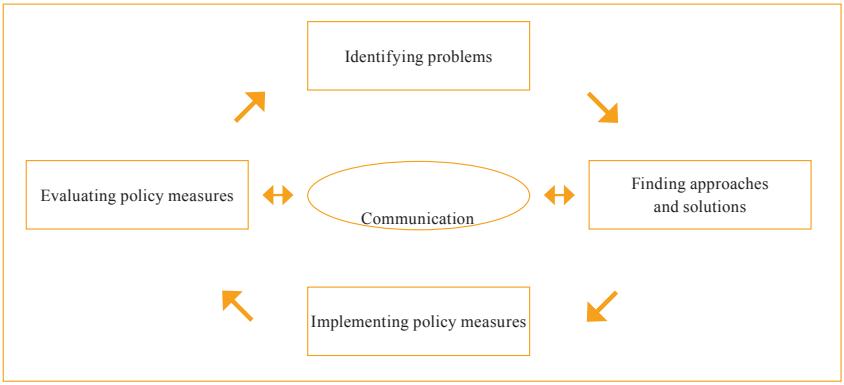
Evaluation and feedback are equally important to guarantee the success of the measures undertaken and to minimize any adverse secondary effects as a result of the intervention. We have provided several key performance indicators to evaluate the measures and have checked how and if evaluation is performed in each case example we collected from the different countries. In addition, we have given original consideration on what we can learn from the case examples. The case examples are summarized in the Appendix.

INTRODUCTION

This report, entitled *"Public Sector Governance of Urban Freight Transport"*, presents the results of surveys and discussions on urban freight transport issues conducted by Working Group 3 *"Urban Freight Management"* of Technical Committee B.4 *"Freight Transport and Intermodality"* of the World Road Association (PIARC). It focuses on the procedure of planning, implementing and evaluating policy measures for urban freight transport. The title of the report indicating *"Governance"* is challenging in terms of the collaborative work necessary to solve difficult problems encountered by stakeholders who are involved in urban freight transport. It suggests the use of partnerships among public and private stakeholders.

There are four major stakeholders: shippers, freight carriers, residents, and administrators who all have different goals and implement various initiatives. On the one hand we need to take an approach based on the industrial point of view, which allows us to establish more efficient and competitive logistics systems for supporting Just-In-Time production and delivery systems. Shippers, in general, hope to receive and send their goods in a reliable manner which does not violate the designated time window for delivery to lower delivery costs. Freight carriers try to meet the shippers' needs using their resources, public infrastructure and information to maximise their profits. On other hand, residents in urban areas seek to minimise the nuisance caused by urban freight transport and to create a safer and more comfortable community. The administrators of municipalities try to enhance the quality of human life as well as decrease congestion levels within the urban road network, decrease the negative environmental impacts and increase the security of urban freight transport.

This report provides guidance for the governance of urban freight transport to the public sector. The main targets of the report are: administrators in municipalities, regional governments, and central governments as well as logistics managers of transport companies and manufacturers. Administrators in the public sector may not be familiar with planning, implementing and evaluating policy measures within urban freight transport, due to a lack of knowledge and experience in the area. This report presents a framework for governance of urban freight transport and some examples of recent good practice in several urban areas and cities in different countries. The framework is composed of four steps *(see figure, following page)*: (a) Identifying problems, (b) Finding approaches and solutions, (c) Implementing policy measures, and (d) Evaluating policy measures. After evaluation some feedback may be needed to be given to the first step of problem identification. The iterative and cycling characteristics of the procedure are essential. Good communication between these four steps and among stakeholders is a key element of the governance procedure, to ensure successful policy implementation.



FRAMEWORK OF GOVERNANCE ON URBAN FREIGHT TRANSPORT

Report Organization

Chapter 1, page 13, in the report describes identifying problems relating to urban freight transport from various points of view including economic efficiency as well as the social issues of congestion, environment, safety, and visual intrusion. *Chapter 2, page 25,* depicts a number of approaches and solutions to overcome complicated urban freight transport problems. *Chapter 3, page 39,* highlights the methodology to implement policy measures, which takes into account the coordination and collaboration of several stakeholders. *Chapter 4, page 67,* finally demonstrates the systematic evaluation methods used to consider the social acceptance of policy measures. Some examples of good practice are used in each chapter to present lessons learned and identify success factors. Case studies of good practice are presented in the appendix.

The report will contribute to establishing public-private partnerships on urban freight transport issues. These public-private partnerships are required to share the knowledge and perspectives among stakeholders, to promote better understanding and cooperation between different organisations, although this may take more time to carry out extra surveys, analysis and discussions. As the procedure of public-private partnerships is relatively new to the area of urban freight transport planning and management, the report will be beneficial for administrators as a reference and guideline.

A guide to implement the road freight transport management is published as a separate document [17].

The report summarises the ideas and experience on the governance of urban freight transport based on real examples and practice in several cities. However, further research and development is still needed in the area to establish a standard methodology, that could be applied in any city or urban area including those in developing countries.

1. PROBLEM IDENTIFICATION

1.1. INTRODUCTION

We have seen that urban goods logistics and transport nowadays have to fit into a context dominated by three basic pillars: mobility, sustainability and serviceability. The objectives pursued should aim at a trade-off between these three pillars. Finding realistic solutions for urban goods distribution should make it possible to both collect and deliver goods produced and sold in cities while minimising the adverse impact of these deliveries on the environment, on road safety, and on the consumption of fossil energy.

The implementation of such transport policies requires efficient cooperation between all the actors involved in the process. This cooperation must be based not only on mutual recognition of the interests and objectives of each stakeholder, but also on a thorough knowledge of the facts at hand. This chapter sets out the characteristics of urban goods transport, with special emphasis on the problems generated but also encountered by urban goods transport. It highlights the complex interacting mechanisms to be considered for an approach to be successful. Finally, it should be noted that an accurate and objective picture of the problems related to urban goods transport will require the collection of adequate data and information.

1.2. SOCIAL PROBLEMS

1.2.1. Congestion

Congestion affects the transport networks of many countries and takes many forms. In particular, chronic congestion is observed on urban roads and on the main arterial roads near metropolitan areas. All forecasts indicate this congestion phenomena will further increase in future:

- at the urban level, congestion will expand by the fast-growing car ownership and urban development in countries where the economy has not yet reached the stage of maturity;
- some strategic roads will become increasingly congested.

In the United Kingdom the traffic exposed to severe congestion is expected to rise from 8% in 2003 to 13% in 2025; in the Netherlands a 30% increase in motorway congestion is anticipated by 2020. In Belgium the traffic prediction model, PLANET, developed by the Federal Planning Bureau is forecasting a significant increase in both passenger and freight transport between now and 2030 (30% in total number of passenger-kilometres and 60% in tonne-kilometres of freight), which will be inevitably followed by seriously deteriorating traffic conditions – such as a decrease in average speed on the road network (31% during peak hours, and 17% during slack hours).

This general development entails a sharp rise in marginal external congestion costs, i.e., the time-related cost caused by one additional road user for all other road users. Congestion costs – whether direct costs in terms of loss of time, or indirect costs in terms of pollution, and adverse effects on heath (e.g., stress), are indeed, significant. However, like in any estimation they vary widely with the assumptions made in the calculations. Figures expressing congestion in monetary terms should, therefore, be interpreted with due care.

Goods vehicles contribute, and are subject to this congestion phenomena. Depending on the count and the traffic model it is estimated that, during morning peak hours, goods vehicles heavier than 3.5t account for 5 to 10% of the total number of vehicles in traffic, representing about 10 to 20% of the number of passenger car equivalents (PCEs). Goods vehicles lighter than 3.5 t, which are increasingly used in urban areas, should be added to these figures. Moreover, by their presence in traffic, trucks further restrict the capacity of an already oversaturated network by their loading and unloading operations, which are widely performed when double-parked on the road. It should be noted that deliveries by double-parked vehicles are due for the greater part to illegally parked vehicles occupying delivery areas.

1.2.2. Environmental nuisance

Pollutant emissions

Over the past few decades, substantial progress has been achieved at the source i.e., the vehicles. Regulations have prompted the development of increasingly less polluting vehicles. For instance, since 1982 European regulations have imposed strict standards for newly built vehicles, including both heavy and light goods vehicles (HGV and LGV), by setting ambitions for controlling the emissions of the following four pollutants:

- carbon monoxide (CO);
- nitrogen oxides (NO_X);
- unburnt hydrocarbons (HC);
- particulate matter (PM).

Unfortunately, the progress achieved at the source has been amply offset by the increase in traffic. In particular, the greenhouse gas (GHG) emissions due to road transport increased by 28% from 1990 to 2006, whereas the average decrease in other sectors was as up to 3%. *(International Energy Agency 2008, in UITP : www.uitp.org/news/pics/pdf/MB_CO23.pdf)*

The transport sector has not set a good example. For instance, in a Belgian national communication on climate change it is stated that the share of transport in GHG emissions rose from 14% in 1990 to 19% in 2006, of which 97% was attributable to road transport.

More specifically, what is the impact of freight transport in urban areas? Depending on the studies, vehicles transporting goods are estimated to account for about 25% of all urban traffic during morning peak hours. This share is quite considerable. Furthermore, given the increase in traffic and the relatively slow rate of renewal of the existing vehicle fleet, a good many vehicles on the road are still at Euro 1 standards, with many operating in town centres. Indeed, as many enterprises tend to use their older vehicles for trips in town centres, more polluting vehicles are concentrated in these locations. It should be observed that local regulations in a number of northern European cities use certain Euro standards or certain characteristics (e.g., the date the vehicle was put into service) to promote the use of *"clean"* delivery vehicles in town centres.

Table 1 shows the average pollutant emissions by various vehicle types in urban areas. Some pollutants such as particulate matter, which is typically produced by diesel engines, are for the greater part emitted by heavy and light goods vehicles exclusively powered by diesel.

TABLE 1 - AVERAGE POLLUTANT EMISSIONS IN URBAN AREAS (Passenger load factor considered)

	Two-wheeled vehicles	Passenger cars	Buses and coaches	Light goods vehicles (<3.5t)	Heavy goods vehicles (>3,5t)
	g/pass-km			g/t-km	
CO	39.77	8.37	0.36	6.01	0.51
VOC	19.63	1.55	0.09	1.23	0.12
NO_X	0.09	0.86	1.22	1.48	1.98
PM		0.04	0.05	0.31	0.14
CO_2	191.57	164.73	85.19	437.95	164.93

Source: INRETS

This table reveals the poor performance of LGVs. Unfortunately, their share in the fleet of goods vehicles travelling in urban areas tends to increase. The main reasons for this increase are local traffic restrictions limiting the size of vehicles, and just-in-time production stimulating smaller but more frequent deliveries. Banning heavy goods vehicles from urban areas, is therefore, a *"false good idea"* from an environmental point of view.

Noise

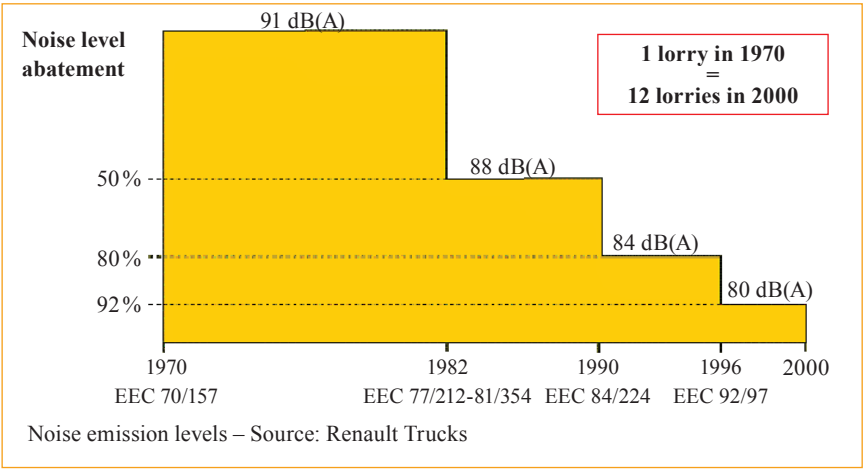
Like pollutant emissions, noise from goods vehicles is regulated by directives and laws *(table 2)*. In Europe, directive 92/97/EEC relating to the permissible sound level of vehicles, has been in force since 1st October 1996 for any motor vehicle intended for use on the road, having at least four wheels and a maximum design speed exceeding 25 km/h.

TABLE 2 - NOISE REGULATION BY VEHICLE TYPE

Type of vehicle	Characteristics	Limit values dB(A)
LGV	Loaded weight < 2t Loaded weight < 3.5t	76* 77**
HGV	Loaded weight > 3.5t; engine power < 75 kW Loaded weight > 3.5t; engine power < 150 kW Loaded weight > 3.5t; engine power > 150 kW	77 78 80

Source: ADEME.
* Increased by 1 dB(A) for vehicles with a direct diesel injection engine and for vehicles designed for off-road use, with a possibility to have both.
** Since the measurement procedures for LGVs and HGVs are not the same, the limit values cannot be directly compared.

It can be seen that the regulation sets a limit of 78 dB(A) for vehicles with an engine power less than 150 kW and a limit of 80 dB(A) for vehicles with an engine power greater than 150 kW. It is worth noting that the threshold of 150 kW approximately corresponds with a lorry of 12t.



Noise emission levels – Source: Renault Trucks

FIGURE 1 – NOISE REGULATION IN EUROPE

As illustrated in *figure 1*, a strict programme of regulations imposed on manufacturers has considerably reduced the sound levels of HGVs.

However, besides engine noise other factors play a part in the noisiness of urban deliveries:

- traffic noise, i.e., the way the vehicle enters ambient traffic and moves with it. Stop-and-go traffic, which is especially frequent in congested urban areas, is particularly detrimental in this respect;
- rolling noise, i.e., the noise generated by the contact between the tyres of the vehicle and the road surface;
- noise from the actual loading and unloading operations, such as lowering the tailboard, backup alarm, cooling engine of a refrigerated lorry, conversations with delivery drivers.

A number of European cities (for example in the Netherlands, through the PIEK - peak noise levels - programme) have set maximum sound levels for delivery vehicles travelling in town.

1.2.3. Safety problem

Goods vehicles, especially lorries, have a negative image as far as road safety is concerned. Reality is different, however, as the lorry is rather a *"good performer"* in road safety. Generally speaking, their involvement in accidents tends to decrease, whereas the number of kilometres they travel is on the increase. For instance in Belgium the number of fatalities in accidents involving a HGV dropped by 26% between 1998 and 2007, while traffic volumes and the number of kilometres travelled, including by HGVs weighing more than 3.5t, increased. In France the presence of HGVs in accidents was reduced six times between 1980 and 2006, whereas the number of kilometres travelled kept on increasing.

However, the lorry's weakness remains the comparative severity of accidents[1] in which it is involved, especially in urban areas. This can be ascribed to several factors:

- the nature, mass and configuration of HGVs in particular the many blind spots and the swerve radius required for manoeuvring;
- the concentration of traffic in built-up areas and the tendency of HGVs to react more slowly to obstacles;
- the immediate nearness of vulnerable road users in urban areas and the risk which HGVs represent to them. Although car occupants are the first victims of accidents with HGVs, in urban areas a high percentage of cyclists is recorded among the victims of accidents involving an HGV.

[1] Severety of accidents = number of fatalities/1,000 personal injury accidents.

Furthermore, when analysing the causes of accidents with HGVs the most frequently reported factors are failure to keep a safe distance and traffic jams. Urban areas are therefore, in principle, risk areas, especially during the daytime when traffic is very busy.

Finally, it should be mentioned that besides lorries, sizable numbers of delivery vans are presently on the road and that the use of these vehicles is less strictly regulated in terms of driving times and driving licences, among other things. On the other hand, no study has been able to demonstrate to date any influence of this lack of regulation on road safety.

1.2.4. Energy consumption

98% of the energy consumed by the transport sector is of fossil origin. The relative part of transport in total energy consumption in the European Community is estimated at 30%, equal to that of industry. The share split per transport mode is 84% for roads, 11% for air, 2.5% for rail, and % for inland waterways.

Roads are, and will continue to be, the predominat mode of freight transport in the years to come. In 2006, roads accounted for 77% of the tonne-kilometres for all land transport (and 46% of the total tonne-kilometres transported) in Europe. Their contribution to the energy balance sheet is, of course, correlated with this modal share: road transport accounts for about 80% of the total energy consumption by the transport sector.

1.2.5. Visual pollution

Heavy vehicles may cause visual clutter in urban areas. By their size they fit in poorly with the urban landscape, especially in residential districts, where the inhabitants do not appreciate their presence.

One of the major problems in this respect is that very few parking infrastructures in urban areas are actually designed to accommodate long-parked HGVs. As a result, HGV drivers living in the city often return home at night with their “tool of trade” and park their vehicles near their homes, in residential districts. This creates quite a few adverse effects such as blocking the light for dwellings in front of which they park, or engine noise when starting the lorries early in the morning.

Although these facts may seem trivial at first sight, many policy makers are sensitive to them and prefer to see smaller vehicles, vans rather than HGVs, driven and parking in their towns.

1.2.6. Damage to infrastructures

The structural and geometric design of road infrastructures has to consider a set of factors, including the vehicles which are now in use or will be used in future. Heavy vehicles cause severe fatigue in road pavements. A conventional 40t lorry is about 160,000 times as damaging to infrastructures as a passenger car. Transport infrastructures (road pavements, but also parking areas and engineering structures) must be designed accordingly. This explains why failure to provide access for delivery vans to roadside shops quite often results in damage to the road structures of pedestrian areas, which are increasingly frequent in cities.

The consideration of heavy vehicles in designing and redeveloping infrastructures will have repercussions not only on construction costs, but also on maintenance costs.

One important characteristic of transport infrastructures is their long life. Decisions on infrastructural matters will have effects for decades. It is, therefore, important to consider not only the present, but also the future demand for transport.

1.2.7. Unsuitable infrastructures

The structural and geometric design of road facilities should be based on a number of considerations (environmental factors such as the characteristics of the subgrade soil or the climate, the materials used and their characteristics, and traffic loading and its characteristics (magnitude and number of axle loads)). It is easily understood that a cycle track, a pedestrian street or a port road need to be designed and constructed in different ways. In town centres, where streets are particularly narrow, it is not rare to see a lorry caught up in tight places. Is the infrastructure unsuited to the size of heavy vehicles or, on the contrary, is the size of these vehicles unsuited to urban configurations and facilities? Three reflections can be made here:

- local planners often declare that they do not have the necessary technical information or background when they have to set specifications for the development of infrastructures or engineering structures to accommodate delivery activities. They ask themselves many questions to which they cannot find precise answers in the technical documents and manuals at their disposal. For example: what are the basic principles and criteria for providing a delivery area, what should be its dimensions on and off the road? Information and training for local planners in the specific subject areas of heavy vehicles and deliveries is most certainly useful;
- like passenger cars, heavy vehicles tend to follow the routes suggested by GPS systems rather than those indicated by directional signs and markings. However, many of those systems do not necessarily have specific software and maps for heavy vehicles. As a result, these vehicles are routed to infrastructures inadequately designed for their size;

- land planning and the siting of functions in town and/or on the outskirts find their full meaning here. How can the needs and concerns of dwelling and industrial and commercial activities be reconciled in a given territory?

1.2.8. Drivers' stress

For delivery drivers, rounds in cities prove to be the most stressful, and the most difficult. They generally pass through the densest areas. A good many delivery rounds in town centres are made with light vehicles, as shipments to traders have decreased considerably in numbers and in weights over the past few years (*"just-in-time"*). On the other hand, some journeys are still made with delivery lorries. Although the distances travelled per day rarely exceed 100 km, the number of delivery points is very high. In a French study[2] the number of delivery points was found to range between thirty and forty for delivery lorries and between sixty and eighty for light vehicles. It should be noted that these figures could even be as high as between eighty and one hundred delivery points for self-employed carriers.

As a result of increasing traffic and trade, public space is becoming less and less functional for the logistic sector operating just in time, under growing constraints. Districts in historic centres are densely dwelled and the streets are often narrow with pedestrian areas, outdoor cafés and various street shows in increasing numbers. Traffic in town centres are a heterogeneous mixture of different flows: public transport, pedestrians, two-wheelers, vehicles passing through, short- and long-staying vehicles, which makes access particularly difficult. Furthermore, it should be noted that there are virtually no areas for receiving delivery vehicles off the road, inside buildings. This means that delivery operations have to take place on the road. The street and the footpath are the only spaces available for handling deliveries, which raises safety problems and conflicts.

Finally, the constraints inherent in the spatial structure and the organization of urban functions are further strengthened by the numerous local regulations. Local policy-makers and planners are generally unfamiliar with delivery activities. There is little dialogue between economic actors and decision-makers, who very rarely have a comprehensive view of all the consequences of their decisions.

1.2.9. Severely tested reliability

Urban goods transport is part of complex logistic chains in which the various actors are making increasing demands. Shipments tend to be divided up and the frequency of orders tends to increase. Transporters have to comply with delivery times often imposed by shippers and subjected to local regulations.

[2] *"La résolution au quotidien des contraintes urbaines par les chauffeurs livreurs"*. Céline Cholez, Université Pierre Mendès France. Les cahiers scientifiques du Transport, p.3-30, n°41/2002.

Reliability is important in this context. It is, however, being severely tested, as transport networks are recurrently saturated by the growing demand for both freight and passenger transport. Travel times are becoming longer and more uncertain. This problem with the flow of traffic is supplemented by a problem with accessibility to parking facilities. Generally speaking, too few buildings have been designed with provisions for indoor deliveries. As a result, loading and unloading operations mostly have to take place on the road, in principle on reserved parking areas.

However, these are regularly taken by overstaying vehicles not involved in any loading or unloading. The uncertainty about travel times is, therefore, augmented by an uncertainty about the availability of parking places. Of course this situation could vary from country to country, in particular the situation seems to be a little bit different in North America, but there are common issue.

1.3. ORGANISATIONAL PROBLEMS

Urban freight transport is generally perceived as a mere generator of problems and adverse effects such as congestion, pollutant emissions, noise annoyance, and road safety problems. Along with these adverse effects, it is important to equally consider the problems encountered by the sector itself, which extremely complicate the kilometres to be travelled in town as the final part of a logistic chain.

1.3.1. Specialised profession

To meet growing market demands, the transport sector has gradually become more professional. Enterprises prefer to concentrate on their core business and to contract transport out to specialised operators, making transport and logistics their fully fledged profession.

FIGURE 2 – DEVELOPMENT OF ROAD FREIGHT TRANSPORT BY BELGIAN ENTERPRISES
Source: BRRC – based on statistics of the Belgian Federal Public Service Mobility and Transport

Figure 2 illustrates this professionalisation of logistics jobs. Whereas early in the nineteen-seventies, activities on own account and for hire balanced each other, transport for hire has grown considerably since the ninteen-nineties and now accounts for 80% of the tonne-kilometres travelled by the Belgian road transport enterprises.

At the same time, the range of services provided by transport and logistics professionals has extended. It is no longer restricted to the transport of goods flows, but now encompasses the management of the full supply and distribution chain. New jobs have appeared in the branch of goods transport such as shipping agent, forwarder or transport operator) and have gradually been integrated in big companies. The sector is currently splintered, with a limited number of big groups and a larger number of SMEs and self-employed subcontractors working for them. In Europe it is considered that 80% of the of aggregate turnover of the twenty leaders in logistics are in the hands of the biggest companies[3]. The sector is the scene of fierce competition, with enterprises appearing and disappearing rapidly. Socially, it is a strongly marked sector, where competition is extremely fierce and margins are small.

1.3.2. The paradox of communication and information

Whereas Intelligent Transport Systems (ITS) technologies (such as Global Positioning Systems, fleet management-routing, route search, contact with traffic and parking management centre, adaptive cruise control, lane warning, sleep detection) are in full development for both in-vehicle and road-based systems, it seems that information

[3] Séraphin Karpros

and communication between transporters and shippers, and between transporters, shippers and the political and administrative bodies in charge of urban freight transport policies, are not very efficient or are even simply ineffective.

Institutionalised or at least organised dialogue between the various actors has been scarce. Transporters are rarely kept informed on the latest local regulations in terms of traffic restrictions, time restrictions, or access to specific facilities, and they are generally faced with them only when they enter the town.

Moreover, urban freight transport and the points of view of the various actors (transporters, shippers, transport operators) are rarely considered in urban planning documents, especially in standard documents such as town development plans, traffic plans, and travel plans.

1.3.3. Numerous and complex local regulations

In order to preserve the living space and the quality of life of their inhabitants, many towns and built-up areas have implemented extensive traffic and parking control regulations, some of which apply to heavy vehicles and delivery vehicles. Access has been limited by various criteria such as vehicle weight and dimensions, combined or not, with time slots. These criteria are used particularly in European cities. Over the past few years new types of regulation have appeared, which are more specifically directed to sustainable development. Introducing an environmental parameter in traffic or parking regulations amounts to selecting the vehicles allowed to make deliveries by their pollutant emission levels – in other words, giving traffic and parking privileges to cleaner vehicles while imposing more constraints on the more polluting.

Most towns have local regulations for deliveries. Some of these apply to the whole territory, while others are specific to a street or district. Consequently, restrictions vary from one town to the next or even between districts within the same town. Delivery drivers are often not informed and have to discover the actual situation in the field. This often leads to traffic disruption, useless trips and substantial loss of time.

Furthermore, it will be obvious that the unilateral definition of regulatory measures, e.g. for vehicle weights and dimensions, may raise serious problems for operators organising logistic chains at an upstream (national or international) level. The final few kilometres in town are most often the last of a long chain.

Finally, the enforcement and observance of regulations remains a major problem, for two reasons. The first is that to be enforceable, regulations must be clear, simple, easy to understand, realistic (for the various actors), and cost-effective. Lack of dialogue between the professionals of the transport and logistics sector and the local planners and decision-makers will obviously be counterproductive in this respect.

The second reason relates more generally to lack of enforcement checks, which is directly harmful for the effectiveness of regulatory measures. The use of infrastructure intended for freight transport vehicles (delivery areas, long-stay parking facilities) by other vehicles are often cited in this respect.

1.3.4. Corporate social responsibility (CSR)

Corporate social (or societal) responsibility is a concept by which enterprises integrate the three pillars of sustainable development – environmental, social and economic concerns – in their activities, strategies and commercial operations, on a voluntary basis. It derives from the growing demands of civil society to integrate global concerns at the more local decision level.

CSR involves the development and use of monitoring tools to identify the level of responsibility and the management indicators (control data). These may be international frames of reference (GRI: Global Reporting Initiative), corporate codes of conduct (Global Compact), certifications, standards or labels (SA8000, ISO 26000), or environmental and social audits. In addition, CSR requires a policy of communication with the general public and with clients and potential clients.

It appears today that CSR is not just a whim of fashion, but an irreversible fundamental trend for high-quality management. It meets a concrete demand, which can no longer be ignored by companies that want to stay in business.

Corporate Social Responsibility already has influences on the different participants in urban freight activity and these pressures are set to grow rather than diminish. Freight operating companies and receivers of goods can improve shareholder value by demonstrating they are *'good neighbours'* in urban areas and that they are reducing the environmental impacts of their operations. However companies also have a responsibility for the health and welfare of their staff, for instance moving to urban night time deliveries to improve efficiency may have negative social consequences for the staff involved. Inevitably these competing tensions have to be resolved in a balanced manner.

In this context it is clear that urban deliveries, which are the final link in the logistic chain, will see their constraints tightened, which will further complicate the solutions to be found and implemented. For instance, one may wonder whether nighttime deliveries are compatible with a social system based on 40 or 35 hour working weeks or a social and family life of high quality, or whether it is advisable to develop the use of small vehicles for the final kilometres in town when larger delivery lorries are less polluting at equal quantities transported.

1.4. CONCLUSION

It was shown that the problems related to urban goods transport are more complex than they appear. Understanding and considering these problems is a prerequisite for the implementation of an action plan. To achieve this, it will be vital not only to provide oneself with the necessary tools to collect a considerable number of objective factual data, but also to gather around the table and consult all the actors involved in the logistic chains and in urban life. It then becomes possible to consider the types of approach and the measures to be taken, which are the subject of the next chapter.

2. APPROACHES TO FIND A SOLUTION

2.1. INTRODUCTION

The previous chapter identified problems raised by, or the side effects of, urban freight transport. These problems ranged from congestion as a result of urban growth and the demand this creates on infrastructure to service present and future freight transport, through to the added pollutant emissions from the resulting increase in freight vehicle traffic.

This chapter proposes a categorisation and overview of approaches to find solutions to the problems and side effects of urban freight transport which can be used and implemented by decision makers and other stakeholders. In this context decision makers include private (Shippers, freight carriers and residents/consumers) and public sector (Planners and regulators) actors, who are inextricably linked yet may have competing interests and not be fully aware of each others objectives. This lack of understanding is a critical issue which at times inhibits better policy formulation and can restrict contemporary freight logistics practices from occurring.

Figure 3, following page, illustrates this interrelationship whilst also showing that freight consumption by shippers and residents is balanced against the policy and regulatory framework, and the freight carriers who operate within this framework, to meet the service levels and compliance expectations of all other actors.

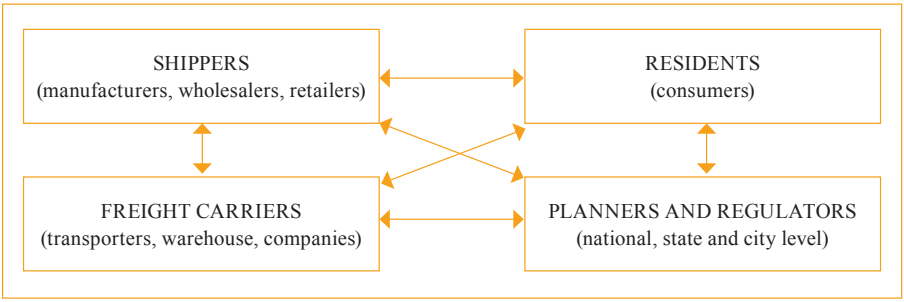


FIGURE 3 – RELATIONSHIP AMONG STAKEHOLDERS
Source: The City Logistics Paradigm

An example of this balance at play becomes clearer when we understand the impact that any change to one component has on any of the other components of the freight transport system i.e. freight users, freight loads, freight vehicles and infrastructure (Heijden, 1997).

Growing demand from greater urbanisation brought on by economic growth only serves to increase freight consumption and amplify the problems or side effects of urban freight transport. The added dimension of urban freight transport not being as well understood by planners as to its importance to the very supply chains that service the needs of urban communities creates a unique dilemma.

There is no doubt that at an individual level and more importantly when combined, these problems and side effects significantly increase the challenges faced by urban freight transport to meet the demand for efficient, compliant, safe and sustainable, first and last mile freight movements.

To aid the pursuit by all actors of overcoming these challenges and improve urban freight transport, this chapter:

- provides an overview of the range of actors, themes, decision types, policies, instruments and solutions involved with urban freight transport and uses these to propose a number of categories of approaches.
- expands and provides further information on the categories as an aid for public and private sector practitioners to more readily classify solutions within each of the proposed categories.

assigns by category those solutions in the form of measures, initiatives and actions that have or can be taken to address the problems raised by urban freight transport.

2.2. PROPOSED CATEGORISATION OF APPROACHES

Reflecting on the identified problems and side effects raised by urban freight transport, one can imagine that the factors, which have an influence on both the problems occurring in the first instance and potential approaches to remedy the situation, are many and varied. As described previously there are many actors and also transactions at play within an urban freight system as represented in the *figure 4*.

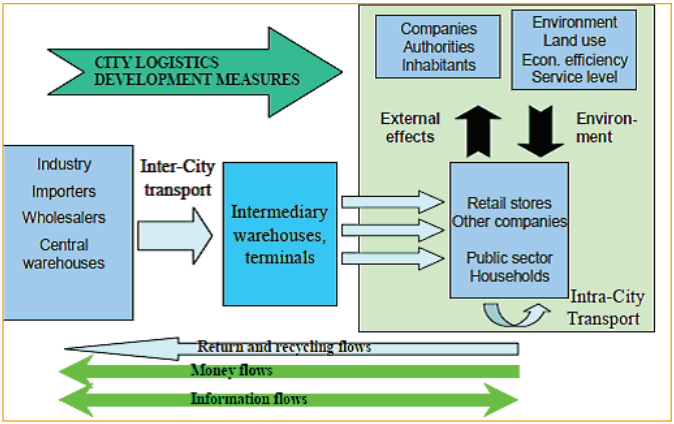


FIGURE 4 – ACTORS AND TRANSACTIONS WITHIN AN URBAN FREIGHT SYSTEM
Source: City Freight

Both the public and private sector are the principal actors in this environment. For instance the public sector is primarily responsible for policy formulation, regulations, land use and infrastructure planning while the private sector is responsible for operational logistics and supply chain decisions covering the likes of delivery strategies e.g. just in time (JIT), and freight equipment choice relating to mode or vehicle type.

The figure also depicts the important interaction between inter and intra city freight movements. This is of growing significance as changes in logistics practices such as globalisation of production, has many downstream impacts especially on national and urban freight transactions and practices.

Consumers are also a key stakeholder whose behaviour can influence urban freight activities. Examples of this in recent years has seen a shift in the shopping habits of many households from city centre retailers to shopping malls and the more recent explosion in internet shopping and related home delivery channels.

We are also aware that since the 1990's much work has been undertaken to identify the problems raised or encountered by urban freight transport. Much of this work

such as BESTUFS, NICHES, COST 321, has led to counter measures being identified or developed to improve the situation.

A review of the literature relating to urban freight transport and associated topics has also pointed to key themes which fundamentally impact on urban freight activities and can be used to determine and categorise approaches and solutions. An example of these themes is shown in a recent Transportation Research Board (TRB) research report into the interdependence of the public and private sectors in freight transport decision making. The report identified five decision types and suggested the lead sector actor associated with each as per the *table 3*.

TABLE 3 - DECISION TYPE AND TYPICAL LEADING SECTOR

Decision Type	Typical Lead Sector
Policy and Regulation	Public sector led
Technology	Private sector led
Infrastructure	Public sector led
Operations/Maintenance	Public sector/private sector shared
Non-transportation (behavioural)	Public sector led
Source: TRB	

While the TRB report looks at transport markets from a wider viewpoint than just urban freight by incorporating international, national and regional perspectives, the decision types are similar to a classification of instruments put forward by Visser et al in a 1999 report to an International Symposium on City Logistics. The classification of these public and private sector instruments were:

- licensing and regulation,
- pricing,
- financial support,
- voluntary co-operation,
- technology improvement, and
- information systems.

Examples of measures supporting these classifications were then applied to land use, logistics operation, networks (roads), terminals, loading and unloading locations and vehicles as shown in *table 4, following page*.

TABLEAU 4 - POLICY MEASURES BY SECTOR						
Policy measures and instruments	**Public**			**Private**	**Public and private**	
Applied on	**Licencing and regulations**	**Pricing**	**Financial support**	**Voluntary co-operation**	**Technology improvement**	**Information systems**
Land use	Zoning for logistic activities or transport intensive retail	Land use pricing	Subsidies for land use prices	Concentrate business on one location	-	-
Logistic operation	Minimal load-factor	-	Subsidising intermodal transport	Load exchange	New load-units	Cargo information system
Networks	Truck routes, vehicle and time restriction	Road pricing	New infrastructures for freight	-	Road construction	Real time traffic information
Terminals	Urbane distribution centre	-	Terminal exploitation	Operation of terminals	Transhipment and storage	-
Loading/ Unloading	Loading time	Differentiated parking charge	Facility support	Shared unloading facilities	Off-street unloading facilities	Reservation system of parking lots
Vehicles	Emission standards	Fuel taxes	Subsidies for low-emission trucks	Share of vehicles fleet	Electric vehicles, handling equipment	Vehicle tracking system
Source: Visser et al.						

Of the above policy measures and instruments, licensing and regulation along with voluntary co-operation were seen to be the principle areas of focus due to the way they were evolving or could be improved on. The TRB report similarly reinforced the need to foster greater co-operation between all involved actors as improving the understanding of each others roles, responsibilities and objectives would lead to improvements in freight planning.

The same themes are also evident in the Organisation for Economic Co-operation and Development (OECD) report "Delivering the Goods", which focussed on identifying best practice policies of OECD cities to dealing with the challenges of urban goods transport. Some of the lessons learned from the range of policy approaches of member countries were:

- lack of awareness and knowledge is a serious obstacle;
- policy measures tend to lack long-term and supply chain perspectives;
- regulations tend to be unharmonised, unstable and are not often enforced sufficiently;
- public-private platforms seem to be helpful.

The report however does see increasing opportunities in dealing with such challenges as awareness is raised through a policy framework focussing on the following areas:

- national and state government initiatives are crucial;
- urban goods transport policy needs consultative planning;
- public-private partnerships are important;
- policies should be formulated so as to enhance developments in the private sector.

Based on the above mentioned range of actors, themes, decision types, policies, instruments and measures, it is proposed to use the following non-prioritised categorisation of approaches to classify known solutions to the problems and side effects of urban freight transport.

Infrastructure Approach
This category is based on development of structures such as roads (including maintenance), parking space or logistics facilities. While historically, infrastructure planning, investment and management has been the domain of the public sector, the growth in Public-private partnerships and the more recent systems approach, which expands infrastructure to cover other facilities, has altered this balance.

Regulatory Approach
Grouping policy, land use planning, licensing, regulations, and associated instruments such as financial support and pricing under a single regulatory approach category, brings together those theme areas and measures usually the domain of, and implemented by, the public sector.

Logistical Approach

On the other hand it is recognised that the role of freight operations, logistics and supply chain management is primarily that of the private sector. Therefore a logistical approach category will capture many solutions that the private sector has employed to meet and overcome regulations as well as operational and market problems. An example here would be the use of night deliveries.

Co-operative Approach

Historically, it seems that policy makers have not been as inclusive with urban freight actors in decision making and vice versa, nor has there been much co-operation between companies operating in the urban freight sector. A co-operative approach category would focus on harmonising measures between private and public sector actors to achieve mutually efficient and sustainable outcomes such is the case with urban distribution centres.

Technology Approach

It is well recognised that information, communications and technology (ICT) is a key enabler of modern freight logistics activities and supply chains. Technology is also featuring more in support of policy measures used by the public sector such as traffic flow metering. As such this category is and will continue to grow in importance.

Behavioural Change Approach

Finally, we need an approach that underpins the above mentioned categories and facilitates those measures which can embed long term and sustainable changes to the behaviour of the actors. This is where a behavioural change approach comes into its own, the importance of which cannot be emphasised enough.

2.3. DESCRIPTION OF CATEGORIES

The aim of this section is to expand on and provide further information for each category of the proposed categories of approaches. This is intended as an aid for public and private sector practitioners to more readily identify an approach and the associated range of known solutions, for use in addressing problems within urban freight transport. The descriptions provided below are not intended to be exhaustive lists but do seek to offer some context for each of the proposed categories.

Infrastructure Approach

The term infrastructure is generally accepted to describe physical assets in the form of a network or system of structures, be it roads, rail, ports, water and gas supply, sewerage, electricity and telecommunications. These networks are central to all economies as they enable, support and enhance the operation of societies at all levels from society as a whole through to individual enterprises and citizens.

It is also accepted that the infrastructure system as a whole is a collection of assets built up over time to form a functional network, and as such is required to be maintained to a level or standard through ongoing maintenance and refurbishment. This work is intended to maintain and enhance the accumulated value of the asset as well as to meet current and future usage demands.

While historically, infrastructure planning, investment and management has been the domain of the public sector, the growth in public-private partnerships among stakeholders has altered this balance. The more recent systems approach, which expands infrastructure to cover other facilities associated and complimentary to the network, has also broadened governance requirements to take account of the need for greater collaborative efforts between the public and private sector.

Examples of measure that would fall into this category would include:

- development of bypasses or ring roads,
- development of urban distribution centres,
- creating off street loading facilities,
- installing on street loading spaces.

Through the above we see the primary characteristics of measures taken within this approach being the need for financial investment and development of physical network structures as well as the development of facilities which closely interact with the road network. This category is also closely aligned with components of the regulatory approach especially where a measure taken requires land use planning and potentially financial measures to recover investment costs.

Regulatory Approach

Typically, the public sector has not directly intervened in freight transport and logistics activities. However the public sector is expected to play a responsible role in order to improve social, economic and environmental outcomes and in doing so make decisions that cut across freight transport activities.

Examples of this would be where the public sector has:

- introduced solutions to cope with the negative impacts of say freight vehicle congestion and accidents or pollution generated by these vehicles, and example being where freight traffic has been shifted from minor roads to major roads as flows are generally smoother on expressways and arterial roads;
- imposed proven city planning practices such as implementing regulations on speed, loading zones, access based on vehicle dimensions and/or weight and operating hours;
- introduced or aligned international conventions and policies to manage freight movements for customs and quarantine purposes.

From this we see an important characteristic of this category being that the introduction of policies and measures under a regulatory approach tends to force change in order to improve social, economic and environmental outcomes as well as align with international conventions. This may seem a "hard" top down and heavy handed approach to many, however in already overstretched areas that are facing problems with or brought on by urban freight, a more forceful regulatory approach and associated measures may be the most practical and expedient way to stop or reverse the problems.

On the other hand many of the policies and solutions within a regulatory approach are not necessarily seen as a resolution, more so they act as a lever to encourage other actors to take an active rather than passive role in tackling the problem.

As noted previously, the likes of land use planning, licensing and regulations, along with associated instruments and or levers such as financial support and pricing, are those areas and solutions usually the domain of and implemented by the public sector. This is normally mandated for under laws in each country and are supported by rules and regulations in place at national and local level. Having this statutory mandate is the primary characteristic that distinguishes this approach from others.

Going hand in hand with this mandate, and as covered in the previous chapter, the level of enforcement and observance can differ widely dependent on the circumstances, practices and state of regulatory development. Therefore the ability to enforce, and create an awareness of solutions developed under a regulatory approach is also an important characteristic. However, the success or otherwise of a regulatory approach in many instances will come down to one other characteristic of this approach which is the ability to achieve an acceptable level of compliance through a blend of supporting *"hard"* (e.g. penalties) and *"soft"* (e.g. information) measures.

Much of the literature, including that covered in the previous section, does caution that this approach can create unintended consequences due to a lack of understanding of urban freight. Therefore the involvement of the private sector in the development of measures within this category is important in order to minimise the creation of further problems.

Logistical approach

Logistics is a dynamic, multi disciplinary set of integrated business activities that are critical to the flow of freight and information, through an entire product supply chain from raw materials, through to final disposal. The particular nature of the urban freight system as shown in *section 2.1*, shows that there is much interaction with the various actors such as companies, authorities and inhabitants, and also that the system is both influenced by, and has influence on; the environment, land use plans, economic efficiency and service levels offered by freight operators.

From this model we see that includes both private and public sector areas of influence. However, this logistical approach has historically been characterised by the involvement only of the private sector in the form of actors such as freight and logistics operators. These actors seek to implement changes in order to derive an economic benefit or advantage such as reducing delivery costs or increasing loading factors of delivery vehicles.

Yet changes to logistics activities (even those further away from the actual urban freight task) can impact on urban freight transport as has been witnessed by the just in time phenomenon, and in some instances the private sector has developed and deployed many logistical measures to meet and overcome regulations, as well as operational constraints and market problems. Some of these measures however may create an unintended and contradictory effect to what urban planners want. An example of this is the use of night deliveries into urban areas, a practice that can remove freight vehicles from congested daytime roads but which creates issues for inner city inhabitants.

Categorising measures within this approach can act as an aid for both urban freight planners, as well as freight and logistics practitioners, who need to be aware of and extend their understanding of contemporary logistics measures. This in turn can lead to a wider group of actors becoming aware of measures available for use in addressing problems associated with urban freight transport.

Co-operative approach

The above account of infrastructure, regulatory and logistical approaches, serves to reinforce the stated need from the literature for mutual understanding of each actor's goals and objectives. This includes the need for alignment between national and local approaches to urban freight policies and indeed between local policies at the urban level within the same region. Unfortunately, it appears that policy makers have not been as inclusive with urban freight actors as they could have, in order to understand the impacts of their decision making.

However, the same can be said in return for urban freight actors as there also appears to be a lack of co-operation between companies operating in the urban freight sector which is due in part to the competitive nature and low margins of this industry as well as operational and regulatory complexities that come into play. One can understand this occurring though, especially when we look at and understand the large numbers of private actors involved and the operational level at which urban freight decision making takes place. Also, apart from controls applied by the public sector as mentioned in *section 2.2.1*, there are very few conditions as to how urban freight activities are co-ordinated, carried out and controlled.

In essence and based on the above, to manage a growing freight task into urban areas where control over activities is dispersed, the provision of additional infrastructure is inappropriate or too expensive, and we have the added dimension of conflicting goals and objectives between actors, requires a high level of inclusiveness and co-operation. It would appear logical then, that to deliver more freight with less capacity (such as road space for goods vehicles due to growth in other vehicle traffic) requires a co-operative approach category focussing on measures that harmonise the activities and objectives of private and public sector actors to achieve mutually efficient and sustainable outcomes.

A characteristic of this approach is that measures focus on enhanced or new, operationally efficient business models such as can be seen with urban consolidation centres. One other important priority of measures would be for information gathering, planning, evaluation and co-ordination of urban freight transport to involve the public and private sectors in a pro active and co-operative role much as occurs with public transport and the broader field of mobility management.

Technological approach

There appears to be little doubt that Information and Communication Technology (ICT) can play a vital role in addressing problems within urban freight transport.

Already freight logistics and supply chain practitioners have embraced the use of ICT in various forms to gain efficiency in their operations. The range of ICT measures available to contribute to addressing the problem for logisticians is vast and has predominantly been influenced by the private sector as they seek to exploit opportunities through the development of product and solutions in order to gain a financial return. Some of the more widely known measures under this category which support the logistical approach include:

- freight transport management systems,
- vehicle routing/GPS systems, and,
- load sharing systems.

We are also seeing the introduction of ICT in various forms within the public sector be it policy promulgation through e-policy channels through to enforcement using a range of Intelligent Transport Systems (ITS), to capture infringement events such as overloading, speeding and red light running. The need for ICT solutions to support measures within the regulatory approach category has in itself encouraged the development and adoption of new technologies to gain wider economic, safety or environmental benefits.

Broadly speaking, the technology approach focuses on vehicle/driver and infrastructure based solutions. Examples of this can be seen in the advent of stricter

emission controls over heavy freight vehicles leading to the development of smart ICT anti idling devices that automatically turn off a vehicle that has been idle for a set period of time. We also see more evidence of infrastructure ICT measures such as occurs with metering the flow of traffic.

Behavioural change approach

The foundation of this approach is to encourage voluntary behaviour change through measures such as promotional activities to raise awareness through the provision of information. The objective of solutions in this category are not necessarily to provide alternatives to say existing operational practices but to try in an active manner to raise awareness of solutions and encourage the use of alternatives which can embed long term and sustainable changes to the behaviour of the actors.

This approach is often seen as the soft component used to underpin the success of those measures within the other categories and which take a harder approach such as the case where a new regulation is created to overcome an issue. In practice this could mean a promotional campaign introduced to promote the regulatory change.

By comparison these soft solutions are often lower cost alternatives as opposed to the harder solutions which tend to infer more of a financial investment such as provision of infrastructure as would be the case where say a dedicated heavy goods vehicle lane is established in an urban area.

As mentioned in the previous chapter, Corporate Social Responsibility (CSR) is playing a growing role in influencing the behaviours of many actors and as such cannot be underestimated as a key driver that supports this approach.

2.4. SOLUTIONS BY APPROACH TYPE

The approaches discussed above encompass a range of solutions, some of which are further expanded on in the following implementation and evaluation chapters or as case studies in the appendices. There are however two elements which have relevance to each category that practitioners need to take into account when seeking to implement solutions – the speed of implementation and the reaction of actors.

The speed of implementing solutions will vary depending on the approach taken, for example a regulatory approach requiring say a law change can be drawn out in comparison to implementing private sector led logistical solutions. Similarly, solutions that share the characteristics of several approaches such as developing dedicated freight routes may draw out differing reactions from the various actors, depending on the predominant approach, and require a degree of brokering to reach a consensus.

Both of these elements can derail even the best of solutions if unaccounted for when planning the approach to use, or lead to a range of unintended consequences. Broadening the governance approach to urban freight transport with greater collaborative efforts and openness between the public and private sector will aid in taking account of the issues before they arise, as well as adding depth and improving acceptance levels to the solutions through a better understanding of the relationship between the approaches and associated measures.

Table 5 lists a sample of the solutions to urban freight problems and attributes each solution to one or several of the various approach categories. While this is not an exhaustive list of solutions it should provide parishioners with enough examples to guide future work.

TABLE 5 - RELATIONSHIP BETWEEN SOLUTIONS AND APPROACHES

Solutions to urban freight problems	Categorisation of Solution by Approach Type						
	Case Study	Infrastructure	Regulatory	Logistical	Co-operative	Technology	Behavioural
Development of bypasses or ring roads	-	√					
Development of urban distribution centres	1, 6	√	√	√	√		
Introduce fuel taxes	-		√				
Introduce road user charge	-		√				
Develop dedicated freight routes	9		√	√	√		
Implement anti idling messages	-		√		√	√	√
Impose vehicle restrictions	1		√	√			
Impose loading time restrictions	2, 12		√	√	√		
Introduce real time traffic information	-			√	√	√	√
Create off street loading facilities	2	√	√	√			
Use of electric delivery vehicles	-					√	√
Provide subsidies for electric or low emission delivery vehicles	-		√		√	√	
Introduce congestion charging	-		√				
Use of GPS and FTMS	-			√		√	
Traffic flow metering	-		√			√	
Implement a vehicle parking reservation system	5		√			√	
Have differentiated parking charges	-		√			√	√
Use of small delivery vehicles	1			√		√	

TABLE 5 - RELATIONSHIP BETWEEN SOLUTIONS AND APPROACHES							
Solutions to urban freight problems	**Categorisation of Solution by Approach Type**						
	Case Study	**Infrastructure**	**Regulatory**	**Logistical**	**Co-operative**	**Technology**	**Behavioural**
Increase load factors - load sharing systems	13			√	√	√	√
Form freight partnerships	2, 3, 7 7,9 11, 13				√		√
Create freight concessions	-		√	√	√		
Improved terminal operations	-			√		√	
Improve social acceptance of urban freight activities	-						√
Improve driver competencies	-		√			√	√
Provide subsidies to scrap less productive vehicles	-		√				√
Land use zoning of freight and logistics activities	-		√				
Land use zoning of freight dependant retail activities	-		√				
Set emission standards	-		√				
Note: see Appendix for a full description of the case studies.							

2.5. CONCLUSION

The approaches proposed in this chapter to classify known solutions to the problems and side effects of urban freight transport will aid practitioners to gain a better understanding of an area where there has been a lack of awareness and knowledge of each actor's role. Understanding the actors and acknowledging the elements of each category will add depth to any solution, or combinations of solutions, that are being considered as part of an urban freight improvement plan.

Alongside this improved understanding is the need to bring stakeholders together using a form of public-private partnerships which will improve governance required to solve urban freight transport issues. Greater collaborative efforts and openness between the public and private sector will aid in taking account of issues relating to urban freight transport and lead to better solutions with improved levels of agreement.

3. IMPLEMENTATION

This report was prepared to provide practical information and guidance on urban freight management. Considering road transport is usually the dominant mode in an urban environment, our discussion in this chapter focuses on road freight transport management (RFTM).

3.1. FRAMEWORK

Work Flow

A typical work flow for road freight transport management (RFTM) is provided in the following chart. It is important that a municipality makes the final decisions after public consultation, thus taking on final responsibility. A Freight Quality Partnership (FQP) or Public Involvement (PI) can be used as helpful methods to discuss and gain support for urban freight transport policy measures before a municipality's final decision.

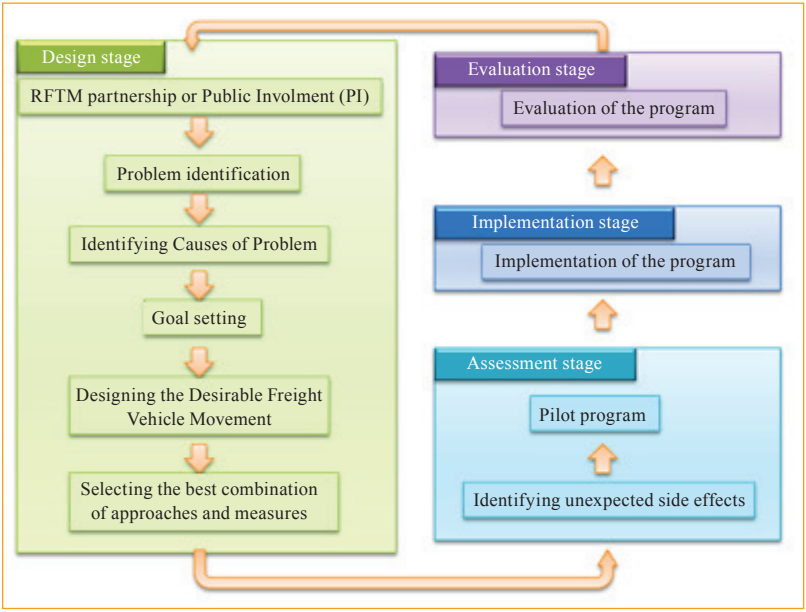


FIGURE 5 – WORK FLOW

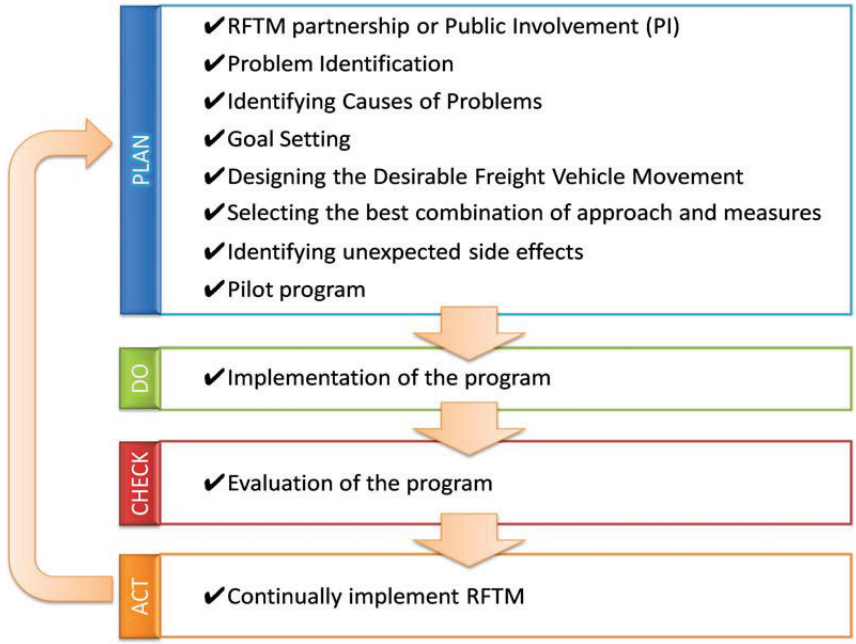


FIGURE 6 – PDCA CYCLE FOR RFTM

"Plan-Do-Check-Act" (PDCA) cycles are often used as a management system in many fields, such as modern quality control or environmental management in private firms *(figure 6)*. Through the four PDCA stages, a project will be continually improved.

As *figure 7, following page,* shows, ideal freight management fits neatly within the PDCA cycle in which freight measures will be improved and made more efficient as each cycle ends. Naturally there should be a variety of cases for application to the cycle, an example is provided in this guide. One can modify this as necessary.

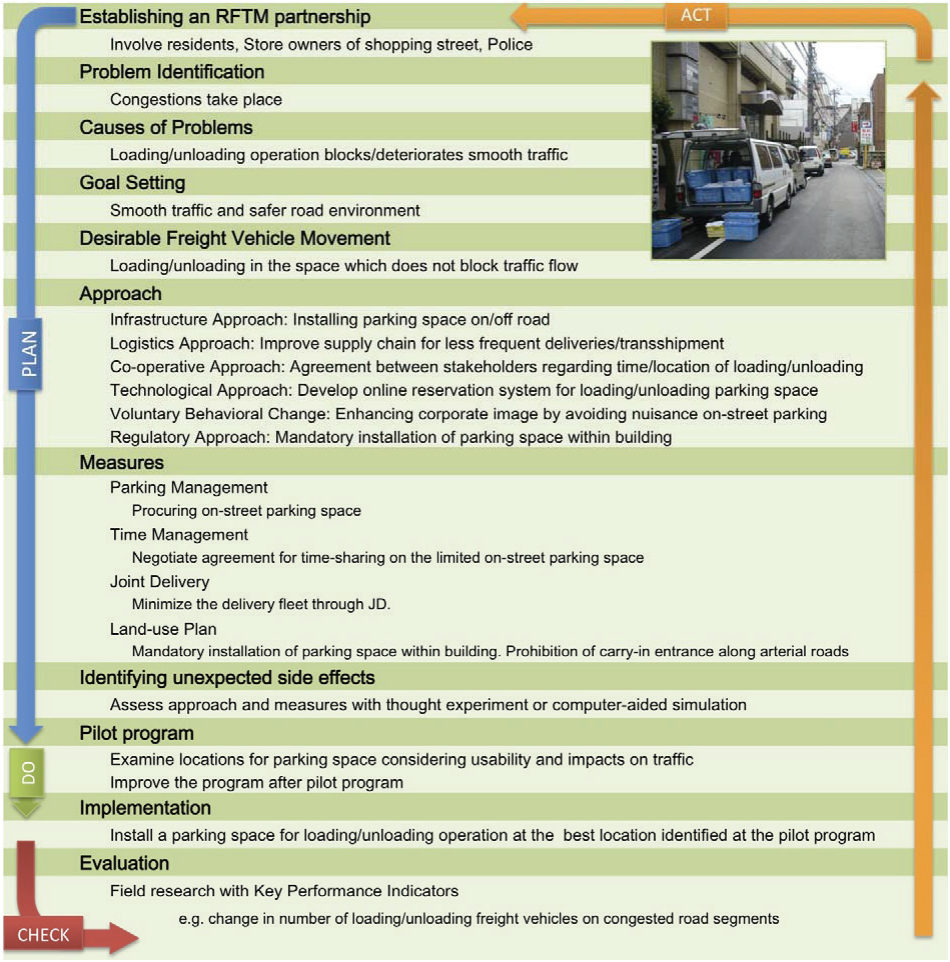


FIGURE 7 – AN EXAMPLE OF RFTM PROCEDURE

Objectives

Road freight transport management aims for three main objectives, namely a society that is economically efficient, environmentally-friendly and liveable *(table 6, following page)*.

TABLE 6 - OBJECTIVES OF RFTM			
Realize 3 objectives at the same time	Objective		Effects
	1. Economically efficient society	Less travel time	Travel further Travel more frequently
		More reliable	Sophisticated production and distribution
		Larger vehicles	Mass transport
	2. Environmentally friendly society	Less CO_2 emission	Global climate
		Less NO_x emission Less noise	Local air quality
	3. Livable society	Safe and comfortable society	Increased traffic safety
		Better place to live	Larger selection of products Comfortable road space Fresh products Affordable price for products

Scope of RFTM

Road transport starts from a facility at one location along the road to another facility connected to each other by freight vehicles. Road freight transport management (RFTM) covers mainly the travel of freight vehicles, starting from the loading of cargo at facility A to the unloading of cargo at facility B; illustrated in *figure 8*. The scope of RFTM mainly covers freight vehicles' travel and loading/unloading. Improving this traveling and loading/unloading will help achieve the RFTM objectives noted above; an economically efficient, environmentally-friendly and livable society.

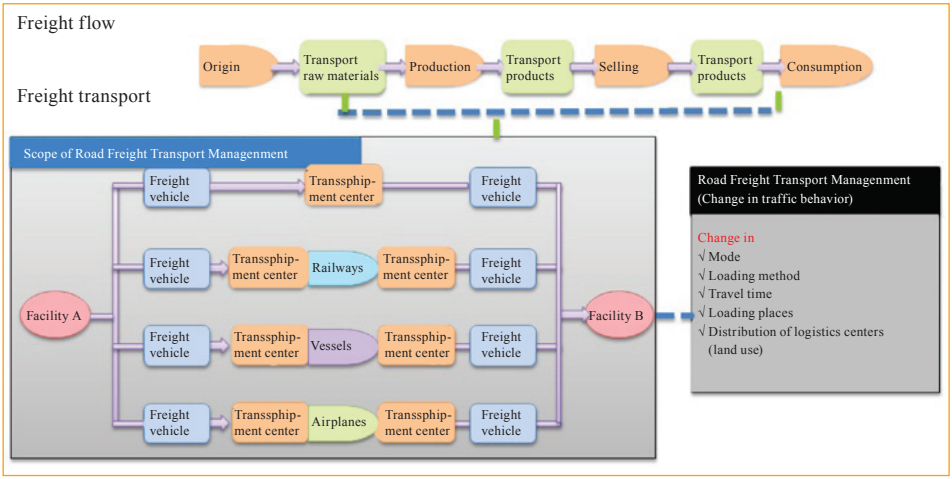


FIGURE 8 – SCOPE OF RFTM

Different perspectives with different positions

Naturally, the public sector has a different point of view than the private sector in that it focuses on regional or national welfare that is sustainable *(figure 9)*. On the other hand, a private sector business focuses on their own economic activities in order to maximise profits such as streamlining freight operations to save costs. In practice, the public sector needs to build a consensus with the private sector including logistics businesses to share both perspectives.

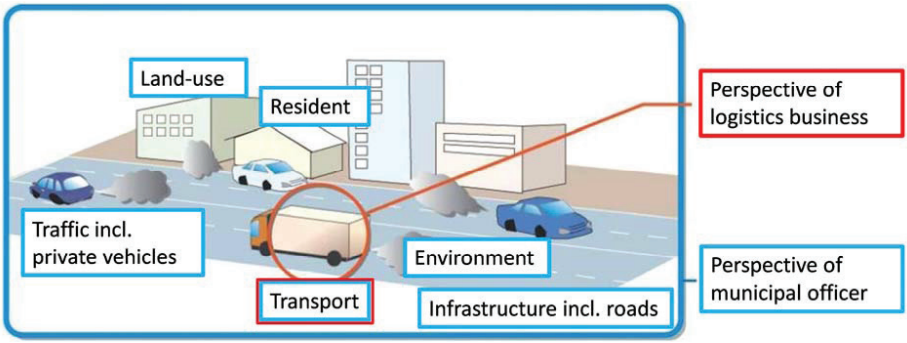


FIGURE 9 – DIFFERENT POINTS OF VIEW WITH DIFFERENT POSITIONS

3.2. DESIGN OF PROGRAM

3.2.1. RFTM partnership (or FQP) / Public Involvement (PI)

There are several techniques for involving stakeholders. This report covers two of them; one is to establish an RFTM partnership and the other is to utilise public involvement (PI). Either one can be used depending on the economical and political situation.

A. RFTM partnership

Structure of RFTM partnership

A RFTM Partnership that includes freight businesses, store owners, residents, officials (municipal and central, police) and academic experts is an effective tool to promote transport management. If the concept of an RFTM partnership is not well known to a community, officials need to explain how it works and ask for assistance from interested groups.

Figure 10, following page, presents an example of RFTM for East Osaka (Japan).

FIGURE 10 – EXAMPLE OF RFTM PARTNERSHIP (EAST OSAKA FQP, JAPAN)

The actors concerned

The *figure 11, following page,* reviews the many actors involved in urban goods transport.

Each actor has different motivations:

- Shippers: to receive and send their goods in a reliable manner;
- Carriers: to meet shippers' needs;
- Residents: to enjoy a good quality of life;
- Administrators: to balance interests of the three above players.

It is important to keep it in mind that each player has different interests and views.

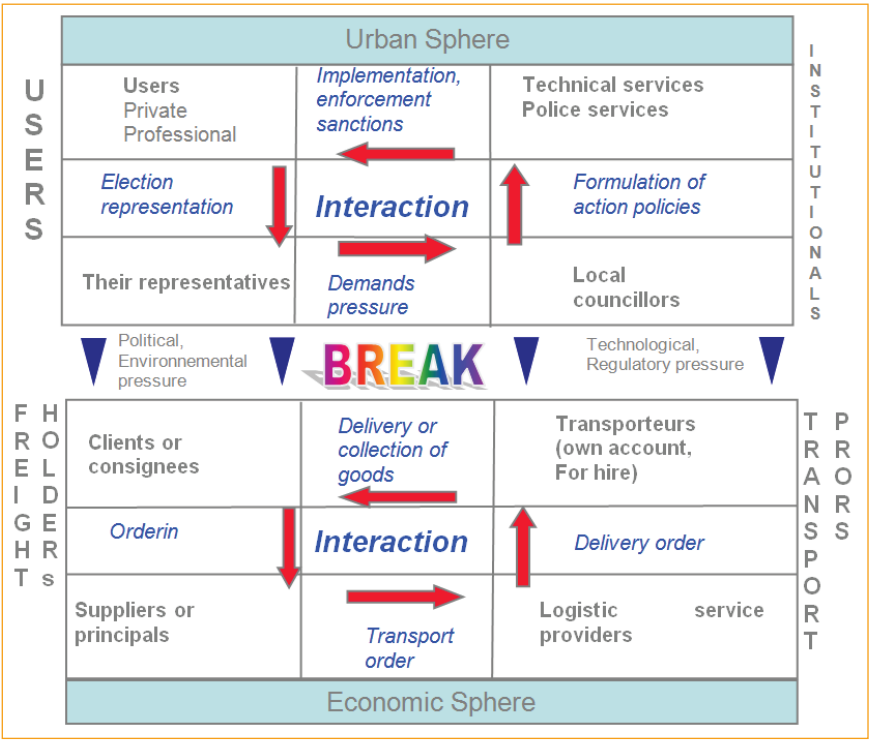


FIGURE 11 – THE ACTORS INVOLVED IN URBAN GOODS TRANSPORT
Source: BRRC, based on CERTU

Many actors, both private (citizens, roadside residents, enterprises, traders, professional federations, transporters, shippers, logisticians) and public (transport authorities, environmental authorities, police), affected by the implementation of a project and their diverging respective interests, requires that the project should be controlled by a participative process throughout the PDCA cycle.

Definition and levels of participation

The concept of a participative process refers to all the means used, both to inform the actors and to collect their opinions, with a view to promoting an understanding and, hence, the acceptance of the project in the long run.

Four levels of actor involvement can be distinguished in the PDCA cycle of a project:

1 - Information

Using a communication strategy, the project (in the different stages of its development) is brought to the knowledge of the various private and public actors such as citizens, professional federations, authorities, economic actors, etc.

This information is essential, as it makes it possible not only to improve the understanding of what is involved in the project but also to highlight common values. Although this information stage cannot be referred to as actual participation, it is an indispensable prerequisite in any participative process.

Various information tools are available: written documents (leaflet, journal, press article, summary technical sheets), events (meetings, exhibitions) or virtual channels (newsletter, website). Popularising the information makes it more accessible and paves the way for genuine dialogue.

2 - Consultation

The object of consultation is to collect the opinions of the actors on an existing situation or a project. The public authorities then review the ideas and opinions and take them into account as appropriate. Several tools can be used here as well: a survey questionnaire circulated by e-mail or used in direct interviews, a blog, a forum of associations, and workshops etc.

Consultation may in some cases be mandatory by law. For instance in Belgium, several information and consultation stages (information session for the general public, public inquiries) must be organised when developing local transport plans which include the aspects related to urban goods transport. The same applies to urban transportation plans in France.

3 - Concerting

Unlike information and consultation, which are unilateral processes, concerting turns the project into a bilateral scheme. Concerting is meant to give weight to the actors. This weight may be different for the various categories of actors. Concerting is characterised by the stakeholders voting and choosing between different variants, for example several alternatives for the project. Among the tools available are workshops, discussion groups, a participative website, etc. Exchange of opinions is the underlying principle of concerting.

4 - Coproduction

This ultimate stage of participation can be defined as a negotiated joint design. Public authorities agree not to impose a unilateral vision on the objectives to be met and the means to achieve this, but expect that the actors themselves reflect on the project. This is a bottom-up strategy, with information flowing from the actors to the authorities. The tools for this stage are numerous as well: design workshops, citizen or expert juries, and consensus conferences etc.

Generally a combination of these different levels of participation and their tools is used in the PDCA cycle for a project.

Examples of RFTM partnership

Examples of RFTM partnership are found in cities in various countries *(see table 7)*.

TABLE 7 - EXAMPLES OF RFTM PARTNERSHIP		
PQF Osaka Est	2005	Various freight-related issues have been identified in the region wher large amount of Freight Transport is generated. Through FQP, public and private sectors have been trying to tackle the issues together.
Derby PQF	2000	The Derby and Derbyshire FQP is a group of local freight interests who meet regularly to discuss concerns, progress initiatives, and agree common approaches to freight issues.
Reference: East Osaka FQP document and Derby City Council document		

The majority of RFTM partnerships is led by a public body and involves freight businesses, cargo owners such as local businesses and shopping precincts, local residents, other public bodies such as police and national government and academic experts. *Tables 8 and 9* present the list of members of two partnerships.

TABLE 8 - MEMBERS OF EAST OSAKA FQP	
Freight business	Osaka Trucking Association and freight businesses in the city
Cargo owner	Businesses in district, Osaka Prefectural Urban Development Corporation and The East Osaka Chamber of Commerce and Industry
Local resident	Resident's associations and residents
Public bodies	Osaka prefecture and East Osaka City Ministry of Land, Infrastructure, Transport and Tourism Osaka prefecture police
Academic expert	Kyoto university
Reference: East Osaka FQP document	

TABLE 9 - MEMBERS OF DERBY FQP	
Freight business	FTA (Freight Transport Association) RHA (Road Haulage Association) Tarmac and Boots
Cargo owner	South Derbyshire Chamber of Commerce
Local resident	–
Public bodies	Local governments (regional county and city), Association of National Parc Authorities, Police, Transport 2000 and Highways Agency
Academic expert	–
Reference: Derby FQP document	

Typical problems raised by the participative process

It is worth noting that there are issues sometimes raised in this stage. Time and budget, representativeness, dynamics, fragmentation of competence and lack of training and experience have been identified as typical ones. Administrative officials should be aware of these common issues and be prepared for them.

1 - Time and budget

The implementation of a participative or concerting process takes time and requires financial means. For example, when holding a public inquiry a certain lapse of time must be allowed for all stakeholders, who live in different conditions and belong to different cultures, to be informed with the proper tools, to become aware, to reflect, and to finally express themselves.

2 - Representativeness

We have seen that many different actors are involved. How can one be sure that the people taking part in the consultation or concerting process are representative of the different groups of actors? It is often heard that those stepping forward in a consultation process are for the greater part people with negative reactions. If this is true, how can *"silent"* favourable opinions be collected as well?

Furthermore, what criteria are used to select associations, federations, pressure groups or societies for participation in the concerting process? And once the selection has been made, how can one be sure that spokespersons truly reflect the opinions of the groups they are representing rather than their personal views? Conversely, how can it be ascertained that associations and federations adequately reflect the reality encountered by the actors in the field and do not present a distant theoretical approach?

3 - Dynamics

Participation needs to be managed in time. Implementing public participation is a slow process which extends the duration of a project either in its design or in its implementation stage. At the same time, both the situation encountered in the field and opinions are liable to change.

It should also be noted that the various categories of actors think in different time scales: councillors are committed to the terms for which they have been elected and want to see results in the short run, authorities often have strategic visions for the longer term, and economic actors look at the very short term.

Finally, concerting must not stop during the implementation of the project. Once the project is well under way, it is, indeed, equally important to monitor it and to have feedback on how it is operated and perceived. This feedback should be an input to the post evaluation of the project, possibly resulting in a correction or a more thorough revision of the measures implemented.

4 - Fragmentation of competence

An additional difficulty lies in the fact that although urban goods transport is at first sight a local matter, it is actually an integral part of a far more complex logistic chain and often calls for solutions emanating from public authorities at different levels of power – local, regional, or even national.

5 - Lack of training experience

Another detrimental factor in implementing solutions within the framework of a participative process is the lack of relevant training among policy-makers and often within public authorities, particularly at the local level. This lack of relevant competence complicates communication.

Knowledge sharing

After a partnership is established, public officials can talk to the main stakeholders interested in freight issues for the purpose of knowledge sharing. The range of actors each may have different interests and issues to be sensitive with *(table 10)*.

TABLE 10 - INTERESTS AND VARIOUS STAKEHOLDERS	
Stakeholder	**Examples of interests**
Shippers (retailers, manufacturers, wholesalers)	Good working environment attractive to skilled workers, accessibility for shoppers, timely availability of goods at low charge, profitability
Residents	Road safety, less noise and air pollution, timely availability of goods at low charge, accessibility to local stores
Freight carriers	Accessibility, sound working environment, sufficient infrastructure for delivery activity, cost efficiency, road safety
Administrators	Maximized public benefit, less complaints from other stakeholders

Sharing knowledge and data is extremely important. If existing data is not sufficient, a survey may have to be conducted. When collecting data there are various aspects of urban freight transport to consider *(see table 11)*.

TABLE 3.6 - VARIOUS ASPECTS OF URBAN FREIGHT	
1	Total number of freight vehicles in the area
2	Siez distribution of freight vehicles
3	Dwell time while loading/unloading
4	Time/day of operation
5	Distance travelled by freight vehicles
6	Traffic disruption caused by freight vehicles
Source: [Allen, Anderson, Browne, Jones, 2000]	

There have been a large number of surveys carried out. For more details, consult *chapter 2 "Problem Identification"*.

B. Public Involvement (PI)

Establishing an RFTM partnership or FQP is not the only method used at this stage. Public Involvement (PI) is also a good tool and has been widely used.

The importance of PI is often cited in administrative literature; it increases public input in the planning stage, which helps an administrative office increase its chance of success. If the administrative office ignores the stakeholders and the public at large, it will rarely enjoy the benefits of their support and approval. By building good relationships with stakeholders, the planned measure will be better understood and more likely supported because they feel they are a part of the program through being involved from the planning stage of the PDCA cycle.

Public meetings or hearings are often held as a means of PI *(figure 12)*. However, it is recommended to focus on interested groups and citizens so that one-to-one discussion can be achieved rather than just addressing a meeting, with little opportunity for feedback. Also videotaping the meeting and releasing it online can provide citizens with an opportunity to understand the situation at their leisure.

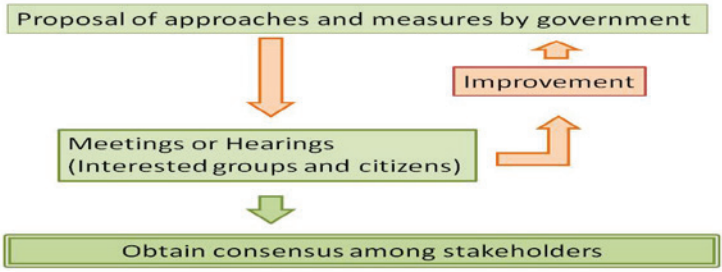


FIGURE 12 – TYPICAL PI PROCESS

For administrative organisation, at least one full-time officer who is experienced or trained in public involvement should be allocated to this work, considering that PI can be time-consuming and takes a lot of work.

3.2.2. Problem Identification

Once every player understands the present situation of urban freight in the subject city and shares his/her view with other actors, it is time to identify the current issues and set a common goal.

Identifying the current problems

In order to solve the problem, it is important to understand the problems and to identify their causes. Typical problems raised regarding the RFTM are provided in the *chapter 1*.

3.2.3. Identifying Causes of Problems

It is also important to identify the causes of the problems in order to select appropriate measures. For example, if one determines the main cause of congestion to be drivers' violation of traffic law, then countermeasures can include tougher law enforcement. On the other hand, if the main cause is determined to be a shortage of parking space at appropriate locations, a countermeasure could be the development of parking spaces for loading/unloading.

1 - Congestion

Causes:

- Freight vehicles have a greater impact on traffic congestion than passenger vehicles, because of their larger size. The impact is substantial especially in congested areas such as city centers.
- In order to respond to the needs for just-in-time delivery, goods are delivered with smaller freight vehicles more frequently. As a consequence, there will be more freight traffic on the road.
- A large number of freight vehicles parked on the road for loading/unloading. Traffic capacity is reduced due to on-street parking and double parking, causing additional congestion.

Points to consider:

Individual large freight vehicles have a greater impact on congestion than smaller ones. However, the fact they have a larger carrying capacity also needs to be considered. Appropriate guidelines for Just-in-time (JIT) deliveries should be laid down considering it improves the quality of transport service, although excessive JIT should be controlled. Also, sufficient space should be provided for transport activities, because loading and unloading activities are essential in transport.

2 - Environmental nuisance

Causes:

- Because freight vehicles, especially larger ones, emit more pollutants per unit than passenger vehicles, they have a greater impact on air quality.
- More pollutants are emitted in busy areas such as city centers where vehicles start/stop and accelerate/decelerate frequently.

- There are still many old freight vehicles on the road which emit more pollutants per unit. Progress in replacing older vehicles with new low-emission vehicles is slow.
- Freight vehicles, especially larger ones, are heavier than passenger vehicles, causing a higher level of noise and vibration.
- Loading/unloading operations are undertaken on the road, which causes noise.

Points to consider:
Individual large freight vehicles emit more pollutants than smaller ones. However, considering that they have larger carrying capacities, transport with fewer large vehicles will emit less total pollutants.

3 - Road safety problem

Causes:
- More collisions take place especially in busy areas such as city centers where vehicles start/stop and accelerate/decelerate frequently.
- Collisions involving large freight vehicle have greater fatality/casualty rates. Also, once a collision takes place, a large freight vehicles can cause a considerable obstruction to traffic flow.

Points to consider:
Collision rates involving large freight vehicles are smaller than those involving small freight vehicles. This is especially true for collision rates per load. Because collisions involving large freight vehicles tend to be serious, the dangers of large freight vehicles are often highlighted. On the contrary, statistics show that large vehicles are safer than small ones.

4 - Energy consumption

Causes:
- Freight vehicles consume more energy, especially fossil fuel, which has adverse effects on climate change.
- There are still many old, high mileage freight vehicles on the road. Slow progress is being made to replace these with new low mileage and fuel efficient vehicles.

Points to consider:
Individual large freight vehicles consume more energy per distance traveled than smaller ones. However, considering that they have larger carrying capacity, transport with fewer large vehicles has less total energy consumption than transport with many small vehicles.

5 - Visual pollution

Causes:

- Large freight vehicles can obstruct other drivers' vision and also block a pedestrian's view of other traffic.
- Even small freight vehicles are not stylish in design compared to passenger vehicles and usually are soiled with dirt, which makes them less visually appealing.
- Freight vehicles cruising around the central residential areas and large freight vehicles parking on the road o extended periods to load and unload adversely affects the visual image of a city.

6 - Damage to infrastructure

Causes:

- Freight vehicles, especially large ones, cause more damage to the road surface than passenger vehicles.
- Managing and maintaining all roads so that large freight vehicles can be accommodated requires considerable expense.

Points to consider:

Large freight vehicles play a certain role in urban freight movement therefore sufficient infrastructure should be provided for them and traffic should be controlled appropriately.

7 - Unsuitable infrastructure

Causes:

- Large freight vehicles are heavy and have a large minimum turning radius. Roads need to have sufficient load capacity and alignment to accommodate them.
- Roads in city centers, especially in older districts, are usually narrow and not suitable for large freight vehicles.
- Infrastructure development to accommodate large freight vehicles requires significant amounts of money.
- Information systems which identify roads which are able to accommodate large freight vehicles (such as a suitably programmed in-vehicle GPS system) are limited.
- Freight drivers tend to drive heavy vehicles on less durable roads if this is more convenient and efficient for their purposes. This tendency makes management of the system even more difficult.

Points to consider:

Large freight vehicles play a major role in urban freight movement therefore sufficient infrastructure should be provided for them and use of the provided infrastructure should be encouraged.

3.2.4. Goal setting

The next step after identifying problems is to set goals. Goals should be simple and clear so that everybody can easily understand them. After a cycle of freight measures have been implemented, the goals should be checked to ascertain if they have been achieved. In this sense, success or failure of the package is easily and fairly determined if the effect is measureable.

3.2.5. Designing desirable freight vehicle movement

Desirable freight vehicle movement in and around the urban areas

As discussed in the previous chapter, freight vehicle movement causes a wide variety of problems. On the other hand, prohibiting their movement is not realistic, considering we have to maintain ongoing socioeconomic activities. Therefore, it is necessary to discuss freight vehicle movement that addresses or mitigates these problems as well as realising efficient socioeconomic activities. The required freight vehicle movement should realize both an economically-efficient and environmentally-friendly society that (i) minimises the travel distance in the urban areas, (ii) uses arterial roads, (iii) chooses lower-emission vehicles and (iv) selects desirable times of the day to operate. Details of such movement can be described as follows.

1 - Around the urban areas

Urban areas usually have a greater population density and are environmentally-sensitive, and normally include a number of destinations for freight vehicles. In order to reduce the environmental burden in the urban areas, it is necessary to minimise freight vehicle movements as much as possible *(figure 12, following page)*. Thus, the following movement is desirable when freight vehicles drive within urban areas:

a. freight vehicles without any destinations within the urban area drive around the urban area using ring roads or bypasses;
b. if the road network is such that freight vehicles have to drive through the urban areas, require them to use principal arterial roads that are more desirable from an environmental and safety perspective;
c. require freight vehicles coming into the urban area to use ring roads and bypasses so that the travel distance within the urban area will be minimal.

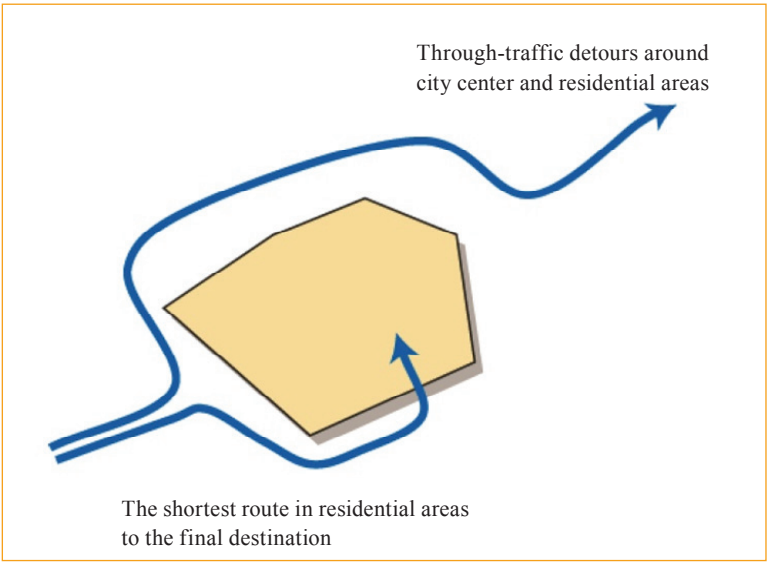


FIGURE 12 – ROUTE SELECTION AVOIDING/MINIMISING FREIGHT VEHICLE MOVEMENT IN AN URBAN AREA

2 - Freight vehicle movement in the urban areas (using arterial roads)

Freight vehicle movement is required to select its route into urban areas so that the environmental burden is minimised especially in cities where there are no ring roads. In this regard, freight vehicle movement into urban areas or surrounding areas is under the following conditions.

Using arterial roads *(figure 13, following page)*

- Require freight vehicles driving into the destinations within urban areas to use motorways or arterial roads that impose less environmental burden. Ideally, such roads should have sufficient width and environmental applications including noise reducing pavement and noise barriers. Also land use of the roadside areas should be non-residential if possible.
- Motor highways that are not interrupted by signals or other factors and arterial roads that have safety applications show lower collision rates and greater safety. Therefore, let freight vehicles use these wider roads.

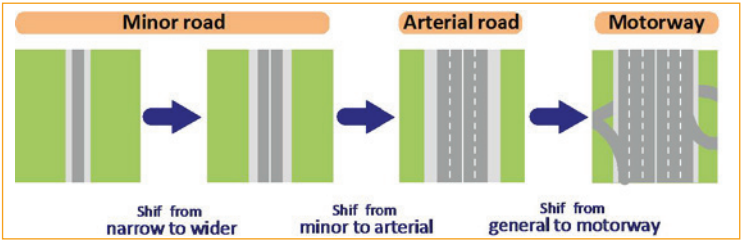


FIGURE 13 – USE ARTERIAL ROADS WITH LESS ENVIRONMENTAL BURDEN AND GREATER SAFETY

- Freight vehicles use surrounding arterial roads if they have no destinations in residential area.
- Freight vehicles use arterial roads near residential areas and select routes that minimises the travel distance within residential areas *(figure 14)*.

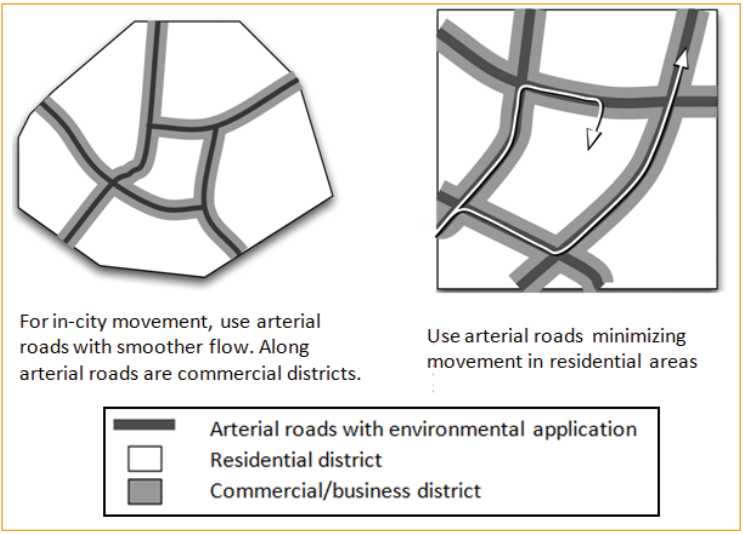


FIGURE 14 – ROUTE SELECTION IN THE CASE OF IN-CITY MOVEMENT

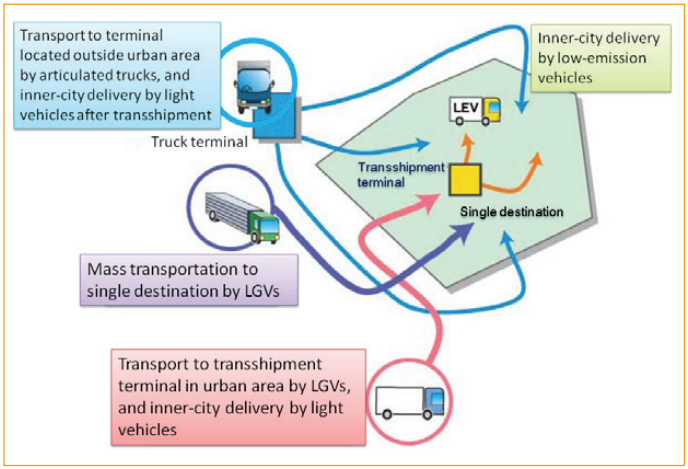


FIGURE 15 – FREIGHT MOVEMENT ENTERING URBAN AREAS

Selecting desirable vehicles for in-city movement:

- use larger freight vehicles near the fringe of the urban areas and change to smaller LEVs (Low Emission Vehicles) for the last-mile delivery after transshipment at a transshipment terminal *(figure 15)*.

Selecting a desirable time of day:

- where feasible, select off-peak times for freight vehicle movement when most people are not using the road. For example, loading/unloading operations finish before 10 am or start after 8 pm.
- avoid freight flow into residential districts at night unless it is absolutely necessary.

3 - Freight movement between urban areas

Use motorways and principal arterial roads for transport between urban areas. In this situation, transport in bulk using large freight vehicles or use other modes such as railways and marine:

- adopt mass transport using large freight vehicles on motorways and principal arterial roads between cities, production areas, ports/air ports/railway stations.
- In the case of a smaller amount of goods, use small vehicles to truck to terminals then transshipment to larger vehicles to transport between urban areas.
- use railways and marine transport if it is more effective from the perspective of energy saving or environmental impact and transport costs can be saved.

3.2.6. Selecting approach

"Approach" in this context means a type of incentive or idea for the problem-solving. Typical approaches are provided in *table 12, following page*. For further details, consult *chapter 2 "Approaches to find a solution"*.

An approach should only be selected from the many available options after careful consideration. This prevents a government officer from taking a simplistic solution. For example, congestion caused by freight carriers' disorganised on-street unloading operations, an optimal approach can be selected from Regulatory, Infrastructure or Voluntary Behavioural Change.

Accordingly, the best measure could be parking/time/vehicle management selected from a Regulatory approach, or the designation of unloading space and developing off-road loading spaces from an infrastructure approach or joint delivery from a Voluntary Behavioural Change approach.

In reality, an approach does not have to be selected before a measure; a measure can be selected before selecting an approach. As the selection of both approach and measure is reviewed through discussion between affected parties, a thoughtful and practical combination of approach and measure can achieved.

Approaches can be categorised in the following manner.

Infrastructure approach
This approach is based on development of structures such as roads, parking space or logistics facilities.

Regulatory approach
Regulatory approach includes grouping policy, land use planning, licensing, regulations and associated instruments.

Logistical approach
This approach is characterised by the involvement of only (or mainly) private entities in the form of actors from freight and logistics businesses. They seek to implement changes in order to derive an economic benefit or advantage such as reducing delivery costs or a higher loading ratio of freight vehicles.

Co-operative approach
This approach focuses on harmonising measures between private and public sector actors to achieve mutually efficient and sustainable outcomes.

Technology approach

This approach involves state-of-the-art technologies, especially ICT to enhance logistics efficiency or to address freight-related problems. For example this includes vehicle routing/GPS systems.

Behavioural Change approach

A Behavioural change approach involves action to raise awareness of measures and to encourage the use of alternatives which can be embedded in long term and sustainable changes to the behaviour of the actors.

Examples of the above-mentioned approaches are given in *table 12*.

TABLE 12 - EXAMPLES OF APPROACH	
(1) Infrastructure	Development of bypasses or ring roads Development of urban distribution centers Create off street loading facilities Installing on street loading spaces
(2) Regulatory	Introduce fuel taxes Introduce roas user charge Develop dedicated freight routes Impose vehicle restrictions Impose loading time restrictions Introduce congestion charging Have differentiated parking charges Create freight concessions Provide subsidies to scrap less productive vehicles Land use zoning of freight and logistics activities Land use zoning of freight dependant retail activities Set emission standards
(3) Logistical	Use of small delivery vehicles Improved terminal operations Improve driver competencies
(4) Co-operative	Form freight partnerships Load sharing systems (increase load factors) Joint deliverying
(5) Technology	Use of electric delivery vehicles Use of GPS and FTMS Implement a vehicle parking reservation system Introduce real time traffic information
(6) Behavioral	Implement anti-idling messages Improve social acceptance of urban freight activities Use of recommended truck routes

3.2.7. Selecting measures

Measures to realise desirable freight vehicle movement.
As discussed in the previous section, in order to realise freight vehicle movement that meets both efficiency and environmental protection, infrastructure development such as road network and distribution centers is required while at the same time providing traffic management measures (such as traffic control devices *(figure 16, following page)*).

1 - Infrastructure development

Road network

- Road network around the urban areas.
  Ring roads or bypasses should be developed on the fringe of urban areas. These roads will divert freight vehicles entering the urban areas. Also, they will provide alternative entry points that help minimize travel distances in the urban areas.
- Road network in the urban areas.
  Clarify the structure and role of each category of roads including motorways, principal arterial roads, arterial roads, minor arterial roads, district roads and others. Freight vehicles should drive on higher class roads for as much distance as possible and avoid narrow roads such as district roads. For the arterial roads, sufficient environmental applications including green buffer zones, wide sidewalks, sound barriers and noise reducing pavement should be installed.
- Road networks accommodating large freight vehicles.
  Major logistics facilities, large-scaled factories and ports/airports/railway stations that deal with a large amount of freight should be connected to each other by arterial roads or motorways.

Transshipment and loading/unloading centers

- Transshipment from large freight vehicles to small ones.
  Major logistics facilities should be built along the major ring roads or arterial roads on the fringe of urban areas.
- Transshipment between modes.
  Transshipment facilities among modes including airplane, marine, railway and road should be provided.
- Joint delivery center.
  Delivery to one destination by a number of carriers will cause traffic congestion and negatively impact on the environment. Joint delivery could provide efficient delivery using fewer vehicle fleets. This requires development of a joint delivery center that is used for collecting goods, sorting by destination and transshipping.
- Loading/unloading facilities.
  At originating points and destinations, loading/unloading facilities are needed that enable efficient operation. The following points should be taken into account when developing the facilities:

- If a large amount of freight is usually generated from the building, the loading/unloading facility should be installed within the building.
- If small amount of freight is usually generated from the building, a common loading/unloading facility should be provided which can be shared by several buildings. An on-street loading bay in front of the building could also be an option.

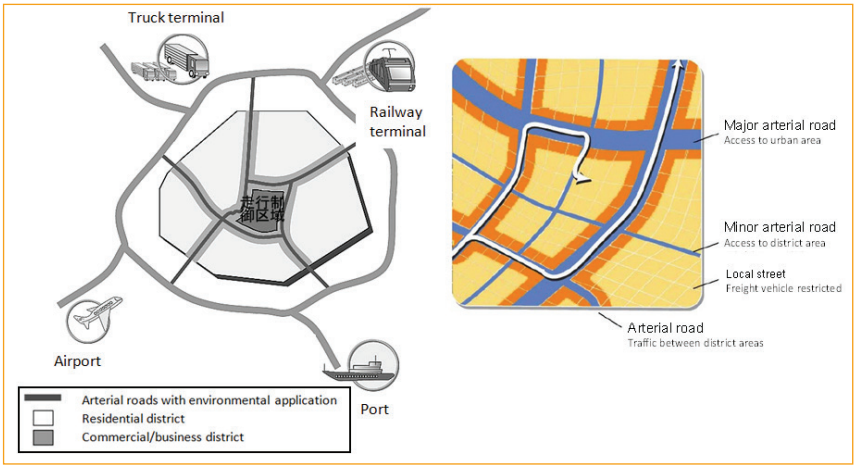


FIGURE 16 – CONCEPT OF ROAD NETWORK AND LOGISTICAL POINTS
Source: MLIT, Japan

2 - Traffic management of Freight Vehicles

Infrastructural development alone cannot realise desirable freight vehicle movement. In addition to infrastructural development, traffic management such as freight vehicle control is necessary. There are two types of traffic management for freight vehicles; through-traffic and flow traffic.

Through-traffic management

- Prohibit all through-traffic freight vehicle movement through the urban area.
- Prohibit all freight vehicle movement through the urban area except for designated routes.

Flow traffic management

Prohibit all freight vehicle movement flowing in/out the urban area except for designated routes.

Parking management

Parking management for freight vehicles is necessary in addition to in/out flow management. Specifically, parking management aims at a reduction in parking,

congestion and environmental burden. It requires the wise use of roads depending on time of day and locations.

The following measures can be provided for parking control of freight vehicles in urban areas:

- parking prohibition of freight vehicles or imposing a set of conditions on their parking.
- parking prohibition of freight vehicles for limited hours to reduce their in-flow.
- designation of parking space exclusively for freight vehicles to address issues of parking shortage induced by passenger vehicles. At the same time, parking prohibition of freight vehicles at all non-designated space will prevent on-street parking that hinders smooth traffic flow.
- set different hours that can be used for parking passenger or freight vehicles.

Harmony with urban structure

- Harmony between the urban structure and freight transport.

In urban areas, there are facilities sensitive to noise and the quality of life such as residences, schools and hospitals and other facilities such as commercial buildings, offices, factories and storage facilities which are sensitive to operational efficiency. Land use plans should be carefully designed so that heavy freight vehicles do not disturb noise-sensitive areas.

Therefore, urban structure should be planned or guided in such a way that these problems can be avoided. In continually changing urban areas, factories and storage facilities that were previously located on the fringe of urban areas are now included within the expanding residential areas. Realignment plans and measures that attract large-scaled commercial facilities to the fringe of urban areas that take this phenomenon into account are important. The following factors are the points when considering urban structure and the distribution of logistics facilities.

a. Production facilities such as factories and storage facilities should be located on the fringe of urban areas and connected to each other by ring roads. By doing so, freight vehicles will be able to access production facilities from other cities without entering residential areas and the connection will be more direct.
b. Tertiary industry facilities such as offices should be brought together at the heart of the city and should be connected with the outer-city by principal arterial roads.
c. As an urban area extends, there is the possibility that factories and storage facilities that were previously located in the fringe of the urban area will be surrounded by the expanding residential area. If this happens or is expected to happen, urban areas should be realigned by taking actions such as moving factories and storage facilities to outer urban areas.

d. Large-scaled wholesale stores located in the outer city should be attracted to areas along arterial roads. In this way products are transported directly to the store using arterial roads.

• Harmony with roadside land use.

Freight vehicle movement, especially using large vehicles, has a great environmental impact on roadside areas. In order to mitigate the impact, the following measures that foster harmony between the road and roadside land-use are will be necessary.

a. Control residential land use along the road. It should be used for high-and-medium rise commercial and office buildings and reduce the number of residences, and at the same time protect the environment of the backland.
b. Attract non residential facilities such as parks on roadside land at the fringe of urban areas. If residential dwellings are established, install environmental buffers and sound barriers to reduce the environmental impact to residents.
c. Mitigate the environmental burden at roadsides by installing noise reducing pavement and underground road crossings for arterial roads in urban areas.

The various measures to achieve desirable freight vehicle movement are summarised in *table 13, following page*.

TABLE 13 - MEASURES TO ACHIEVE THE DESIRABLE FREIGHT VEHICLES MOVEMENT				
Measure				**Example**
Traffic management	Traffic flow management	Through-traffic optimization	Infrastructure development	- Ring roads, bypasses
			Traffic management	- Restriction through-traffic in city/district - Designating major arterial roads for through-truck route
		In/out-flow optimization	Infrastructure development	- Clear functional classification for inner-city road network (motorways, major/ minor arterials and collectors) - Transshipment terminals outside city
			Traffic management	- Designating arterial roads for truck route - Restriction of trucks from entering city center and residential area
	Parking management		Infrastructure development	- Facility for delivery
			Traffic management	- Designating truck-only parking space
	Time management			- Limited time window for trucks entering city center and residential area - Timesharing parking space between trucks and cars - Nighttime and early morning delivery
	Vehicle management			- Using small vehicles - Using low-emission vehicles
Better transport method	Joint delivery		Infrastructure development	- Joint delivery Center - Transshipment terminals outside city (Terminal for transshipment from larger vehicle to smaller vehicle)
			Traffic management	- joint delivery agreement
	Intermodal transport		Infrastructure development	- Intermodal terminals (transshipment equipment in intermodal terminals)
Harmony with urban structure	Land-use plan		Infrastructure development	- Placing environmental buffer along arterial roads
			Land-use management	- Restricting residential building along arterial roads
Other	improve vehicle movement			- ITS, ICT
	Organizational activities			- Freight Quality Partnership

Seeking an optimal combination of approaches and measures

As seen in *tables 12 and 13*, there are various approaches and measures to employ. At this stage, it is important to examine several combinations of approaches and measures to address the problem until the optimal combination is found out.

Table 14 provides the relationship between approaches and measures.

TABLE 14 - MEASURES TO ACHIEVE THE DESIRABLE FREIGHT VEHICLES MOVEMENT

Measures			Approach					
			Infrastructure	Regulatory	Logistical	Operative	Technology	Behavioral
Traffic management	Traffic flow optimization	Through-traffic optimization	X	X		X		X
		In/out-flow optimization	X	X		X		X
	Parking management		X	X	X	X		X
	Time management			X	X	X		X
	Vehicle management		X	X	X	X	X	X
Best transport method	Joint delivery		X		X	X		X
	Intermodal transport		X		X		X	
Harmony with urban structure	Use land			X				
Other	Smooth vehicle movement		X		X		X	
	Organizational activities				X	X		X

3.3. ASSESSMENT OF THE PROGRAM

The Approach and measures can be assessed through the use of a pilot program or computer-aided simulation. In the case of procuring on-street parking space, locations should be carefully examined by temporarily installing a parking space and assessing usability and the impact on traffic.

3.3.1. Identifying unexpected side effects

The designed approach and measures may have negative side effects as well as expected benefits. Both sides of the effects caused by the selected approach and measures should be carefully examined in advance of implementation so that the

advantages will be maximised while the disadvantages will be minimised. There are several techniques to anticipate the advantages and disadvantages depending on the financial constraints of the project:

- a stakeholders' workshop to brainstorm possible effects;
- computer-aided simulation;
- a pilot program.

The pilot program approach is discussed in the next section.

3.3.2. Pilot program

Before conducting a full-scale program, a pilot program can be used to see how the program will work. The objective of conducting a pilot program is to establish the feasibility of the approach and measures.

In the case of a loading/unloading space, an on-street parking space can be temporarily installed as a pilot program. One should learn what people think of it and how it affects on the near-by traffic to examine the adequacy of the parking space as well as its location. If the results of the pilot program shows unpopularity or adverse effects on traffic and/or safety, an alternative plan should be prepared.

A pilot program in Shibuya city, Japan (case study no. 2 in the Appendix A)
The busiest shopping streets in Shibuya, Japan were experiencing severe traffic congestion due to narrow roads together with a large number of vehicles and pedestrians. The project team came up with a pilot program to try out some potential measures to solve the problems.

The 2-month long pilot program included the following measures:

- roadside loading/unloading space,
- tighter law enforcement against illegal parking,
- free parking lot for visitors,
- shuttle bus service for visitors.

The above mentioned measures received favorable response from participants. After the pilot program, the City established an association including residents and other relevant groups and bodies to talk about the upcoming full-scale program. With limited finances, they decided to offer roadside parking space for loading/unloading operations and revise a law requiring newly constructed larger buildings to have a built-in loading/unloading space. See the Appendix "Case studies" for more detail.

3.4. IMPLEMENTATION OF THE PROGRAM

Based on the results of the pilot program, determine if a full-scale operation should be commenced. In the decision process, it is important to check the sustainability of the program. If the program requires public funding, determine how much and how long it is needed before conducting a full scale program.

3.5. EVALUATION OF THE PROGRAM

After the implementation of the program, the results should be evaluated. This is a part of a wider project management process. Evaluation and feedback is equally important to guarantee the success of the measures undertaken and improve on any adverse secondary effects as a result of the measure(s). It is also important to demonstrate how and where value is achieved. Hence the main objectives of any evaluation process are as follows:

- check that actions are implemented as planned;
- analyse the effects of the actions undertaken;
- determine whether objectives are met; and
- react and develop solutions where objectives have not been met or problems have been raised.

KPIs for evaluation

"Key performance indicators" or 'KPIs, are a good tool to determine whether or not the objective of the program is met. KPIs can range from environmental aspects to social benefits. For example, environmental aspect includes, air pollutant emissions (CO, NO_x, PM, etc), noise complaints from residents and industry. These indicators can be identified through measurements and inquiry surveys.

Based on the evaluation made at the *"Check"* stage, the next step is to continually implement the RFTM. If the evaluation suggests the ongoing RFTM needs to be improved, review should be carried out.

Details in the Evaluation process are discussed in the following *chapter 4*.

4. EVALUATING THE RESULTS

4.1. INTRODUCTION

This chapter seeks to evaluate the benefits of identified schemes and the extent to which they address the problems listed below and looked at in more detail in *chapter 1*. The chapter concludes providing overall thoughts on the problem and some broader strategies for the future. Whilst many apparently successful freight

management schemes have been implemented, many have not been fully evaluated. A list of some of the issues that might be evaluated are outlined below, they are dealt with in more detail in *chapter 1*:

- Congestion,
- Safety,
- Noise,
- Design Life and Maintenance Issues,
- Authority Liaison Issues,
- Urban Design,
- Policy Issues,
- Professionalisation of Transport.

4.2. PROJECT EVALUATION

Benefits Perception

The level of benefits perceived from any intervention, is greatly dependent on the differing views of stakeholder, be they public sector, private industry or from wider society. For example, improving the access for heavy vehicles through measures such as extending permitted delivery hours or improving road infrastructure, could directly conflict with the quality of life for some residents, introducing greater levels of emissions and nuisance. With this in mind, the report is written and evaluated from the point of view of public authorities who have, or should have, responsibilities for all stakeholder interests.

Interventions and their associated benefits should be aimed across society. However particular intervention may not offer consistent benefits to all, for instance an action may on occasion be to the detriment of private industry and operators. This further highlights the importance of forums and discussions so that where possible, compromises can be reached for all parties. The key challenge therefore is to complete an evaluation whilst appreciating the wider context of the scheme and level of data available, be it quantitative or qualitative.

Why is Evaluation Important?

Whilst implementation is important, it is part of a wider project management process. Evaluation and feedback is equally important to guarantee the success of the measures undertaken and improve on any adverse secondary effects as a result of the intervention. It is also important to demonstrate how and where value is achieved. Hence the main objectives of any evaluation process are as follows:

- check that actions are implemented as planned;
- analyse the effects of the actions undertaken;
- determine whether objectives are met; and

- react and develop solutions where objectives have not been met or problems have been raised.

Key Performance Indicators

One way in which interventions are assessed is via the use of 'key performance indicators' or 'KPIs,' that reflect the objectives of the actions being implemented, whilst considering their wider implications for freight transport and the environment in which they operate. *Table 15, following page,* provides a selection of objectives and key performance indicators that could be used to evaluate strategic level interventions deployed across an urban centre or wider region.

TABLE 15 - DEMONSTRATES A NUMBER OF KPIS FOR EACH CATEGORY				
Criteria	**Objectives**	**Indicators**	**Information sources**	**Measurement methods**
Life quality	Emissions Reductions	- Noise - Local air quality emissions (CO_2, NO_x, CO) - Traffic volumes on key corridors - Complaints from residents - Complaints from industry - Proportion of HGVs involved in accidents	Acoustics field study Field study Local Authority Police/Local Authority Police Accident Statistics	Measurements, modelling Measurements Traffic Counts Desktop Research Desktop Research Desktop Research
Economic development	Economic development	-Commercial Floor space - Number of visitors/amount of revenue generated per hour/day - Rotation of shops	Local Authorities, land register Offices, real estate promoters, town centre managers	Statistics Questionnaires, studies
Accessibility	Improving Accessibility	- Number of vehicle-km - Number of vehicle -tons-km - Number of vehicle movements - Travel time - Number of obstacles en route – bridges, traffic calming etc - Congestion of delivery areas (vehicle turnover)	Carriers Drivers Field Study Mapping Road managers, police	Questionnaires Traffic Counts
Transport efficiency	Improving Vehicle Load Factors	- Average load factor of vehicles - Fuel consumption per unit of delivery	Operators	Study
Misc.	Wider Social Benefits	- Opinions of residents - Customer Satisfaction - Industry Perception	Local Authorities, and Parish councils	Questionnaires, studies

Wider social benefits may be accrued as a result of the 4 priorities above. It is also important to evaluate these as a result of any intervention, as they often manifest in terms of secondary effects which can impact on the overall success of the project.

4.3. EVALUATING THE SOLUTIONS

The way in which schemes are evaluated varies widely and methodologies can become inconsistent in the valuation of certain variables such as for travel time or road safety measures. The latter also has a number of ethical problems. Further, no singly accepted methodology is used across transport interventions resulting in considerable difficulty when comparing transport schemes from across the world.

Additionally, many of the case studies fail to close the loop on the program management process in that little additional monitoring is given or the process reiterated to further improve the scheme. Ideally this should be the focus of many of the steering groups originally set up to instigate change and they should meet regularly to assess and improve the processes in place. *Table 16, following page,* evaluates evidence provided in each case study to tackle the key urban freight issues highlighted in the introduction.

TABLE 16 - EVALUATION OF EACH CASE STUDY

Case Studies \ Issues	Congestion	Safety	Noise	Local Emissions	GHG Emissions	Design Life and Maintenance Issues	Authority Liaison Issues	Urban Design	Policy Issues	Professionalisation of Transport	Lack of Integrated IT
1. Installation of a joint delivery centre (Yokohama, Japan)											
2. Promoting loading/unloading spaces on the street (Shibuya, Japan)											
3. Public-private cooperative organization activity (Osaka, Japan)											
4. Subsidies for Local Committee Building & Pilot Projects (Japan)											
5. Electric Reservation System for Freight Vehicle Parking, (Japan)											
6. Construction Consolidation Centre, (Japan)											
7. Garonor, Aulnay-sous-Bois logistics centre, (Paris, France)											
8. Street parking regulation of freight vehicles (Paris, France)											
9. Freight Operator Recognition Scheme (London, UK)											
10. Freight Partnership and related measures (Tyne and Wear, UK)											
11. Freight Best Practice (UK)											
12. Eliminating on-street parking program (Sendai)											
13. Eliminating on-street parking program (Musashino)											
14. Eliminating on-street parking program (Hiroshima)											
15. Implementing new regulations for on-street loading bays (Brussels, Belgium)											
16. London Congestion Charging Scheme											

Key: Quantitative Qualitative Both

* Whilst LCC covers a number of area, case study looks solely at stakeholder and local authority liaison

4.4. LEARNING FROM REAL SOLUTIONS

Looking at the lessons learnt in the case studies identified during this work can provide us lessons that can be transferable to other locations and situations.

4.4.1 Lessons learned from each case study

a. Freight Best Practice, UK Department for Transport

Freight Best Practice (FBP) is a program set up by the UK Department for Transport to promote operational efficiency within the freight industry. It is primarily aimed at reducing the CO_2 emissions from freight transport as well as reducing costs and increasing the competitiveness of operators.

The program is evaluated primarily in two ways. A survey of operators is carried out on an annual basis, to provide qualitative, anecdotal evidence of awareness, use and perception of the program in terms of its applicability to the industry and effectiveness in reducing costs and CO_2.

Evaluation in a quantitative fashion is carried out on a bi-annual basis, by an independent organisation that looks at the awareness levels and usage of FBP to calculate market penetration in percentage terms and resultant savings in CO2 and industry costs, thus getting a 'value for money' assessment for the client. The level of publications distributed and to whom, is also evaluated internally, on a monthly basis as well as resultant savings in CO_2. These have demonstrated that the freight industry in England save around 150,000 tonnes of CO_2 per year and make financial saving of over £80m. Additionally a benefits model has been produced and calibrated by successive quantitative benefits evidence to help predict the benefits of varying courses of action for FBP. Comprehensive levels of evaluation such as this enable FBP to be a dynamic program reacting to trends and identify gaps in the market. This makes the program more focussed and able to direct itself to where the greatest benefit will be created i.e. 'small operators' or 'the retail industry' This makes it one of the most accurately evaluated examples of public sector freight management.

b. Installation of a joint delivery centre (Yokohama, Japan)

A joint delivery system was set out by the Motomachi Shopping Street, the first in Japan. After a preliminary study, a project team was formed to improve the roadside environment (such as air quality and noise), to ensure a positive pedestrian environment, and to improve traffic safety. The system has been successful meeting the objectives.

Coherent policy to address the known issues and careful preparations were the key factors for the success. Even though there were variety of opinions sometimes opposing each other, having over 300 shops in the Shopping Street, careful negotiation was undertaken to reach an acceptable compromise to majority of parties that still meets the initial objectives. Preliminary studies (traffic volume survey and questionnaire surveys) clearly identified issues. Fortunately, the project team was able to find a place for the joint deliver centre in vicinity to the Shopping Street at a low cost. To avoid vested interest, an independent local business was asked to manage the joint delivery operation. It was perceived that a significant improvement was achieved in the shopping street creating an impression of "easy-to-drive-by" to *"safe and environmentally-aware"*. The risk of alienating car drivers through parking restrictions was judged acceptable as the Motomachi Shopping Street had already built a strong brand.

Success factors:

- Initial research was undertaken to understand freight movement and the associated problems and issues from a variety of interested groups.
- Consensus building was established under careful negotiation.
- A near-by Joint delivery centre was fortunately available at low cost.
- A third party outside of direct interests was delegated to operate the joint delivery operation.
- The Shopping Streets holds brand awareness among customers.

No quantitative evaluation has been provided.

c. Promoting loading/unloading spaces on the street (Shibuya, Japan)

Shibuya City decided to improve traffic in the shopping area taking the opportunity afforded by Tokyo City to implement the *"Smooth Tokyo 21"* policy. The set-up conference included the shopping street federation, logistics companies, responsible authorities and the Police. It identified issues to be tackled, namely constant traffic congestion and danger to pedestrians. The project was considered generally successful, although the off-street parking spaces were lost due to insufficient funds.

Factors that led the project success include well-built consensus among the interested groups. To raise tenants' awareness of terminal logistics, each tenant was given an opportunity of door-to-door visit for better understanding. In this case, a draft plan had already been made to be shown to tenants or residents.

Success factors:

- Consensus building among the interested groups including shopping street and freight companies.
- A draft plan to positively influence shop tenants and residents
- Symposium
- Meeting to explain to the locals
- A variety of promotional materials
- Banner on the crossover bridge
- Website, Radio and Traffic information board
- Presence of Tokyo City's initiative

Cause of failure:

- Financial shortage to keep permanent parking spaces

No quantitative evaluation was been provided.

d. Public-private cooperative organization activity (East Osaka, Japan)

A Freight Quality Partnership was formed by the local stakeholders to tackle various problems including on-street parking by freight vehicles due to lack of alternative parking space.

Throughout the project, communication and consultation has been an important key. They set two types of opportunities to talk; *"conference"* and *"workshop"*. In their term *"conference"* is to talk officially with large number of participants, whereas *"workshop"* is to discuss frankly with smaller number of participants. By holding many workshops, members became close and had good communication, resulting in consensus building.

Success factors:

- conducting a preliminary research for the actual condition of:
  - land-use,
  - roads,
  - questionnaire with residents and the industry in the area,
  - interview with on-street parkers,
  - traffic volume and traffic flow,
  - number of on-street parking;
- setting clear goals:
  - eliminating trucks parking on street,
  - reducing private vehicles parking on street,

- truck route management,
- better local environment;

- providing both conference and workshop leading good opportunities for communication and consultation;
- classifying action plans into two categories:
  - short-range: ready (or close to ready) to implement,
  - long-range: to be implemented within 10 years after enough consideration and research.

The project, looked to undertake a cross party assessment of the requirements of freight within the area and set common goals as a result on both a long term and short term basis. Little has yet been done regarding the evaluation of its success, but it uses an approach that has proved effective in a number of other countries, particularly the UK. Further evaluation needs to ascertain what direct actions have occurred as a result of the committee's setup and how these actions have impacted on the problem of congestion. A mixture of qualitative and quantitative data needs to be collected such as anecdotal evidence from residents and business as well as traffic counts and turnover of vehicles in parking spaces.

e. Electric Reservation System for Freight Vehicle Parking (Toyota, Japan)

Toyota City decided to address illegal parking for loading/unloading by freight operators. The City successfully provided ITS-based parking space off street. The parking spaces were remotely monitored with a web-camera. The drivers would make a reservation with a cell phone and they could enter the parking space using an electronic payment card. It was popular among freight drivers because it was easy to understand and use. After the pilot program, the full-scale operation is underway led by the private sector. Whether or not the system performs well economically determines success or failure of this measure and that evaluation has not yet been provided.

Success factors:

- a relatively long period of pilot program enabling to include seasonal effects,
- wise use of IT,
- an easy-to-understand and easy-to-use system,
- preliminary research on on-street parking so that the effect of pilot program can be evaluated .

Possible cause of failure:

- setting unreasonably high parking free for the full-scale operation,
- failure to grasp the parking space actually demanded.

f. Garonor, Aulnay-sous-Bois logistics center (Paris, France)

Like other major cities in the world, reducing freight vehicles from the center of the city has been a priority for Paris. A combination of infrastructure investments (ring road and logistics terminal development) and freight regulation were implemented. As a result of the introduction of these complementary measures, large freight vehicles began to travel on the ring roads outside the city center, while smaller freight vehicles continued to have city center access. Freight operators unload the goods from large vehicles and load them on to smaller vehicles in the logistics terminals located along the ring road outside the City. Regulation alone, without infrastructure investment, could have ended up in failure. Providing places for freight operation along the ring road seems to be a success factor.

Success factors:

- strategic land use distinguishing freight flow from city center,
- combination of infrastructure investments and freight regulation.
- Possible failures (It could have failed under the following conditions):
- inconvenient (or isolated) location of the logistics center,
- unreasonably high usage fee for the freight operators,
- incomplete ring roads.

There is no quantitative evaluation provided.

g. Street parking regulation of freight vehicles (Paris, France)

Regulation of use of on street loading/unloading space limited to 30 minutes was introduced to City of Paris in the light of *"Charter of Good Practices of Transport and Delivery of Goods"* was concluded between City of Paris and 47 interested groups in 2006. It reflected concerns of environment and economic deficiencies related to freight vehicles on-street parking.

In 2002 when exclusive lanes for bus and bicycles were introduced, freight businesses expressed strong objections claiming that new rule did not take into account road space for freight operation, (e.g. loading/unloading). Ultimately this led to development of the Charter.

Although an evaluation of the 30 minutes parking limit regulation has not been carried out, the fact the 30 minutes regulation obtained interested groups' consent should be viewed as success considering there was a strong objection from freight industry.

A success factor is persistent effort in building consensus; it took 3 long years to reach an agreement. The fact the regulation does not have a legal binding force, however, can be a potential barrier to a strict control.

Success factor:

- persistent effort in building consensus,
- successful agreement of *"Charter of Good Practices of Transport and Delivery of Goods"*.

Potential barrier:

- the regulation does not have a legal binding force,
- low public awareness of the new rule in that use of roadside space in the bus lane and congested area is limited to freight drivers.

h. Freight Operator Recognition Scheme (London, UK)

Transport for London educates and encourages freight operators to follow best practice, rather than focusing merely on keeping within the law. FORS is a key project within the London Freight Plan and provides a quality and performance benchmark for the industry. It will benefit London as a whole by encouraging freight companies to prioritize safety and reduce their impact on the environment. It recognizes and rewards excellence of freight company's operation with bronze, silver and gold (at this moment, standard for gold has not been determined).

It seems successful with continuous efforts in maintaining communication with freight industry through newsletters (as frequent as 3 times a year) and user-friendly website. Also, advantage when tendering for business and driver training seem to be incentive for freight companies to join the scheme.

Although it does not have legal binding force, FORS specification shows advanced approach in ensuring legal compliant of subcontracted drivers; it requires the FORS member company to check the validity of the drivers' licenses of the subcontracted drivers and to make sure that they are not in breach of any drivers' hours or working time regulations. And it also requires the member company to ensure that tachographs are returned to them from its subcontractor.

A member at *"silver"* level uploads the required data onto the FORS website on a regular basis. By comparing with similar operations, a member can see where it stands in relation to its competitors while the company identity is kept confidential, which is another benefit of becoming a FORS member to freight company.

Success factors:

- excellent communication,
- some benefits to freight companies; free drivers training, benchmarking, workshops and others,
- encouraging tone rather than regulating/punishing,
- the scheme is free and wide open to any company operating vans and lorries in London,
- making good use of their website and frequently-published newsletter *"FORSight"* as an information tool.

Initial evaluations show a benefit to cost ration of over 2.5:1.

i. Freight Partnership and related measures (Tyne and Wear, UK)

After a field survey conducted resulting in the report *"Nature of freight"*, the Tyne and Wear Freight Partnership was launched at a consultation event held in Newcastle in April 2005. The Partnership seeks to understand the problems and issues relating to freight movement and provides a mechanism through which they can be addressed. It brings together transport operators, industry representatives, local authorities, the Highways Agency and key local stakeholder groups to facilitate delivery of an action plan targeted at improving the efficiency, safety and sustainability of freight movement.

Since the Partnership was launched, a variety of major outcomes have been achieved such as strategic freight maps, destination maps, signage improvement and an easy-to-understand website. Importantly, there was a consensus that the Partnership should work to a clearly defined action plan including *'Do Now'* and *'Do Soon'* types, focusing on the delivery of tangible outputs.

The achievements of the Partnership have been recognized by winning two national awards; Freight Partnership of the Year (2008) and Transport Policy and Planning Award (2008).

Maintaining communication and consultation has been a success factor. The website launched in December 2006 had 32,500 hits by 5,600 individual users by June 2007, indicating it has been well-used.

Success factors:

- consensus that the Partnership focuses on the delivery of tangible outputs;
- good communication and consultation, including serviceable website and promotional DVD. The website proves well-used having over 300,000 hits since December 2006. Also, the meeting minutes are open at their website ensuring fairness and transparency in decision making of the Partnership;
- sufficient financial resources with funding from CIVITAS, an EC initiative aimed at helping cities achieve a more sustainable, clean and energy-efficient urban transport system by implementing a range of technology and policy-based measures.

No formal evaluation has been carried out to date, however the popularity of the destinations maps indicates that a good level of usage and therefore benefit may exist.

j. Eliminating on-street parking program (Sendai, Japan)

Whether or not a pilot program is successful affects the following full-scale measure to a large extent. If the pilot program is well organized and its results are promising, then the full-scale measure can be smoothly initiated. A good example is Sendai City's effort in eliminating on-street parking program.

The city had recognized the on-street parking as a major issue and previous studies found as much as 40% of parked vehicles were freight vehicles on an average weekday. A consultative conference was formed to deal mainly with freight vehicles on-street parking issue and it carefully prepared for the upcoming pilot program. The program turned out successfully with understanding and cooperation from the majority of interested parties, which ultimately led to some measures incorporated into a regular operation.

Success factors:

- a thoroughgoing preparation before the pilot program, in which truck drivers were aware with the locations of the new loading spaces. As a result, the truck drivers did not have to wander around seeking the loading space, which prevented unnecessary traffic;
- consistency of attitude of the responsible officer. In this case, the police department in charge had been the same over time (it is not unusual that department or officer in charge changes in several years in Japan and deferent department or officer can have different point of view even in the same organization). The police consistently showed cooperative attitude to the effort, which was obviously a great help.

No quantitative evaluation has been provided.

k. Eliminating on-street parking program (Musashino, Japan)

A success factor for freight management is often a solid consensus. We can see a good example of a this in Musashino City's efforts. As in common with other urban cities, Musashino City has been facing on-street parking issue in its commercial center. In order to provide the shoppers a comfortable and safe pedestrian space on street parking was considered undesirable.

The city set up a conference involving local shopping streets, freight businesses, parking business, and local police. The freight businesses expressed concerns about costs since the road traffic laws was tightened and that it would be difficult to bear more costs. Other members in the conference tend to take it for granted that the additional freight costs (e.g. parking costs) should be borne by freight businesses.

When it comes to cost sharing, it is important to identify beneficiaries. The conference in this case reached the agreement that every interested party would benefit if the town attracts more customers. The conference functioned well and successfully initiated an experimental pilot program. Shop owners who initially did not participate changed their views after positive news from the pilot program from their customers.

Success factors:

- shared original intention to start the effort,
- appropriate attitude by officials; not too strong and not too weak.

Possible failure:

- details of the pilot program were not well communicated to freight drivers, which led to low level of involvement in the joint delivery program;
- meeting the requirements of road administrator (city) and traffic administrator (police) was not easy in this case. The program included conversion a road section into pedestrian-friendly sidewalk, with which the administrators expressed concerns. Trees planted in the middle of the sidewalk prevented emergency vehicles from passing.

l. Eliminating on-street parking program (Hiroshima, Japan)

All too often shops that order goods feel no sense of responsibility to manage the delivery of the goods they order even though they can play an important role in optimising freight activities.

In Hiroshima's case, some of shop owners in the city participated in a watch-dog campaign, in which participants asked the freight drivers who parked on street to

park in the designated spot. Also, they felt the drivers becoming more cooperative with the program through the communication in the campaign. A joint delivery program was conducted as a part of this effort, as well. Joint delivery is often costly and has to be financially sustained and it is hard to justify the benefits to the freight industry and make them willing to pay. At this moment, evaluation of the pilot program is not complete. Whether or not they will continue the joint delivery system is yet to be decided.

Success factors:

- cargo-owners' change in attitude to the freight activities through the watch-dog campaign.

4.4.2. Analysis of the lessons

Table 17, following pages, presents the relationship between the cas studies collected and approaches.

With a careful look at the case studies collected and summarized in the previous section, an analysis was conducted focusing on success factors, barriers and problem solutions. Although the collected cases do not cover the full details of the effort, the analysis revealed interesting and useful lessons.

TABLE 17 - RELATIONSHIP BETWEEN CASE EXAMPLES AND APPROACHES

Case number	Case examples	Location Country	Brief description	Approaches						
				Understanding the situation	Cross-departmental organization	Right persons to talk at right time	Partnership and consensus	Communication	Vision/goal setting	Wise use of subsidies
1	Installation of a joint delivery center	Yokohama, Japan	Successful joint delivery system involving 200 stores, resolving safety, congestion and environmental problems.	x			x			
2	Promoting loading/ unloading spaces on the street	Shibuya, Japan	Loading/unloading spaces on/off road have been installed by making good use of existing infrastructure.				x	x		
3	Public-private cooperative organization activity	East Osaka, Japan	An FQP makes an action plan to address local traffic problems.	x			x	x	x	
5	Electric Reservation System for Freight Vehicle Parking	Toyota, Japan	Toyota City provides carriers parking space off street for common loading/ unloading operation.	x						
6	Garonor, Aulnay-sous-Bois logistics centre	Suburb of Paris, France	Developing a ring road and freight regulation in Paris, as well as logistics platform along the ring road.						x	
7	Street parking regulation of freight vehicles	Paris, France	Regulation of use of on street loading/ unloading space within 30 minutes was introduced to City of Paris				x		x	

TABLE 17 - RELATIONSHIP BETWEEN CASE EXAMPLES AND APPROACHES (next)

Case number	Case examples	Location Country	Brief description	Approaches						
				Understanding the situation	Cross-departmental organization	Right persons to talk at right time	Partnership and consensus	Communication	Vision/goal setting	Wise use of subsidies
8	Freight Operator Recognition Scheme	UK	Quality and performance benchmark for the industry					x		
9	Freight Partnership and related measures	Tyne and Wear, UK	An FQP makes an action plan to address local traffic problems.				x	x		x
11	Eliminating on-street parking program	Sendai, Japan	Parking spaces for freight operation are provided.	x	x					
12	Eliminating on-street parking program	Musashino, Japan	Restriction of in-flow traffic during the limited hours.				x		x	
13	Eliminating on-street parking program	Hiroshima, Japan	An experimental joint delivery program.				x			
14	National guideline about urban freight transport and stock receipt in local planning and traffic management	Urban areas, Norway	National government prepared a guideline of urban freight transport for municipal officials		x			x		

TABLE 17 - RELATIONSHIP BETWEEN CASE EXAMPLES AND APPROACHES (next)

Case number	Case examples	Location Country	Brief description	Approaches						
				Understanding the situation	Cross-departmental organization	Right persons to talk at right time	Partnership and consensus	Communication	Vision/goal setting	Wise use of subsidies
15	Implementing new regulations for on-street loading bays	Schaerbeek, Etterbeek, Uccle municipalities of the Brussels-Capital Region Belgium	A new traffic signing system for parking was introduced.					x		
16	Road signs on the Brussels ring for the TIR center zone and Anderlecht industrial zone	Brussels ring, Belgium	Directional road signs upstream of the ring road and Brussels ring were installed.					x		
17	Integral Waste Disposal System in the Canton Thurgau	Canton Thurgau Switzerland	Rail transportation to the newly built incineration plant became active.		x					

Note: see Appendix for the full presentations of the case studies.

Success Factors

a. Understanding the situation

Understanding the situation of the target area is important. Before the officials talks to other interested groups, it is strongly recommended to study the current status (and historical one if available) of the traffic and land use, the main players of the area and their interests, politics and awareness of logistics issues.

Typical main players are the shopping street and residents. However, other players should be included depending on the case and local customs *(table 18)*.

TABLE 18 - RELEVANT PLAYERS

Administration	Business	Locals
National Prefectural/State Municipal Police	Bus business Freight business Chamber of Commerce	Shopping street Resident

b. Building a cross-departmental organization

In some countries, organizational structure of administration is too rigid for a Road Freight Transport management that often requires extra effort for flexibility. For example, traffic management is usually allocated to the Police while road and other infrastructure management fall under the jurisdiction of national/prefectural/municipal government in some countries. Unless there is a position specifically responsible for logistics, much effort in facilitating cooperation among the relevant officers may be necessary. Regular meeting with national/prefectural/municipal officers and police officer for information exchange can make an excellent preparation.

c. Choosing the right persons to talk at the right time

One cannot be careful enough to choose the first person to talk with. There are points learned from the case studies:

- the head of the shopping street in the area can be a candidate. He or she can take initiative;
- shop owners of the shopping street in the area;
- head of traffic department of the Police in the area.

Best way can vary with characteristics of the area. One should give much thought to this.

d. Partnership/Consensus-building

Partnership-building or consensus-building is almost always the key to success. When a project starts running, one problem after another comes up because urban freight management involves various interested people with different preferences by its very nature. For example, as seen in the case of the shopping streets in Kichijoji or Shibuya in Japan, retailers and freight drivers need a place for loading/unloading whereas pedestrians and general drivers want clear road space with few parked freight vehicles on street in the setting of limited road space. There is a conflict of interest over use of road space.

This drives us to the question how every interested road user can be contented. One answer to the question is buried in the projects implemented in the past. Most successful case studies, especially in the urban settings, tend to establish conferences involving various representatives of interests. The representatives express their opinions about the concerned matters on the table and listen to opinions of other representatives. In the case of Paris, there was a tension between the City and freight businesses at the beginning, because the initial measure of installation of exclusive lane for busses and bicycles seemed unfair and insufficient treatment to freight businesses. However, as the conference went on, they became to relax toward constructive attitude.

It can be best summarized in the following sentence; partnership-building and consensus-building are extremely important in the smooth progress of the project without causing feelings of inequality.

e. Communication

The case studies indicate that communication is a key to success for building consensus. FORS of London and Freight Partnership in Tyne and Wear provide good examples of how the use-friendly websites work efficiently to link the people. Once a website was launched, frequent updates are essential to keep the interested people's attention. Programs like FORS have to have more than certain number of members in order to have influence. FORS has been successful in this regard having more than 200 members, which is over 10% of the vans and Lorries in London. Newsletters prove useful in informing new schemes, regulation, and news as well. Shibuya's case various tools other than website; radio, poster, brochure and so on. A multiple communication tool can attract various people's attention.

f. Vision/goal Setting

After successfully building consensus, it is also important to set a vision or goal of the conference. For an example of project to eliminate on-street parking, a vision can be a creation of open café, vehicle-free promenades, festivals, more vegetation or flea markets on streets. Or more quantitative goals such as certain number of illegal parked vehicles on streets or satisfactory results from retailers, freight drivers or pedestrians. The case of Kichijoji set several expected results (or goals) and validation methods; survey of change in traffic volume, number of parked vehicles, travelling speed between before and after the pilot project and a questionnaire to visitors to the shopping street. The surveys are useful for presenting objective results to the members of the conference so they can regard whether or not each measure of the project works well or decide whether or not precede the project and explain the situation to the distributor of the government subsidy.

g. Wise Use of Subsidies

Either national or municipal governments usually provide subsidies intended for better Urban Freight Management or other forms of projects in the context of city planning. In the case of Norwich, the distribution centre was developed in suburban area as one of CIVITAS projects of European Committee. Tyne and Wear Freight Partnership is funded by Local Transport Plan Partners, bringing together local authorities, Highways Agency and freight businesses. Pilot projects in Japan can be offered subsidy if approved. Ministry of Land, Infrastructure, Transport and Tourism of Japan defrays costs of formulation of planning and preparation of the pilot project, with amount of subsidy between 10 and 15 million yen (about 100,000 to 150,000 in US dollars).

4.4.3. Barriers

Costs

Costs can be a major barrier to any projects. In the case of Garonor in France, SOGARIS Corporation faced going under because of the financial situation. The situation was recovered by the publicly-shared group, the project would have been compelled to abandon. Conference in Kichijoji is still struggling for operational expenses. City of Shibuya had to give up setting a permanent parking lot off street due to financial shortage, too. It is, therefore, necessary to think of a way to secure funds so the program runs for a long period.

Parking Space

In the urban settings, road space might not be wide enough to hold vehicle traffic and pedestrian traffic. Freight vehicles are sometimes forced to park for loading/unloading on streets, blocking pedestrians' traffic or causing traffic congestions. Keeping parking lots for a long term is costly, which brings the previous *"Costs"* barrier.

Conflicting interests of different groups
There is a possibility of serious conflicts between different groups. The more representatives of group, the more likely different opinions there will be. Without strong leadership, a project can be stuck with no progress.

Lacking awareness of issues
Sometimes residents or shop owners in the target area of the program are not even aware that there is an issue. In this case, it can be difficult for officials to explain why a new measure is needed.

4.4.4. How to overcome the problems

Costs
As seen in the previous section of "Wise Use of Subsidy", costs can be reduced with aid of subsidy. In addition, cost-sharing for operating joint delivery is problematic. It is not easy to reach an agreement in that everyone feels fair and satisfied. The key is consensus-building among the interested groups. In case of Yokohama, the conference requested a local company that has no interest in the project for operating joint delivery so that every transport business would feel fair.

Parking Space
Limited resource can be shared in terms of space or time; public parking space can be opened to freight drivers or time-sharing of parking space can be also realistic. If there is room for public space, it is possible to develop a new parking lot or expanding road so that on-street parking for loading/unloading can be allowed.

Conflicting interests of different groups
Consensus-building is the key to success. If a conference becomes too large or too formal for members to present honest opinions, dividing into several workshops can solve the problem. Granted and open-minded discussions tend to occur at smaller groups.

Lacking awareness of issues
From Shibuya's case, we can learn a lesson. The officials made a rough plan first then explain it to residents and tenants. This way can bring awareness of issues and clear image of solution and their next action. In addition, it is always a key to clearly explain what their benefits are and what they will have to pay for the benefits.

Stating clearly the expected impacts of the measure is also important to raise awareness of issues. FORS of London states the impacts on business and on London in its specification for performance. Bronze performance requires the candidate members to provide snapshot data per 100,000 vehicle km for vehicle incidents and penalty charge notices or other infringements. The specification says that the expected impacts on London include safer roads and less congestion due to collisions.

In this manner, freight business recognizes anew that their daily operation has a great deal to do with traffic situation in the city as a whole.

4.5 CONCLUSIONS

An analysis of Urban Freight Management projects revealed success factors, barriers and solutions to overcome barriers. It can be summarized from the lessons that consensus-building is extremely important and a shortcut to success in many cases.

Another important point is that each case is unique and thus there is no universal solution to address any problems. It is true that consensus building is extremely important, but there are many ways to achieve it. One has to choose the best way depending on the situation.

There is a great deal of qualitative evidence of actions being undertaken across different approaches, and particularly the use of co-operative working between both stakeholders themselves and stakeholders and local planning authorities. However, little quantitative information as to the benefits and costs derived are provided by the vast majority of case studies, be it a number regarding reductions in vehicles or emissions, or value attached to externality reduction. Greater work is needed in order to assess those benefits. Similarly those that do assess projects using a wide range of KPIs and there are often different methodologies for the calculation of each.

One way in which the World Road Association may be able to assist is in the formulation of a standard set of assessment tools with which to evaluate projects on a global basis.
There is equally little consideration to the use of alternative modes – certainly outside of Europe, yet this is a major solution for any urban and inter urban deliveries, particularly where consolidation centres have been used. The World Road Association could be instrumental in developing and promoting multimodal solutions, particularly in developing economies, where major infrastructure is still under development and road congestion is increasing at a faster rate than other more developed economies.

Other issues such as carbon dioxide emissions, how companies look to reduce this in the face of international legislation and what advice is available for them is an issue that will become of increasing importance into the future. None of the case studies look specifically at how this might be tackled, though some advice is available through programs such as the UK's *'Freight Best Practice' Program and from the Carbon Trust or via the US Department of Energy program 'Smartway'*

Compliance with safety regulations and their enforcement – particularly for goods vehicles outside their home state is an increasing problem in the UK and throughout Europe. This is partly due to the disparate sets of rules that govern each country as well as difficulty in enforcing such legislation on foreign owned vehicles.

5. CONCLUSION AND RECOMMENDATIONS

This report presents a new concept of urban governance for urban freight transport issues. Urban governance incorporates collaboration among stakeholders involved in urban freight transport including: (a) freight carriers, (b) shippers, (c) residents (consumers) and (d) administrators. They face complicated problems of congestion, environmental impacts, crashes, high energy consumption, and labour issues relating to urban freight transport. The target of urban freight transport policy is to achieve mobility, sustainability and liveability. Under the framework of urban governance these stakeholders work together in public-private partnerships to identify problems, find approaches and solutions, implement policy measures and evaluate the outcome. This procedure of urban governance is different from the conventional way of planning and management which allows a municipality to develop an initiative and implement policy measures without any consultation with other stakeholders, although public comments are often collected before making a decision. Conversely, this concept of urban governance requires the participation of all stakeholders from the beginning stage of planning. Urban governance is needed because these stakeholders all have different objectives and perspectives on urban freight transport in terms of efficiency, negative environmental impacts, and traffic safety issues within their community. Therefore, the multi-objectives of multi-stakeholders should be clearly incorporated into the decision making of policy measures.

A new and challenging framework for tackling urban freight transport issues based on urban governance is presented. The framework is composed of four steps: (a) problem identification, (b) finding approaches and measures, (c) implementation and (d) evaluation. At each step all stakeholders should be involved in surveys, analysis and discussions. The procedure is cyclic and iterative with communication and feedback between each step as well as among stakeholders. Communication plays an important role to avoid any misunderstanding and promote collaboration amongst stakeholders. The procedure takes time in setting up the forum or workshop and may require long discussion before reaching a final decision. The partnership approach is not mandatory in all situations when policy measures are implemented. However, we can reach a consensus of better solutions by sharing knowledge, data and recognition of problems through a partnership.

The public authority is basically responsible for planning, implementing and managing policy measures associated with urban freight transport. A municipality takes major responsibility for producing a plan of urban freight transport based on discussions with other stakeholders. On the other hand, central government should

take responsibility to harmonise policy measures which are proposed by municipalities through guidelines for urban freight transport. This is important since different cities, for example, may implement different regulations on truck movements which can result in generating a large burden for freight carriers. In addition, both central and local government need to support the initiatives of private firms to achieve a better traffic flow of freight vehicles in urban areas.

In this procedure of urban governance, ensuring the social acceptance of policy measures is important. To achieve it, public exposure is required of all the approaches explored to find solutions, since hiding any approach could harm the credibility of the public authority.

The representativeness of each stakeholder should be carefully examined in setting up a partnership framework. The freight industry, in general, is composed of small and medium size companies and it is hard to pick a representative company from this group. In some cases a trucking association could be a representative. As residents have a wider diversity of age, occupation, educational background and so on, it is also difficult to choose appropriate representative people from this group. A questionnaire survey will be an effective means to get a wider range of opinions from residents.

Some good practices of urban governance for urban freight transport issues given by different countries are presented in this report. Success factors have been drawn from these good practices, including clear identification of objectives, continuous efforts over several years to achieve goals, the existence of an energetic leader and the support of city authorities. The success factors are generic and may be applicable to other cities. However, the transferability to cities and urban areas in other countries should be carefully examined, because social conditions and the level of development are sometimes quite different.
Balancing policy measures for efficient and environment friendly urban freight transport systems is essential. In most cases a single measure is not enough to obtain a successful result, but a combination of multi-measures is sometimes effective. This is due to the complexity and ambiguity of urban freight transport issues. For example, the restriction of normal truck access to a city centre can be combined with a measure to allow eco trucks, with subsidies from a city authority, to access to a city centre.

For many reasons, local authorities have often overlooked urban freight transport issues. One reason is that local authorities consider that urban freight transport activities belong to private companies and are not within the scope of public responsibility. Another reason is the lack of knowledge of urban freight transport issues within the personnel of a municipality. However, a large number of cities face similar problems of urban congestion and environmental issues partially due to freight vehicles. Therefore, it is essential to disseminate knowledge of urban governance for urban freight transport.

Developing countries have similar problems of urban freight transport to those of developed countries. The problems are even worse, since urbanisation and motorisation in developing countries is very rapid and poor infrastructure accelerates the inefficient use of freight vehicles and generates negative impacts on the environment. Therefore, the knowledge and experience of developed countries should be transferred to developing countries.

Finally, further research on urban freight transport is required, since this area is relatively new and there remain many unsolved problems. International cooperation is important to share the knowledge and experience necessary to establish efficient and environment friendly urban freight transport systems.

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GLOSSARY	
BESTUFS	BEST Urban Freight Solutions, or BESTUFS maintains network between urban freight transport relating groups to identify best practices, success criteria and bottlenecks regarding urban freight.
City Logistics	The process for totally optimising the logistics and transport activities by private companies with support of advanced information systems in urban areas considering the traffic environment, the traffic congestion, the traffic safety and the energy savings within the framework of a market economy.
COST 321	The COST 321 project studied the design and implementation of innovative measures to improve the environmental performance of freight transport in urban areas.
CSR	Corporate social responsibility
FQPs	Freight Quality Partnerships or FQPs are groups of transport operators and local authorities that come together to tackle the issues around freight access and deliveries in a particular location.
RFTM	Road Freight Transport Management, or RFTM measures are a set of policies designed to improve the safety and economic efficiency of freight vehicles, as well as reducing their associated environmental burdens and local quality of life.
GHGs	Greenhouse gases
GRI	Global Reporting Initiative
HGVs	Heavy goods vehicles
ICT	Information and Communication Technology
IRGC	International Risk Governance Council
ITS	Intelligent Transport Systems
Just-In-Time delivery	The delivery system in which parts or materials are only delivered to a destination just before they are needed
KPIs	Key performance indicators
NICHES	New and Innovative Concepts for Helping European transport Sustainability, or NICHES is the Innovative concept for making urban transport more efficient, competitive and sustainable
PCEs	Passenger car equivalents
SMEs	Small to medium-sized enterprises
TRB	Transport Research Board
PDCA	Plan-Do-Check-Act

APPENDIX

CASE STUDIES OF URBAN FREIGHT TRANSPORT MANAGEMENT

1. LIST OF COLLECTED CASE STUDIES

The case studies collected are listed in *tables A.1 ans A.2*.

TABLE A.1 - LIST OF CASE STUDIES (PART 1)			
Title	**Period**	**Location**	**Country**
1. Installation of a joint delivery centre (Yokohama, Japan)	Preparing period: 1999-2003 Implementation: June 2004 ~	Motomachi Shopping Streets, Yokohama	Japan
2. Promoting loading/unloading spaces on the street (Shibuya, Japan)	2002 to 2003	Shibuya, Tokyo	Japan
3. Public-private cooperative organization activity (Osaka, Japan)	2006~	East Osaka	Japan
4. Subsidies for Local Committee Building & Pilot Projects (Japan)	-	Across the country	Japan
5. Electric Reservation System for Freight Vehicle Parking, (Japan)	2007-2008	Toyota	Japan
6. Garonor, Aulnay-sous-Bois logistics centre, (Paris, France)	1967~	Suburb of Paris	France
7. Street parking regulation of freight vehicles (Paris, France)	Jan. 2007~	Paris	France
8. Freight Operator Recognition Scheme (London, UK)	Jan. 2007~		UK
9. Freight Partnership and related measures (Tyne and Wear, UK)	Jan. 2007~	Tyne and Wear	UK
10. Freight Best Practice (UK)	2005	Across the country	UK
11. Eliminating on-street parking program (Sendai)	2006	Sendai	Japan
12. Eliminating on-street parking program (Musashino)	2005	Musashino	Japan
13. Eliminating on-street parking program (Hiroshima)	2006	Hiroshima	Japan
14. National guideline about urban freight transport and stock receipt in local planning and traffic management	Implementation September 2005	Urban areas	Norway
15. Implementing new regulations for on-street loading bays	Preparing period 2009-2010	Schaerbeek, Etterbeek, Uccle municipalities of the Brussels-Capital Region	Belgium
16. Road signs on the Brussels ring for the TIR center zone and Anderlecht industrial zone	2008	Brussels ring	Belgium
17. Integral Waste Disposal System in the Canton Thurgau	Preparing and test period: 1995 Implementation: June 1997 ~	Canton Thurgau	Switzerland

TABLE A.2 - LIST OF CASE STUDIES (PART 2)			
Title	**Issue(s)**	**Solution(s)**	**Responsible Organization**
1. Installation of a joint delivery centre (Yokohama, Japan)	1) economic inefficiency, 2) environment	6) joint delivery	Motomachi Shopping Street Association
2. Promoting loading/unloading spaces on the street (Shibuya, Japan)	2) environment, 3) traffic safety, 4) quality of life	1) development of law systems 5) establishment of consultative committee	City of Shibuya, Tokyo, MLIT and Shopping streets in Shibuya
3. Public-private cooperative organization activity (Osaka, Japan)	4) quality of life	2) development of facilities 5) establishment of consultative committee	City Governments, Police Dept, Region Development Bureau, Region Transport Bureau, Trucking Association, Metropolitan Development Corporation, Delivery Companies
4. Subsidies for Local Committee Building & Pilot Projects (Japan)	1) economic inefficiency, 2) environment (regional environment), 3) traffic safety and 4) quality of life (local environment)	4) subsidies	MLIT and local municipalities
5. Electric Reservation System for Freight Vehicle Parking, (Japan)	2) environment (regional environment and, 3) traffic safety	7) ITS solution	Toyota City
6. Garonor, Aulnay-sous-Bois logistics centre, (Paris, France)	4) quality of life (local environment)	2) development of facilities, 3) access control	Garonor
7. Street parking regulation of freight vehicles (Paris, France)	4) quality of life (local environment)	2) development of facilities 5) establishment of consultative committee	Paris
8. Freight Operator Recognition Scheme (London, UK)	3) Traffic safety, 4) quality of life (local environment)		Transport for London

TABLE A.2 (next) - LIST OF CASE STUDIES (PART 2)

Title	Issue(s)	Solution(s)	Responsible Organization
9. Freight Partnership and related measures (Tyne and Wear, UK)	3) traffic safety, 4) quality of life (local environment)	2) development of facilities, 5) establishment of consultative committee	Tyne and Wear LTP core team, transport operators, industry representatives, local authorities, the Highways Agency and key local stakeholder groups
10. Freight Best Practice (UK)	1) economic inefficiency, 2) environment (regional environment), 3) traffic safety		Funded by Department for Transport and managed by Faber Maunsell Ltd.
11. Eliminating on-street parking program (Sendai)	4) quality of life (local environment)	1) development of law system, 2) development of facilities, 5) establishment of consultative committee	Sendai City
12. Eliminating on-street parking program (Musashino)	1) economic inefficiency, 4) quality of life (local environment)	2) development of facilities, 3) access control, 4) joint delivery, 5) establishment of consultative committee	Musashino City
13. Eliminating on-street parking program (Hiroshima)	4) quality of life (local environment)	4) joint delivery 5) establishment of consultative committee	Hiroshima City
14. National guideline about urban freight transport and stock receipt in local planning and traffic management	1) economic efficiency, 2) environment, 3) traffic safety, 4) quality of life (local environment) 5) work environment	Increase knowledge about urban freight among urban planners	Norwegian Public Road Administration

TABLE A.2 (next) - LIST OF CASE STUDIES (PART 2)

Title	Issue(s)	Solution(s)	Responsible Organization
15. Implementing new regulations for on-street loading bays	1) economic inefficiency, 3)traffic safety	1) development of law systems	Municipalities
16. Road signs on the Brussels ring for the TIR center zone and Anderlecht industrial zone	1) economic efficiency 4) quality of life (local environment)	2) development of facilities 3) access control	Bruxelles Mobilité - AED
17. Integral Waste Disposal System in the Canton Thurgau	1) economic efficiency 2) environment	2) development of facilities	Verband KVA Thurgau Rüteliholzstrasse 5, CH-8570 Weinfelden

2. SUMMARY OF EACH CASE STUDY

Each case study is summarized in the following form, in *table A.3*.

TABLE A.3 -TABLE FORM OF CASE STUDY	
Title	-
Issue(s)	economic inefficiency environment (regional environment) traffic safety quality of life (local environment)
Solution(s)	development of law systems development of facilities access control subsidies establishment of consultative committee joint delivery ITS solution
Responsible Organisation	-
Period	-
Location	-
Country	-
Summary	Outline of the measure Problem identification Approaches to find a solution Implementation Difficulties to be overcome Evaluating the results Other things to be noted (if any)

CASE STUDY 1 - INSTALLATION OF A JOINT DELIVERY CENTRE (YOKOHAMA, JAPAN)

Issue(s)	1) economic inefficiency, 2) environment
Solution(s)	6) joint delivery
Responsible Organization	Motomachi Shopping Street Association
Period	Preparing period: 1999-2003
	Implementation: June 2004 ~
Location	Motomachi Shopping Street, Naka ward, Yokohama, Japan
Country	Japan

1. Outline of the measure

The joint delivery system was set out by the Motomachi Shopping Street and consisted of about 300 shops; it was the first such experiment in Japan. The objectives of the measure are to improve the environment (such as air quality and noise), to ensure space for pedestrians, and to prevent road traffic accidents. These objectives are thought to be achieved by the reduction of the number of trucks going through, and parking on, the shopping street.

2. Problem identification

There was a heavy concentration of car traffic in Motomachi Street – up to 500 vehicles/day of through traffic, and the volume was increasing. Despite the increasing traffic volume, there were insufficient parking spaces in the area, which caused many vehicles to park illegally on the street.

This situation resulted in the deterioration of the environment (such as air quality and noise) and traffic safety problems.

3. Approaches to find a solution

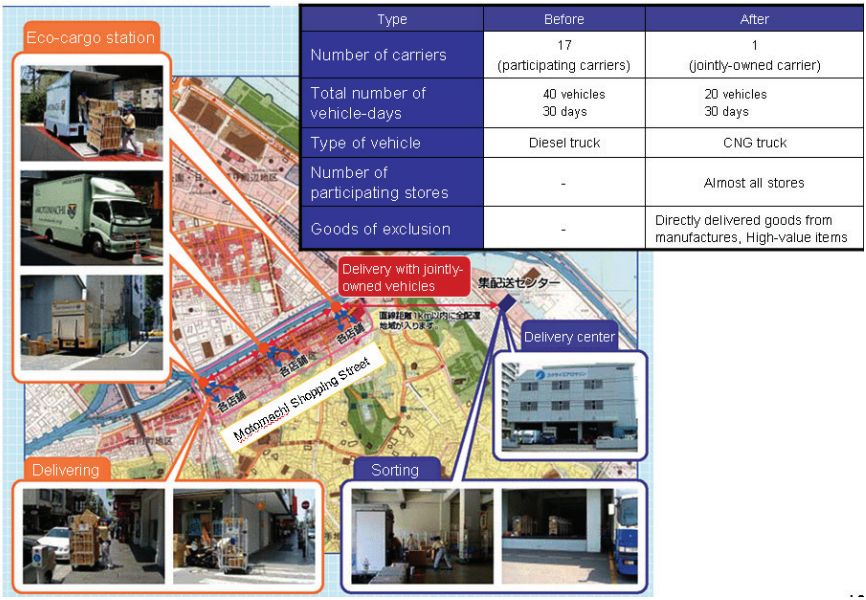
A project team that consisted of shop owners and interested groups was established. It identified problems to be solved, and picked up some tasks that could be done in 3 years, namely; establishing a joint delivery system, securing parking spaces for freight vehicles, eliminating illegally parked vehicles, improving crossings, introducing low-emission vehicles and encouraging idling-stop practice. Three low-emission vehicles (CNG vehicles) were introduced for delivery to and from Motomachi Shopping Street through a joint delivery centre that was installed nearby the Motomachi area *(see table 1 and 2)*. Three Eco-Cargo-Areas (parking stations to load/unload goods) were installed in the Shopping Street and the delivery from the Eco-Cargo-Area to each shop was performed by cart *(see figure 2)*.

Almost all goods to and from Motomachi Street are delivered through the joint delivery centre by the CNG vehicles. The distribution companies are only allowed to carry the goods to and from the joint delivery centre, and are not able to carry the goods directly to and from Motomachi Street.

Distribution companies must pay 150 JPY to the operator of the joint delivery for each parcel.

Almost all shops and distribution companies (almost 20 companies) were joined in the joint delivery measure. In addition to the delivery for shops, the goods for ordinary households were delivered through the joint delivery centre and this also contributes to the reduction of traffic at Motomachi Street.

FIGURE 1 - CVN VEHICLES



Type	Before	After
Number of carriers	17 (participating carriers)	1 (jointly-owned carrier)
Total number of vehicle-days	40 vehicles 30 days	20 vehicles 30 days
Type of vehicle	Diesel truck	CNG truck
Number of participating stores	-	Almost all stores
Goods of exclusion	-	Directly delivered goods from manufactures, High-value items

FIGURE 2 - MAP

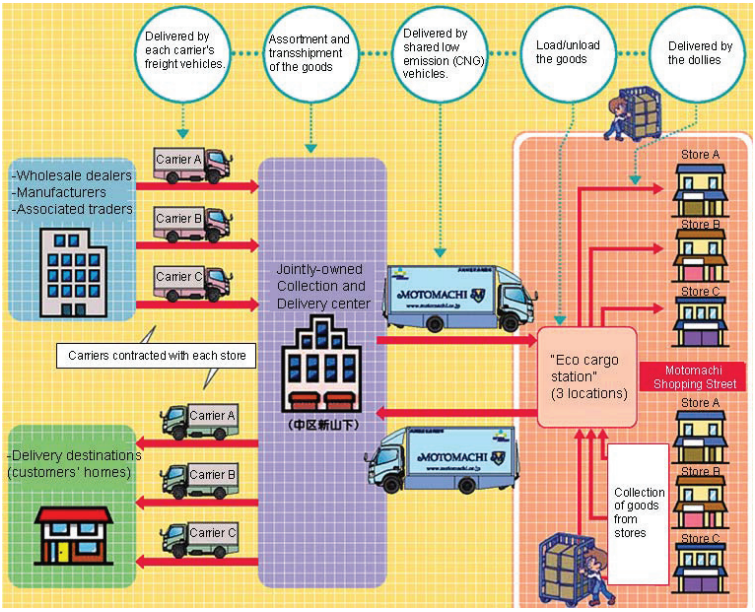


FIGURE 3 - OUTLINE OF THE SYSTEM

4. Implementation

"Traffic environment improvement project at Motomachi Shopping Street" was started in 1999, and various solutions including things other than joint delivery were considered until 2001. The project team consisted of the Motomachi Shopping Street Association, representatives of delivery companies (Kanagawa Trucking Association), the neighbourhood community, local police, the local road authority and the related organisations of Yokohama City *(see table 1)*. The project team implemented the traffic count and questionnaire investigation. In 2000, a social experiment for joint delivery was performed for 10 days. After several years of consultation, the joint delivery centre was installed and started operating from June 2004.

TABLE 1 - HISTORY OF THE PROJECT	
1999	- Starting the *"Traffic environment improvement project at Motomachi Shopping Street"* - Basic research (Traffic count, Questionnaire) - Draw up a list of traffic environment improvement measures
2000	- Adjustments of the contents of the measures for experimental implementations
2001	- Experimental implementation of the measures (social experiment) - Measuring the effects of the measures - Adjustments for the full-scale implementation
2002-2003	- Implementation of measures which could be introduced swiftly - Adjustments of the related organisations for the full-scale introduction of the joint delivery
2004	- Introduction of the joint delivery

FIGURE 4 - RELATED ORGANIZATIONS

5. Difficulties to be overcome

The main difficulty for the implementation of the measure was consensus building for the joint delivery project. Some shop owners opposed to the measure because of the delay of deliveries, and distribution companies were at odds with each other over who would seize the initiative of this measure.

The Motomachi Shopping Street Association persuaded shop owners, who initially opposed the project, to support it by emphasising the benefits of the project, such as the improvement of the street's landscape and the increase of customers due to the improved landscape. In addition to this, the Motomachi Shopping Street Association delegated the task of operating the joint delivery centre to a local company that did not have any interest in the project, to avoid quarrels with the affected delivery companies.

6. Evaluating the results

There was a reduction of the number of trucks from 100 (11 companies) to 29 (1 company) during the period of the social experiment (10 days).

7. Other things to be noted

This joint delivery project is the first attempt of this kind of measure by an independent shopping street association in Japan. One of the reasons for the success of this project was the reasonable purchase price of the facilities for the joint delivery centre, which was a vacant storehouse located at Shin-Yamashita area (within 1 km from the shopping street).

CASE STUDY 2 - PROMOTING LOADING/UNLOADING SPACES ON THE STREET (SHIBUYA, JAPAN)

Issue(s)	2) environment, 3) traffic safety, 4) quality of life
Solution(s)	1) development of law systems, 5) establishment of consultative committee
Responsible Organisation	City of Shibuya, Tokyo, MLIT and Shopping streets in Shibuya
Period	2002 to 2003
Location	Shibuya, Tokyo, Japan
Country	Japan

1. Outline of the measure

Loading/unloading spaces on/off roads have been installed by making good use of existing parking meters and general parking spaces to eliminate illegal on-street parking for loading/unloading to realise smoother traffic flow. Also, the program included guiding vehicles to parking lots and offering free parking for short-time users. The effect of the program was then evaluated.

2. Problem identification

The following problems were identified:

- traffic congestion caused by significant transport demand due to highly accumulated commercial industry and businesses;
- more commercial facilities are expected to be built, and immediate transport measures are required;
- pedestrians' safety and efficiency have deteriorated because footpaths have been narrowed by advertising displays, and pedestrians have to walk on roadways to avoid parked bicycles;
- chronically-disorganised street parking.

3. Approaches to find a solution

The previous measures implemented by Tokyo City and Police were used as an approach to find a solution.

- Nihonbashi Yokoyamacho *"Track Time Plan using parking meter"* (Police Dept., 1996).
- Roppongi *"Off-street loading/unloading spaces using existing parking lot"* Tokyo, 1998).
- Investigate necessary parking capacity to eliminate street parking.

4. Implementation

4.1. Instigation of a conference for the pilot program

Tokyo City had started its program *"Smooth Tokyo 21"* intended to mitigate severe congestions in the City. The City approached Shibuya City to join the program and Shibuya City agreed.

Meetings were held five times (of which, three meetings were held before the pilot program, one meeting during the program and one meeting after the program).

Involved Governmental Bodies
- Police dept., Traffic division,
- Police dept., Regulation division,
- MLIT. Tokyo National road office, Traffic division,
- Tokyo, Metropolitan Urban development office, facility planning dept.,
- Shibuya-ward, Urban development dept.,
- Shibuya-ward, Civil engineering dept.

Involved Private Organisations
- Board of shopping street federation,
- Chairmen of three related shopping streets (In Shibuya, chairman is town mayor),
- Called for all shopping streets (7-8 streets),
- Parking provider,
- Large logistics companies (Sagawa, etc.).

4.2. Establishment of subordinate groups

Three sub groups were established to reflect members' opinions to the pilot program:

- logistics measures group: Examine relating loading/unloading measures, and submit draft to the council;
- car/bicycle parking measures group: Examine parking guide facilities, and submit draft to the council;
- resident discussion group: Exchange opinions about the pilot program, and submit draft to the council.

4.3. Implement the pilot program: Oct.10 – Nov.30, 2000

- Tokyo City explained the implementation of the program to each store.
- Tokyo City and Police dept. asked logistics companies to adjust delivery time.
- Shopping streets asked drivers to stop street parking.

- Logistics companies sent people to supervise whether loading/unloading parking spaces are appropriately used (2 persons x 7 locations x 2 weeks).
- During the program, opinions were collected at sites and improvements made based on the feedback.
- The government bore the cost of the pilot program.
- During the pilot program, Tokyo City conducted hearings with logistics companies and users of loading/unloading spaces.

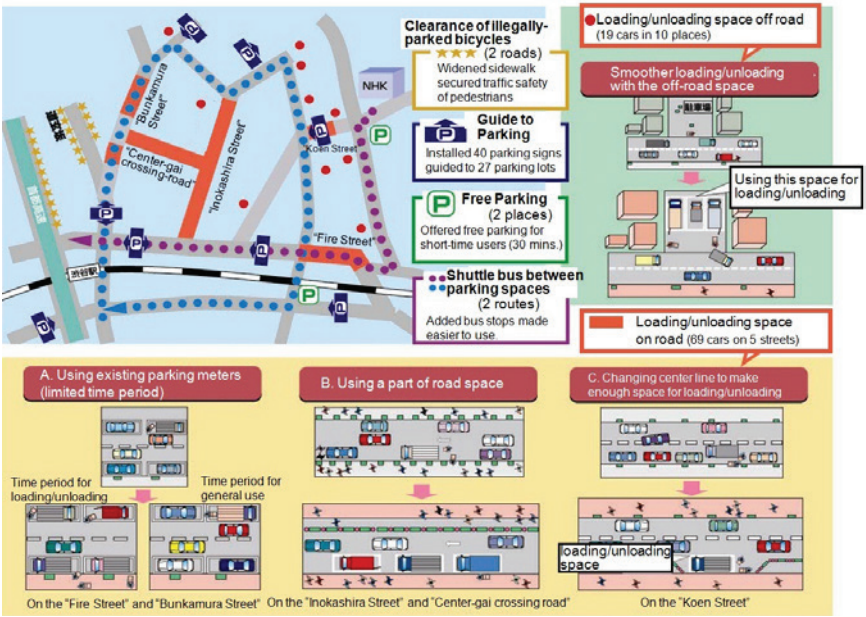


FIGURE 5 - COMPREHENSIVE PILOT PROGRAM OF TERMINAL DISTRIBUTION AND PARKING MANAGEMENT

4.4. Launched residents association: 2001

- As a result of the pilot program, 70% of participants, including volunteers, demanded to continue the program. In 2001, after the pilot program, the residents association was launched and was supported by Tokyo City, Shibuya - ward, the Police dept. and the shopping street federation.
- Held workshop once a week, and discussed the design and operation of loading/unloading parking spaces. Prepared three drafts for design and created a model.
- Conducted simple experiment before introduction.
- Local shopping street federation asked each store for help, and got full support because each store has a close relationship with the street (utilising the strength of this relationship was seen as better than being asked by Tokyo City).

4.5. Substantial introduction: 2002

- Shibuya-ward narrowed the width of the road, and introduced permanent paid spaces exclusive for loading/unloading.
- Gave up taking over loading/unloading spaces due to cost issues, but revised the regulations to obligate department stores with large floor spaces to install loading/unloading spaces.

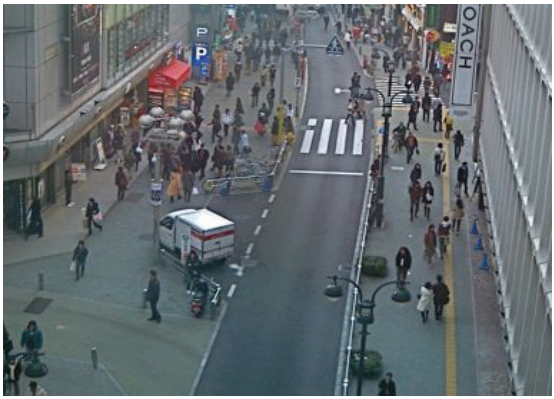


FIGURE 6 - LOADING/UNLOADING SPACE ON THE STREET

5. Difficulties to be overcome

Although all measures in the pilot program proved successful, a shortage in funding did not allow continued usage of the off-street loading/unloading spaces in a full-scale operational environment. Instead of keeping the off-street loading/unloading spaces, a new bylaw was enacted, in which large-scale department stores have to have a loading/unloading space in their property.

6. Evaluating the results

Interview with bus drivers one year after the commencement of the full-scale operation revealed that the road environment had become much better. In addition, travel time of busses had decreased.

CASE STUDY 3 - PUBLIC-PRIVATE COOPERATIVE ORGANISATION ACTIVITY (OSAKA, JAPAN)

Issue(s)	4) quality of life
Solution(s)	2) development of facilities, 5) establishment of consultative committee
Responsible Organization	Osaka City, East Osaka City, Osaka Police dept, Kinki region Development Bureau, -Kinki region Transport Bureau, Osaka Trucking Association, Osaka Metropolitan Development Corporation, Delivery companies in area
Period	2006~
Location	East Osaka, Japan
Country	Japan

1. Outline of the measure

Higashi Osaka FQP (Freight Quality Partnership) Conference was established by local stakeholders to tackle the freight parking problem in Nov 2006. An action plan to address problems was formulated and the local stakeholders have been cooperatively working on it.

2. Problem identification

The following problems were identified:

- in East Osaka distribution district and surrounding area, there was significant on-street parking by freight vehicles, blocking main roads;
- many freight vehicles would park during the night and early morning as they waited in order to deliver parts and materials to factories in East Osaka distribution area, in time for the start of operation;
- it was difficult to introduce joint delivery as a union had tried to introduce joint delivery in the past but had failed to become operational;
- even if freight vehicles parking is developed, it is impossible to stop all illegally-parking vehicles. It is ideal to deal with these issues with the local communities, by securing the parking spaces in the area, or discouraging illegal parking of unrelated vehicles.

3. Approaches to find a solution

To find a solution, consensus building for each problem was undertaken until the specific measures were proposed.

1. Eliminating truck's on-street parking	- Development of logistics parking - Informing the location of parking space
2. Eliminating private cars' on-street parking	- Instructing and raising awareness about illegal street-parking - Tightening of regulations
3. Managing traffic flow	- Traffic restriction into the residential roads - Access route map of the subject area
4. Improving the local environment	- Planting trees and trash picking activities - Idling stop practice

FIGURE 7 - CONSENSUS BUILDING AT FQP

4. Implementation

4.1. Planning

After the FQP Conference was established in 2006, issues were found based on traffic investigations and a questionnaire, and then a concrete policy and action plan were developed during conference meetings.

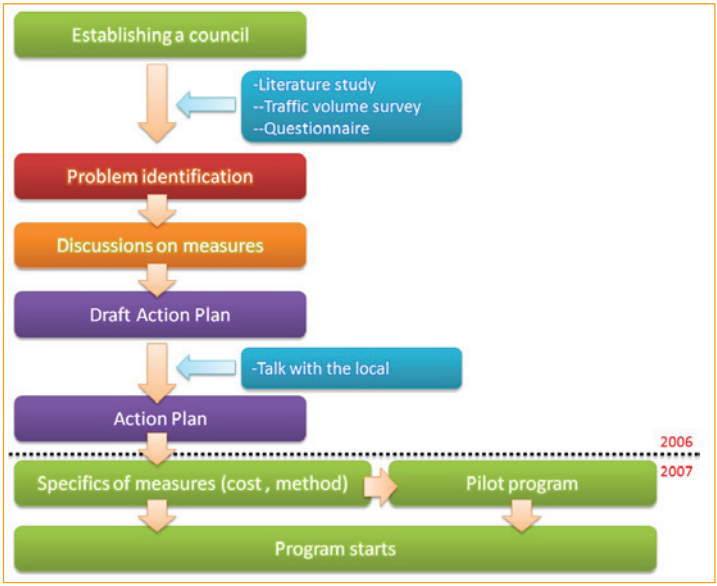


FIGURE 8 - WORK FLOW

4.2. Conference

The members of the FQP Conference are Technical experts, Osaka City, East Osaka City, Osaka Police dept., Delivery companies, cargo owners, chamber of commerce, etc;

Participants

- Experts
- Government Agency: Osaka City, East Osaka City, Osaka Police dept.
- Headquarters jurisdiction: Kinki region Development Bureau, Kinki region Transport Bureau,
- Private Company: Osaka Trucking Association, Osaka Metropolitan Development Corporation, Delivery companies in area, East Osaka Chamber of Commerce, Local communities, residents.

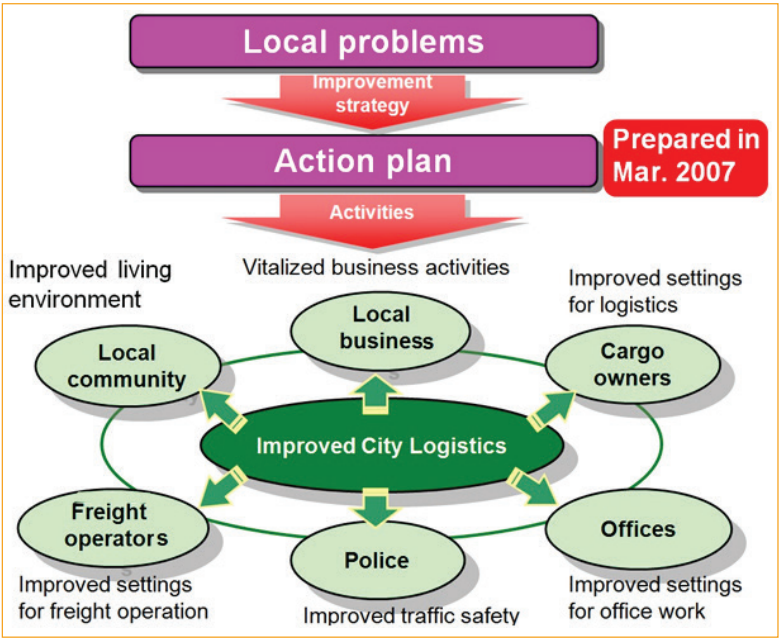


FIGURE 9 - COOPERATION BETWEEN STAKEHOLDERS

4.3. Management policy in FQP Conference

- The East Osaka FQP Conference gained consensus by having several workshops to; share common targets, summarise opinions, report to the council, decide the policy.
- Meetings and workshops were hosted by the City with 5 FQP Conference meetings held to Jan. 2008 (Nov. 13, 2006, Jan. 17, Feb.6, Mar.16, Sep. 12, 2007), along with 5 workshops Jan. 24, Feb. 1, 2007, Mar.2, 6, Jul.2, 2007).

- The workshops summarised members'opinions, reported to the FQP Conference meetings who then decided the policy and action plan.
- The number of participants attending the workshops was fewer than at the FQP Conference meetings. Workshops can be held casually, and participants of workshops can deliver frank opinions. Communication between persons can be developed easily in a workshop setting.

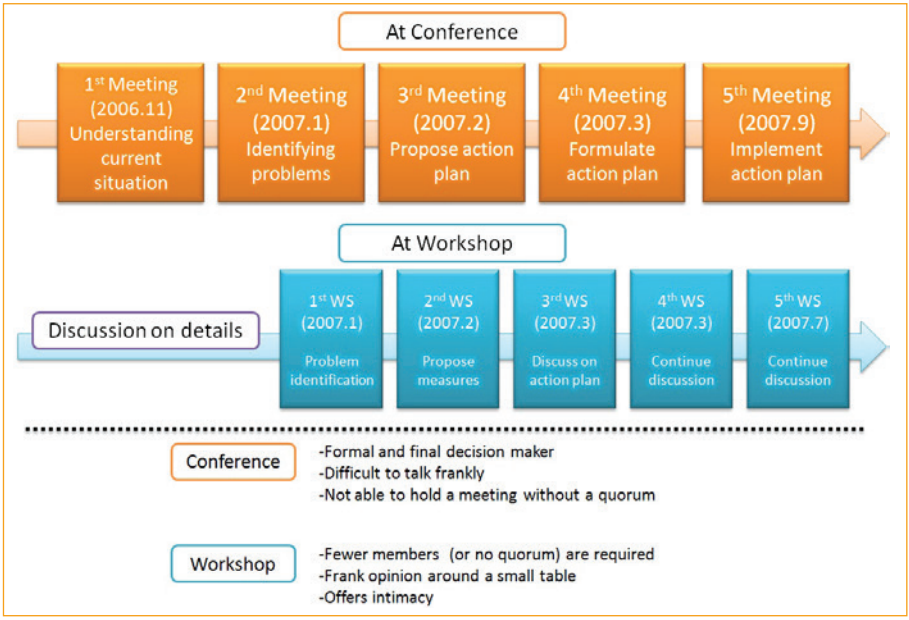


FIGURE 10 - USING CONFERENCE AND WORKSHOP FOR DIFFERENT PURPOSES

5. Difficulties to be overcome

- During the FQP conference meetings and workshops, difficulties were revealed.
- Current logistics systems in the area are varied and complicated. Systems differ by type and size of business.
- Consensus building can be difficult when there are conflicts of interest.
- The members of the FQP conference felt that the key ways to overcome the difficulties above are 1) to grasp the voice at each worksite, 2) to set a common goal and 3) to build a creative partnership toward the goal.

6. Evaluating the results

Evaluation for the results is to be determined.

CASE STUDY 4 - SUBSIDIES FOR LOCAL COMMITTEE BUILDING & PILOT PROJECTS (JAPAN)

Issue(s)	1) economic inefficiency, 2) environment (regional environment), 3) traffic safety and 4) quality of life (local environment)
Solution(s)	4) subsidies
Responsible Organization	MLIT and local municipalities
Period	-
Location	Throughout Japan
Country	Japan

1. Outline of the measure

The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has economic incentives for realising better traffic environment by providing subsidies.

2. Problem identification

People's values and needs have become diverse, and awareness of their living environment has increased. It was necessary to adopt an approach to gather the various opinions of the locals toward introduction of a new measure.

3. Approaches to find a solution

The MLIT determined that subsides for pilot programs are a good way to tackle some problems. A *"Pilot Program"* is a tool to let the local residents consider a new measure to resolve local problems, to give them a chance to actually experience the new measure, and finally to support the decision on whether or not the tested measure should be fully installed.

4. Implementation
A number of pilot programs from 1999 to 2007 (Offered and Adopted by Road Bureau, MLIT) are shown in *table 2, following page*.

The subsidies cover several themes and were used in a number of areas as per *table 2*.

TABLE 2 - THEMES AND CASE EXAMPLES		
Theme	**Case example**	**Number of area***
A. Prioritized pedestrian and cyclist zone	Zone in which priority is put on pedestrians and cyclists, transit mall	**53**
B. Use of road space such as open café	Multipurpose use of road space such as open café and events	**41**
C. Promotion of public transport use	Park and Ride, car sharing	**13**
D. Smoother traffic at tourist sites	Entrance restricition of touring traffic, information service for tourist	**11**
E. Betterenvironment for bicycle use	Rental bicycle, cycling roads	**18**
F. Logistics and parking	Creating loading/unloading space on/off road	**9**
G. Directions with street name	Information sign with street name and number	**22**
H. Others	Restriction of road works and information service about road works for pedestrians	**17**
Total		**184**
* avoids double counting of multi-year projects		

5. Difficulties to be overcome

Difficulties are not known at this time.

6. Evaluating the results

In general, more and more pilot programs have been adopted by the Road Bureau, MLIT.

TABLE 3 - NUMBER OF PILOT PROGRAMS FROM 1999 TO 2007										
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**Total**
Number adopted	6	9	14	14	20	29	32	41	33	198

CASE STUDY 5 - ELECTRIC RESERVATION SYSTEM FOR FREIGHT VEHICLE PARKING, (JAPAN)

Issue(s)	2) environment (regional environment and, 3) traffic safety
Solution(s)	7) ITS solution
Responsible Organization	Toyota City
Period	2007-2008
Location	Toyota City
Country	Japan

1. Outline of the measure

The measure would provide a safer environment for pedestrians by eliminating on-street parking of freight vehicles during loading/unloading operations. Also, a safer traffic environment would be provided.

2. Problem identification

Like many other cities, Toyota City had a number of illegally parked freight vehicles during loading/unloading operations. They not only took road spaces but also deteriorated surrounding air quality by emitting exhaust gas when the engine was idling. Also, illegal parking caused traffic congestion and, in some instances traffic accidents.

3. Approaches to find a solution

A preliminary survey would be conducted followed by pilot programs. If the pilot programs proved successful, the measure would come into full-scale operation.

4. Implementation

4.1. Preliminary survey

- 88 freight vehicles parked on road at the city centre.
- estimate 25,000 in a year.

4.2. Pilot program

Aug. 2007 ~ Mar. 2008
Off-street parking space was provided for frequent loading/unloading operations.

- enough space for three vehicles
- pre-reservation system by cell phone

- open to registered vehicles with an ETC system or a special ID card
- 10 yen (=10 cent) /min for parking
- remotely controlled and monitored by web camera



FIGURE 11 - PARKING LOTS REMOTELY MONITORED BY WEB-CAMERA

4.3. Pilot program results

Parked vehicles on street for loading/unloading:
- reduced by 56% near the new parking lot.
- space for 6 vehicles is needed to meet carriers' demand.

Environment:
- estimated emission reduction: 1,262 tonnes of CO_2 per year

Coverage of the parking lot:
- a parking lot is thought to cover 200m for carrying goods from the parking lot to the final destination.

5. Difficulties to be overcome

More freight vehicles than expected parked on street for loading/unloading. Additional parking space was required to address the demand.

6. Evaluating the results

- a parking lot has proven to be beneficial (about 50% reduction in on-street parking).
- the new parking space needs more room to hold six vehicles considering the current demand.
- inquiries to the carriers revealed that they carry the goods by hand/dollies for 200m (up to 250m) after getting out of the vehicles.
- five parking lots would cover about 80% of the on-street parking by freight vehicles for loading/unloading, considering 200m of carrying distance.

7. Other things to be noted

Based on the evaluation, a full-scale operation was initiated.

CASE STUDY 6 - GARONOR, AULNAY-SOUS-BOIS LOGISTICS CENTRE, (PARIS, FRANCE)

Issue(s)	4) quality of life (local environment)
Solution(s)	2) development of facilities, 3) access control
Responsible Organization	Garonor
Period	1967~
Location	Suburb of Paris, France
Country	France

1. Outline of the measure

Developing a ring road and freight regulation in Paris, as well as a logistics platform along the ring road.

2. Problem identification

Large freight vehicles coming into the centre of Paris.

3. Approaches to find a solution

Combination of infrastructure investments (ring road and logistics platforms) and freight regulations in the City of Paris.

4. Implementation

Develop Garonor's logistics platform as a public-private platform with shares held by the City of Paris and neighbouring authorities. Just after commencement of this project, Paris started to develop a ring road and freight regulations for the City.

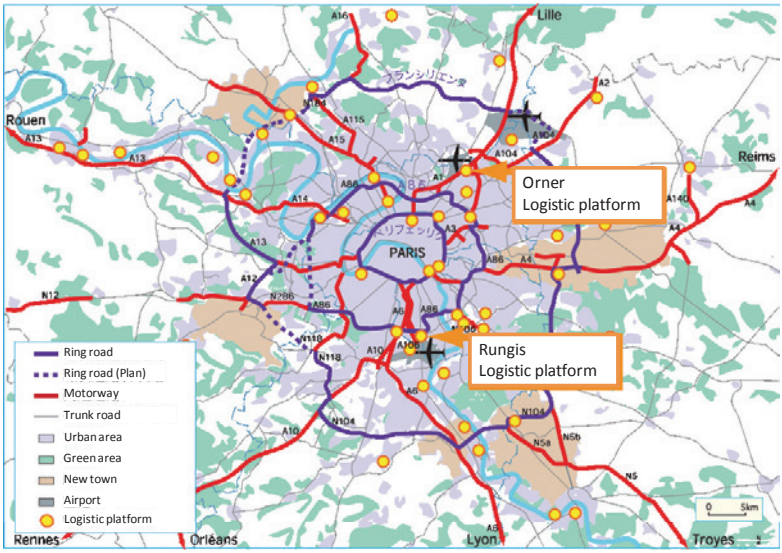


FIGURE 12 - LOGISTICS PLATFORM IN PARIS

5. Difficulties to be overcome

Not particularly identified.

6. Evaluating the results

Unknown for quantitative effect. For qualitative effect, due to both development of the ring road and freight regulation in the City, factories and warehouses have been moved to the outer city. Logistics platforms can flexibly respond and match business user needs for improvement in logistics, and many logistics platforms have been built.

CASE STUDY 7 - STREET PARKING REGULATION OF FREIGHT VEHICLES (PARIS, FRANCE)

Issue(s)	4)quality of life (local environment)
Solution(s)	2) development of facilities, 5)establishment of consultative committee
Responsible Organization	Paris
Period	Jan. 2007~
Location	Paris, France
Country	France

1. Outline of the measure

Regulation for the use of on-street loading/unloading space within thirty minutes was introduced to the City of Paris in the light of *"Charter of Good Practices of Transport and Delivery of Goods"* that had been concluded between the City of Paris and 47 interested groups in 2006.

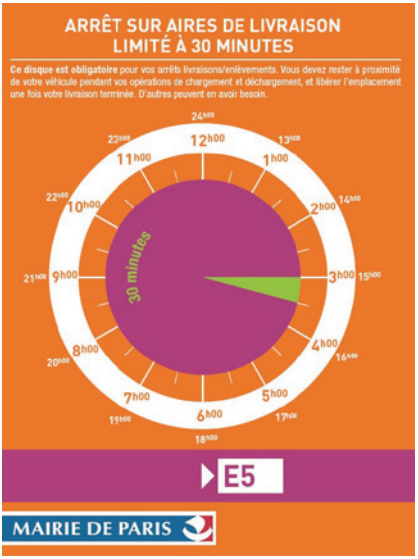


FIGURE 13 - THE SIGN OF STARTING TIME OF DELIVERY

2. Problem identification

Lack of concern shown by drivers as to the economic and environmental impacts of freight vehicles parking for loading/unloading on street.

3. Approaches to find a solution

In the context of Paris' effort toward promoting alternative traffic modes to automobiles, exclusive lanes for busses and cyclists were developed. On the other hand, freight businesses expressed concerns that there would be insufficient space for loading/unloading. This led to a comprehensive review of freight vehicle control as a whole. A consultative committee was launched in 2002. The committee members include the City, freight businesses, the chamber of commerce and the police and it met six times in three years. In 2006, the *"Charter of good practices of transportation and delivery of goods in Paris"* was established. New regulation started in 2007 and evaluation was to be conducted every six months.

4. Implementation

Along with the promotion of loading/unloading space in the city, vehicles were obliged to display the parking time using an on board disc (see figure 13), and limit their use of loading/unloading space to within thirty mins. Delivery time was decided according to the size of the vehicle compared with the ground area. Parking of low emission vehicles was permitted throughout the day.

5. Difficulties to be overcome

There was strong objection by freight businesses in response to the introduction of the exclusive lane for busses and bicycles in 2002. It was claimed that the new rule did not take road space for freight operations into account.

6. Evaluating the results

The Pilot Committee, which decided the policy in Charter, was developed into the Charter Monitoring Committee, and held biannual meetings to check whether the contents of Charter were actually implemented. It has only been one year since the new freight regulation, so no concrete evaluation has been obtained yet.

CASE STUDY 8 - FREIGHT OPERATOR RECOGNITION SCHEME (LONDON, UK)

Issue(s)	3) Traffic safety, 4) quality of life (local environment)
Solution(s)	
Responsible Organization	Transport for London
Period	Jan. 2007~
Location	london, UK
Country	United Kingdom

1. Outline of the measure

The Freight Operator Recognition Scheme (FORS) is a key project within the London Freight Plan and provides a quality and performance benchmark for the freight industry. It will benefit London as a whole, by encouraging freight companies to prioritise safety and reduce their impact on the environment.

2. Problem identification

Transport is now the only sector in which greenhouse gas emissions are continuing to rise. In addition, the density of population, urban development and traffic, as well as constraints caused through historic land use patterns, makes local emissions and congestion within London a huge problem.

3. Approaches to find a solution

With an increasing number of restrictions on the operations of freight vehicles in London, such as the congestion charge, low emissions zone and numerous parking restrictions, Transport for London (TfL) saw that is was important to give something back to the logistics sector. As such they produced a program of advice to freight transport companies operating within London, as well as a system that encourages and rewards safety and efficiency through three levels of recognition: bronze, silver and gold.

4. Implementation

The scheme was fully implemented in 2009 to promote sustainability and encourage operators to improve efficiency through driver profiling, training, driver license checks and reducing penalty charges. Operators are also invited to benchmark their activities through an online facility, on an anonymous basis against other FORS members and so able to rate their performance externally

5. Difficulties to be overcome

One of the foremost difficulties in promoting any best practice program within the transport industry and indeed, any sector, is overcoming resistance to change and the attitude that as transport professionals, they cannot be taught anything new.

6. Evaluating the results

Evaluation takes place on a regular basis in the form of customer feedback from workshops, and work is being carried out to assess the quantitative impact of the benefits realised from the work taking place by helping operators to improve their efficiency.

CASE STUDY 9 - FREIGHT PARTNERSHIP AND RELATED MEASURES (TYNE AND WEAR, UK)

Issue(s)	3) traffic safety, 4) quality of life (local environment)
Solution(s)	2) development of facilities, 5) establishment of consultative committee
Responsible Organization	Tyne and Wear LTP core team, transport operators, industry representatives, local authorities, the Highways Agency and key local stakeholder groups
Period	Jan. 2007~
Location	Tyne and Wear, UK
Country	United Kingdom

1. Outline of the measure

The Tyne and Wear Freight Partnership seeks to understand the problems and issues relating to freight movement and provides a mechanism through which such issues can be addressed. It brings together transport operators, industry representatives, local authorities, the Highways Agency and key local stakeholder groups to facilitate delivery of an action plan targeted at improving the efficiency, safety and sustainability of freight movement.

2. Problem identification

Congestion, signage, not enough information for truck drivers, and safety for pedestrians and cyclists.

3. Approaches to find a solution

Establishment of Tyne and Wear Freight Partnership to identify and address the issues regarding logistics in the area.

4. Implementation

The Partnership was established following government guidance set out in *'Sustainable Distribution: A Strategy'*, which aims to set out a framework for working between the industry, local government and others in achieving sustainable distribution and energy efficient saving of route miles. At a local level, the strategy promotes the development of Quality Partnerships between local authorities, the freight industry, business communities, residents and environmental groups. This is most effectively delivered through the Local Transport Plan (LTP) process.

After a field survey was conducted, resulting in the report "Nature of freight", the Tyne and Wear Freight Partnership was launched at a consultation event held in Newcastle in April 2005. This was successful in bringing together transport operators, industry representatives (Road Haulage Association and the Freight Transport Association) along with key delivery agencies, including the five local authorities and the Highways Agency. Importantly, there was a consensus that the Partnership should work to a clearly defined action plan, focussing on the delivery of tangible outputs. The consultation event also included discussions on potential *'Do Now'* and *'Do Soon'* tasks to be included in the action plan. It was agreed that tasks to be undertaken in the first year amongst others included establishing Freight Communication links, including quarterly meetings and a newsletter, and producing and marketing an advisory freight routing map. Other tasks included under the *'to Do Soon'* category included promotion of driver training programmes and an assessment of the case for the development of a Freight Consolidation Centre.

5. Difficulties to be overcome

No difficulties have been disclosed.

6. Evaluating the results

Although evaluation has not been made, some benefits are expected such as the improved efficiency, safety and sustainability of freight movement

CASE STUDY 10 - FREIGHT BEST PRACTICE (UK)

Issue(s)	1) economic inefficiency, 2) environment (regional environment), 3) traffic safety
Solution(s)	
Responsible Organization	Funded by Department for Transport and managed by Faber Maunsell Ltd.
Period	2005
Location	Throughout UK
Country	United Kingdom

1. Outline of the measure

Freight Best Practice (FBP) is a program set up by the United Kingdom (UK) Department for Transport to promote operational efficiency within the Road Haulage Industry. It is primarily aimed at reducing the CO_2 emissions from road transport as well as reducing costs and increasing the competitiveness of operators.

FIGURE 14 - FREIGHT MANAGEMENT GUIDE

2. Problem identification

Transport now accounts for more than 16% of the UK's CO_2 emissions and is the only sector in which emissions continue to grow, increasing by 12% since 1990. Heavy goods vehicles (HGVs) account for 5% of the UKs emissions and the industry is finding it harder to remain competitive in light of rising operational costs, primarily in the price of diesel. The Government has therefore set up the Freight Best Practice program to promote best practice and encourage efficiency throughout the industry to save operators money and reduce CO_2 emissions.

3. Approaches to find a solution

FBP offers a range of advice aimed across the haulage industry. This primarily centres around fuel saving, but also offers information and tools to advise on areas

such as vehicle aerodynamics, vehicle tracking and routing, driver training, preventative maintenance and multimodal transportation. Information is offered through a variety of media, such as printed guides; interactive, online tools; DVDs; Audio CDs and posters. Consultants will also go into companies and advice on the FBP program and how it can help them improve their operations. All advice is funded by the Department for Transport and, as such, is free to the industry.

4. Implementation

Work on transport energy efficiency goes back to 1992 when the then Department of the Environment supported a demonstration project on aerodynamic styling for articulated vehicles. Another project was established in 1994, which focussed on improving fuel efficiency for freight fleets. Further developments took place culminating in September 2005, when the newly branded Freight Best Practice program was launched and has been managed by Faber Mausell ltd (now AECOM) since 2005 and has reduced industry costs by over £170 million, and reduced CO2 emissions by over 600,000 tonnes.

5. Difficulties to be overcome

One of the foremost difficulties in promoting any best practice program within the transport industry and indeed, any sector, is overcoming resistance to change and the attitude that as transport professionals, they cannot be taught anything new. As such, effectively targeting the relevant audience and using the advice to result in a change of behaviour remains a challenge. Evaluating the effectiveness can also be a problem as there is little feedback after information has been disseminated to the operators.

6. Evaluating the results

The program is primarily evaluated in two ways. A survey of operators is carried out on an annual basis, to provide qualitative, anecdotal evidence of awareness, use and perception of the program in terms of its applicability to the industry and effectiveness in reducing costs and CO_2.

Evaluation in a quantitative fashion is carried out on a bi-annual basis, by an independent organisation that looks at the awareness levels and usage of FBP to calculate market penetration in percentage terms and resultant savings in CO_2 and industry costs, thus getting a ‘value for money’ assessment for the client. The level of publications distributed and to whom, is also evaluated internally, on a monthly basis as well as resultant savings in CO_2.

CASE STUDY 11 - ELIMINATING ON-STREET PARKING PROGRAM (SENDAI, JAPAN)

Issue(s)	4) quality of life (local environment)
Solution(s)	1) development of law systems, 2) development of facilities 5) establishment of consultative committee
Responsible Organization	Sendai city
Period	2006
Location	Sendai, Japan
Country	Japan

1. Outline of the measure

To eliminate on-street parking in the city centre, extra parking spaces for loading/unloading activities have been provided after an experimental pilot program. The city converted a part of the existing road space into loading space for carriers in collaboration with police. Also, time-sharing of road space with taxis has been implemented. Although effects of these measures are yet to be determined, a consultative conference (committee), involving various relevant parties, is working toward a better street scene.

2. Problem identification

On-street parking has been identified as a major problem in the city. A study shows that as much as 40% of the total on-street parking is by freight vehicles on an average weekday. Moreover, only 20% of the buildings have a loading space within their structure. It is obvious that the city does not have sufficient loading space for carriers.

3. Approaches to find a solution

A consultative conference (committee) was established to seek a solution that would satisfy the majority of parties followed by an experimental pilot program in 2005. A full-scale operation has been implemented since the end of the pilot program.

4. Implementation

Installation of loading space in a building above a certain size was made obligatory by a city regulation in 2006. In addition, the Road Traffic Law was tightened, especially with reference to illegal parking. A consultative conference was established involving police, carriers, residents, chamber of commerce and Sendai City, which afterwards decided to initiate a pilot program in 2005. Based on the evaluation of the pilot program results, the time sharing scheme for on-road loading space, and widened meter-zone for freight vehicles, has been adopted as a full-scale measure.

5. Difficulties to be overcome

New regulation for obligatory installation of loading space in a building is effective only for new buildings. It will take a long time to achieve the full effect of this regulation. The obligation of installing the loading space applies to buildings above a certain size. The building size in this regulation is determined so that the resulting number of loading space will be sufficient for the current demand. If the transport activity increases in the future, the loading space issue will possibly remain.

The newly appointed on street loading space is further from the target destination for many carriers, which in turn takes more time to deliver to the final destination after getting goods off the vehicle. As a result, the vehicles stay in the loading space for a longer period of time.

6. Evaluating the results

No evaluation has been performed yet.

CASE STUDY 12 - ELIMINATING ON-STREET PARKING PROGRAM (MUSASHINO CITY, JAPAN)

Issue(s)	1) economic inefficiency and 4) quality of life (local environment)
Solution(s)	2) development of facilities, 3) access control, 4) joint delivery and 5) establishment of consultative committee
Responsible Organization	Musashino city
Period	2005
Location	Musasino, Japan
Country	Japan

1. Outline of the measure

Musashino City decided to eliminate illegal parking in the Kichijoji station, which is a popular commercial centre, in order for it to become a more comfortable place for visitors. The idea behind this is to compete with other commercial centres nearby, such as Shinjuku.

2. Problem identification

On-street parking hindering pedestrian traffic.

3. Approaches to find a solution

A consultative committee was formed to seek the optimal solution. Solutions include access control by limiting hours, off-street parking space for loading activities and joint delivery through a pilot program.

4. Implementation

A consultative committee initiative leading to a pilot program followed by full-scale measures to improve pedestrian traffic. Joint delivery is also under consideration.

5. Difficulties to be overcome

Access control counted totally on drivers' goodwill, having no legal binding force. Joint delivery conducted during the pilot program was not very successful due to insufficient publication, high usage charge and limited coverage of deliverable goods.

6. Evaluating the results

No evaluation has been performed yet.

CASE STUDY 13 - ELIMINATING ON-STREET PARKING PROGRAM (HIROSHIMA CITY, JAPAN)

Issue(s)	4) quality of life (local environment)
Solution(s)	4) joint delivery, 5) establishment of consultative committee
Responsible Organization	Hiroshima city
Period	2006
Location	Hiroshima, Japan
Country	Japan

1. Outline of the measure

Hiroshima City decided to address on-street parking by freight vehicles in the city centre. While the city makes efforts in providing loading space in the short term, it also examines longer term measures that decrease the total freight traffic in the city. A joint delivery system emerged as a promising approach to the latter point of view.

2. Problem identification

On-street parking by freight vehicles.

3. Approaches to find a solution

A joint delivery system aiming for a decrease in freight traffic.

4. Implementation

A consultative committee was established prior to a two month long experimental pilot program for the joint delivery system. During the program, members of the shopping streets in the city participated in a watch-dog campaign, in which participants asked the freight drivers who parked on street to park in the designated loading spaces. At the same time, the number of drivers using on-street parking was measured. In addition, CO_2 emissions were compared before, during and after the program. Feedback from visitors was collected as well.

5. Difficulties to be overcome

A great number of the carriers and the shop owners involved in the program agreed with the principle of the joint delivery system but were against some of the particulars. Competition among carriers and cost sharing was a big issue. Some of the members agreed with the concept if it was initiated in the future, but would not agree now. Also, differences in the position of carriers tends to make for several different points

of view. Most drivers were willing to cooperate in the program, whereas branch managers of the carriers were not, as they are sensitive to changes which impact on operational costs.

6. Evaluating the results

The results show slightly positive effects in both eliminating on-street parking and decreasing CO_2 emissions. However, official evaluation is not complete yet.

CASE STUDY 14 - NATIONAL GUIDELINE ABOUT URBAN FREIGHT TRANSPORT AND STOCK RECEIPT IN LOCAL PLANNING AND TRAFFIC MANAGEMENT (NORWAY)

Issue(s)	1) economic efficiency 2) environment 3) traffic safety 4) quality of life 5) work environment
Solution(s)	Increase knowledge about urban freight among urban planners
Responsible Organization	Norwegian Public Road Administration
Period	September 2005
Location	Norway – urban areas
Country	Norway

1. Outline of the measure

The guideline is called *"The city and freight transport"*. The main target group are municipalities and their local planners and traffic management staff. The guideline has two main parts. Part one is focused on logistics, and how the urban freight transport/city logistics is organised, the different use of vehicles and equipment, as well as the trouble, challenges and safety problems the driver must manage. This section also give basic figures for planning urban freight transport; e.g. the frequencies of deliveries to different kinds of shops and enterprises, how deliveries vary over the day, average parking time and how to calculate space needed for deliveries.

The second part focuses on issues like land use, the need for public-private cooperation, consolidation centres and traffic regulations. There are also chapters on street design and how to design stock receipt areas. References to laws and regulations on the matter are given. Examples from best practices and projects in other countries are given – i.e. experiences from the European BESTUFS project.

Conflicting goals and considerations the planners meet are acknowledged.

The guideline was distributed to urban municipalities. It is available for free from the Norwegian Public Road Administration (NPRA's) publication service. More than a thousand copies have been distributed. The handbook is also available for download from NPRA's web page (http://www.vegvesen.no/_attachment/69892/binary/34520). Truck owners associations, the truck drivers union, wholesalers and other private stakeholders have also found the guideline useful.

2. Problem identification

The urban freight industry complained about poor accessibility and little care about urban freight transport by local administrations and developers of shopping centres.

When the NPRA was involved in the problem, it realised that little attention was given to urban freight in the planning process. The knowledge of freight transport and logistics seemed to be low among urban planners, and the issue was not in focus. There was generally a lack of available parking space, the vehicles were often larger than the gates and courtyards the needed to access, and the delivery spaces were too small, inefficiently organised and sometimes occupied by waste handling equipment.

3. Approaches to find a solution

Solutions had to be handled at the local level. Formal cooperation between local municipalities and the freight industry had already commenced in some cities. Traffic and parking managers and the police participated in these meetings. Planners and street designers were generally not involved, and the expertise on freight and logistics was low. The best way to be involved at the national level was to raise the issue of urban logistics, and improve the knowledge about goods delivery for planners.

4. Implementation

The guideline was developed in close cooperation with the freight industry. Municipalities and the police were also involved. An architect was the consultant and secretary for the project in order to ensure that the guidelines were in the language of planners and designers. Meetings and hearings were conducted, and the process took three years to fulfil. The completed guidelines were presented and disseminated at conferences, seminars and at universities to students.

5. Difficulties to be overcome

There were no serious obstacles in the process of writing the guidelines. A difficulty to overcome was to continuously keep urban freight high on the agenda in the planning process.

6. Evaluating the results

There has been no formal evaluation of the guidelines. The impression given is that urban freight transport now is higher on the planning agenda than previously. This has not only been caused by the production and implementation of guidelines alone, but it is likely that the guidelines have contributed to the growing importance of freight in the planning process. The carriers have also used the guidelines as a tool when talking to local municipalities.

The guidelines were used as a reference for the Norwegian *"Building Research Design Guides"* which is a complete source to technical solutions for buildings. The series is the most used planning and design tool amongst Norwegian architects and engineers.

CASE STUDY 15 - IMPLEMENTING NEW REGULATIONS FOR ON-STREET LOADING BAYS (BELGIUM)

Issue(s)	1) economic inefficiency, 3)traffic safety
Solution(s)	1) development of law systems
Responsible organization	Municipalities
Period	Preparing period 2009-2010
Location	Schaerbeek, Etterbeek, Uccle municipalities of the Brussels-Capital Region
Country	Belgium

1. Outline of the measure

A new signage system for parking was introduced.

2. Problem identification

The control of on-street loading bays is problematic because only the police are presently allowed to monitor it, according to the road sign usually used (sign E1). As the police have higher priorities, these bays are usually not controlled and are systematically occupied by vehicles that do not load and unload, to the detriment of delivery drivers.

3. Approaches to find a solution

To increase the number of controls of the loading bays, and to allow stewards or car park attendants to monitor the use of them, the signing of bays must be revised and signs that will lead to penalties in case of an offence must be installed.

Since 2004, time-limited parking has not been harshly punished. The failure to respect the E9 sign (parking allowed) with an additional sign limiting the parking time is thus seen as a decriminalised offence. This type of sign must therefore replace E1 signs if the municipality wishes to entrust stewards/car park attendants with the control of loading bays.

A group of three municipalities, out of the nineteen municipalities of the Brussels-Capital Region, volunteered to find the most appropriate new signage and to test and implement the solution found. A follow-up committee was created in September 2008 that included such members as: mobility advisors from the three test-municipalities, a member of the road regional administration, a member of the mobility strategy regional administration, a member of the Association of the City and the Municipalities of the Brussels-Capital Region, several members of the police and a member of the Belgian Road Research Centre.

In February 2009, after some discussion amongst the working group, everyone agreed that loading bays should be indicated with an E9 sign. This sign will be accompanied by an additional blue sign (V type) with pay parking in white letters and with the indication of days and hours, as for instance from Monday to Friday, from 7 am to 1 pm. To indicate the beginning of the regulation, one must naturally place an additional sign with an upside arrow (Xa or Xc type, in function of the layout of the place).

FIGURE 15 - EXAMPLE OF SIGN

An information sign is also placed on the support. On this white sign, payment modalities will be written in black letters, in accordance to article 27.3.3. that states that on places indicated with E5, E7 or E9a to E9h signs, completed by an additional sign with the mention pay parking, and on places with parking meters or ticket machines, parking is allowed differently and under other conditions, that must be brought to the attention of the people concerned.

The rate, the price and the fact that suppliers do not have to pay is also mentioned. For instance:

- Rate 3
- Fixed rate €100,00
- EXCEPT DELIVERY (EXCEPTE LIVRAISONS)

Horizontal signing
Just as for normal loading bays, the signing will be completed by a white zigzag line.

4. Implementation

The new signing system was gradually implemented in the three test-municipalities (Etterbeek, Uccle and Schaerbeek). This implementation was accompanied by a large communication campaign, to inform shopkeepers and delivery drivers. They received an explanatory document. Simultaneously, at the beginning of the experiment and during one month, car park attendants did not report vehicles in offence but placed an informative leaflet under the windscreen wiper.

At the same time, the implementation is still followed by the follow-up committee, which gathers regularly to discuss the problems and results from real situations.

5. Difficulties to overcome

The fear initially expressed that motorists would become aggressive because of the fee being too high turned out to be unjustified.

The zones are not all respected in the same way. Several causes may account for this. (Un)loading zones were not set up on the basis of a scientific methodological study. On the contrary, as are most loading zones in the area, they were set up on request of the shopkeepers.

Another problem is that the nearby streets are blue zones (display of a parking disc for up to two hours of parking in a row). The parking time is too long, which has a negative impact on the working of the system. Consequently, it was proposed to reduce the parking time in blue zones to thirty minutes or one hour at most.

The consciousness-raising campaign clearly had a positive impact on the acceptance of the measure by shopkeepers. On the other hand, a negative point was the fact that the folders for delivery drivers were only spread amongst shopkeepers and never got to delivery drivers.

6. Evaluating the results

The Association of the City and the Municipalities of the Brussels-Capital Region made three inquiries about parking: a first one before the placing of the new signs, a second one during the consciousness-raising campaign and a third one during the actual operation, and six months after the set-up of the system.

The results of these inquiries show that the system has a positive impact, because the occupation rate of the loading bays has decreased. In other words, the average

parking time on loading bays is becoming shorter. Nevertheless, given the fact that these areas are only controlled once or twice a day, parking rotation could still be improved. In the future, the firms mandated by municipalities for the control of these areas will have to increase the number of controls.

At the same time, police services also state that the new system is more respected.

A new enquiry should take place soon, one year after the implementation of the system.

CASE STUDY 16 - ROAD SIGNS ON THE BRUSSELS RING FOR THE TIR CENTER ZONE AND ANDERLECHT INDUSTRIAL ZONE (BELGIUM)

Issue(s)	1) economic efficiency 4) quality of life (local environment)
Solution(s)	2) development of facilities 3) access control
Responsible Organization	Bruxelles Mobilité - AED
Period	2008
Location	Brussels ring
Country	Belgium

1. Outline of the measure

Placing of directional road signs upstream of the ring road, and on the Brussels ring road, for two industrial zones of the Brussels Capital Region, i.e. the TIR centre zone and Anderlecht industrial zone. That is a total of 24 road signs, among which 22 are new and two are existing road signs that have been adapted.

2. Approaches to find a solution

In 2002-2003, Belgian Road Research Centre (BRRC) conducted, on behalf of the Brussels Capital Region, a first study on the road signs that should be placed on the ring road, and upstream of the ring road, for the main industrial zones of the Brussels Capital Region. The results of this study were presented to the Flemish Region at the Principieel Akkoord meetings, but the Region refused the solutions presented in this study due to the high number of road signs that had to be placed.

3. Implementation

After a few years of discussion, the Brussels Capital Region introduced a new request to the Flemish Region, but this time only for the two industrial zones, i.e. TIR and Anderlecht. The 24 road signs were placed in 2008 and the total cost was 135,000.00 EUR, half of which was paid by the Brussels Capital Region.

Difficulties arose as to the exact name that should be given to the TIR zone; finally, an agreement was reached with the following text: Haven-Noord + 2 pictograms (1 boat and 1 truck, with the mention TIR on the truck).

4. Difficulties to be overcome

The problem is due to the situation of the Brussels ring road, i.e. mainly on the Flemish Region area, and the refusal to pay for the placing of road signs concerning industrial zones situated in the Brussels Capital Region.

5. Evaluating the results

The road signs that have been placed are rather clear; some of them have already been replaced because of acts of vandalism.

Beside these road signs on the ring road, the Brussels Capital Region in 2010 also placed directional road signs for the main port complexes, from exit six of the ring road.

Road signs that indicate the way to go back on the ring road will be placed in 2011.

CASE STUDY 17 - INTEGRAL WASTE DISPOSAL SYSTEM IN THE CANTON THURGAU (SWITZERLAND)

Issue(s)	1) economic inefficiency, 2) environment
Solution(s)	2) development of facilities
Responsible Organization	Verband KVA Thurgau Rüteliholzstrasse 5, CH-8570 Weinfelden
Period	Preparing and test period: 1995 Implementation: June 1997 ~
Location	Canton Thurgau, Switzerland
Country	Switzerland

1. Background

The political will for an efficient, coordinated concept for waste disposal in the region, with cooperation of diverse political groups has been the reason for introducing a new waste disposal concept in the Canton Thurgau. A new single waste incineration plant in the region in 1997 replaced two older plants. Therefore an efficient transport and logistic concept for the total longer transport distances of the waste to the plant became crucial. To ease the effects of traffic in the areas near the incineration plant, which is densely populated, rail transport had to be considered. A newly built incineration plant was approved under the condition that a considerable part of the transport is carried out by rail instead of road transport (reduction of tonne-kilometres on the road in the whole region).

2. Description of the measure

2.1. Objective(s)

The objectives of the measure are to reduce traffic caused by waste collection and transport activities in the area and to reduce negative environmental impacts as well as saving of costs by reducing trips and consolidation of activities.

2.2. Outline

The project was initiated by cooperation among 66 municipalities and the administration of the Canton Thurgau. Waste disposal in the region was delegated to a public organisation called *"Verband KVA Thurgau"*. The region covers about 195,000 inhabitants.

The main aim of the waste logistics concept was an increase in efficiency and a reduction of environmental burdens in the whole waste logistics of the region.

The transport concept is called *"Integral disposal system"* (IES) and is used for waste collection as well as for the clustered transport to the incineration plant. Within a radius of ten kilometres from the plant, household waste collection is carried out by trucks, and further away by intermodal transport using rail for the main-haul to the plant.

A standard Roll-off Container Transport System (ACTS) container (27 m^3) is used on the waste collecting tour (household waste) with a specialised truck, equipped with a compactor (translift). When full, the ACTS container is driven to one of five road-rail transfer points (intermodal terminals – CUS), where the container is transhipped onto a rail wagon, and an empty container transhipped back on the truck. 130 containers were in use in the year 2008.

FIGURE 16 - VEHICLE WITH CONTAINER AND TRANSLIFT FOR HOUSEHOLD WASTE COLLECTION

FIGURE 17 - TRANSSHIPMENT OF THE CONTAINER FROM TRUCK TO RAIL WITH ACTS SYSTEM

Parallel to the public waste collection system there are three transfer facilities (RAZ), plus the waste incineration plant, where private and small industrial firms can bring their bulky waste themselves. These points are equipped with a compactor. When required a truck takes the full containers to one of the nearby trans-shipment points for transfer to rail.

The third way (for small industrial companies) is to have a compactor and a container on site. The full container is then brought to a trans-shipment point.

At the road-rail transfer points, standard goods handling facilities are used, as is common for the ACTS system. This only needs a rail track next to a paved area. The transshipment is done by the trucks own hydraulic mechanism.

Flow of operation: Road to Rail

1. Wagons are waiting with empty turning frames. Brakes are locked.

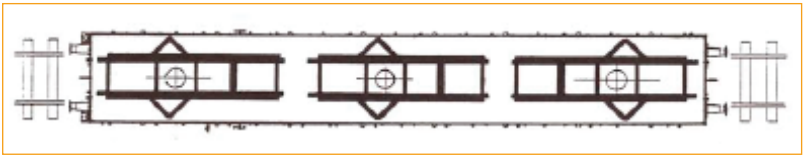


FIGURE 18 - TRANSSHIPMENT PROCESS ROAD TO RAIL #1

2. Lorry driver unlocks the turning frame and pulls it out. Then he reverses the vehicle onto the frame. He is guided by two reflectors on the frame which he observes in the rear-view mirror. If required, the driver can alter the chassis height. The container is then pushed from the lorry onto the frame using the on-vehicle equipment.

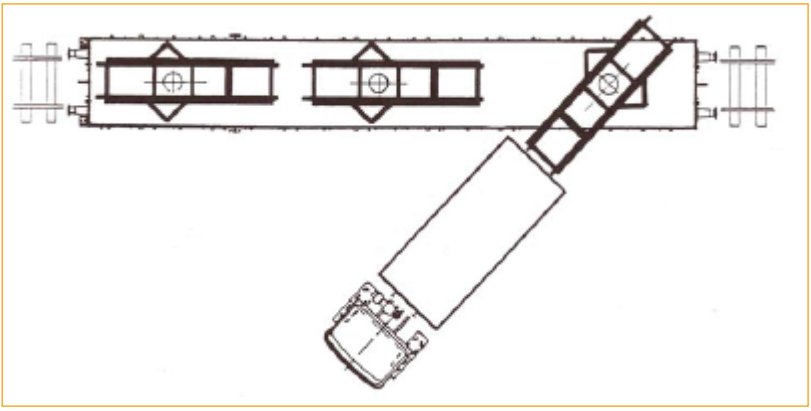


FIGURE 19 - TRANSSHIPMENT PROCESS ROAD TO RAIL #2

3. The driver then moves the vehicle forward approximately one metre. He fastens the cable that is fixed to the chassis on a hook on the frame and then pulls the frame back in.

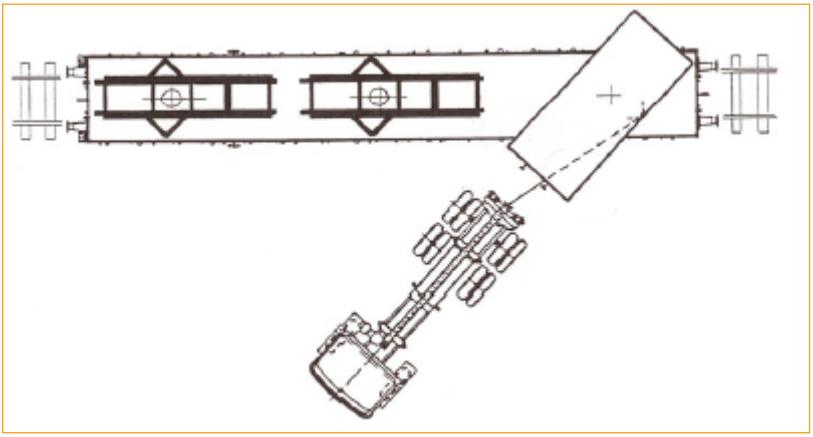


FIGURE 20 - TRANSSHIPMENT PROCESS ROAD TO RAIL #3

4. Once the frame has been locked on the rail wagon the container is ready to be moved

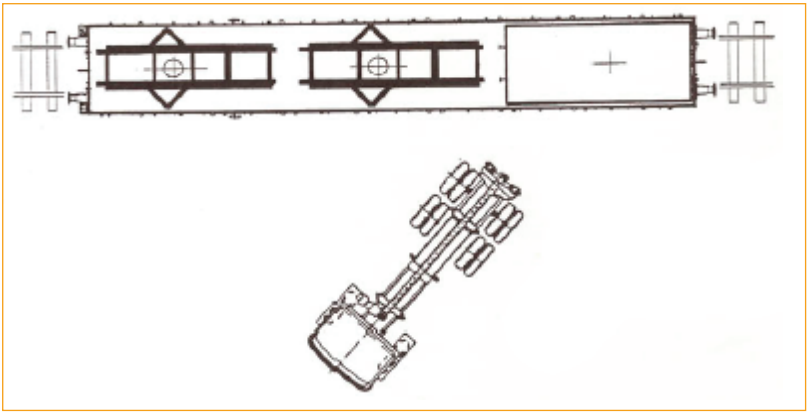


FIGURE 21 - TRANSSHIPMENT PROCESS ROAD TO RAIL #4

Flow of operation: Rail to Road

1. Rail wagon is ready for unloading of containers

FIGURE 22 - TRANSSHIPMENT PROCESS RAIL TO ROAD #1

2. Driver reverses the vehicle towards the container, fixes the cable and pulls the frame and container out and then pulls the container onto the vehicle chassis by using the on-vehicle equipment.

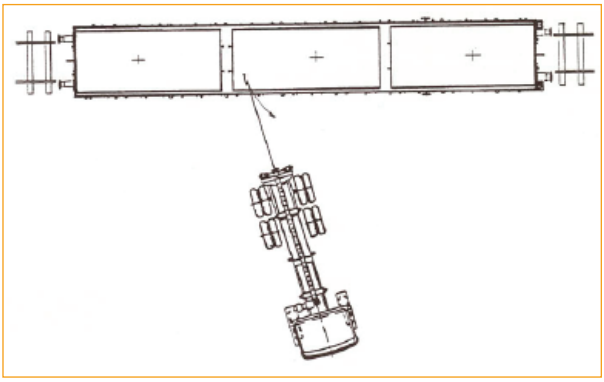


FIGURE 23 - TRANSSHIPMENT PROCESS RAIL TO ROAD #2

The following figure illustrates the space requirements of the system.

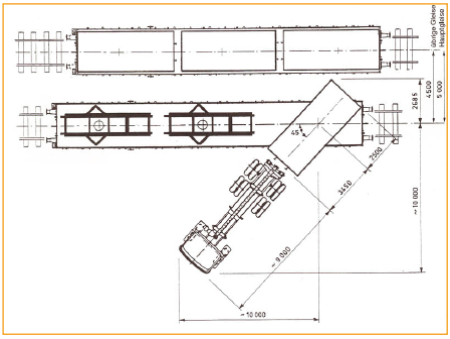


FIGURE 24 - TRANSSHIPMENT PROCESS RAIL TO ROAD #3

Loading and unloading can be undertaken from either side of the track.

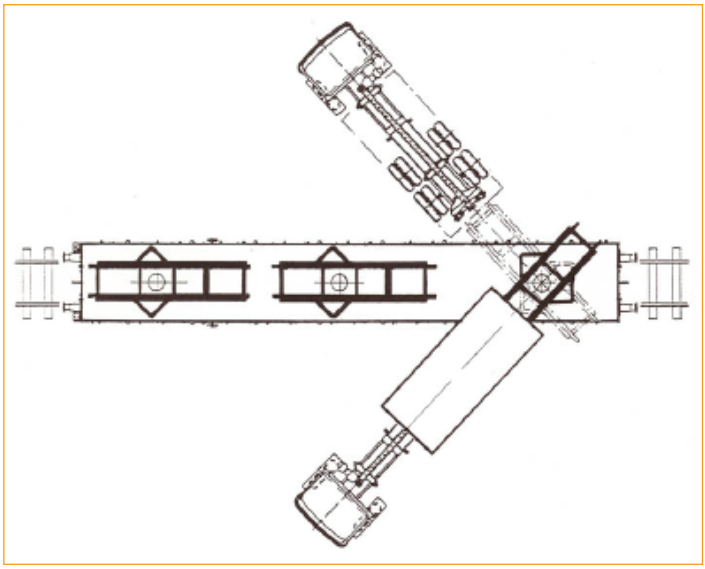


FIGURE 25 - TRANSSHIPMENT PROCESS RAIL TO ROAD #4

The main advantage of the concept is the separation of the waste collection process and the waste transport process. On the one hand, the waste collection tours become more efficient (the time consuming transport to the incineration plant can be left out). On the other hand, the waste transport can be carried out by rail, which is the more environment friendly means of transportation.

Kind of waste handled: all general household waste in the region, bulky waste of households and of small industrial firms, combustible construction waste

Used technologies are: ACTS container and trans-shipment system, a system called Translift installed on the collection vehicles to compact the waste and forward it into the container, compactor system for transfer points (RAZ) and companies.

Apart from the IES, the project includes an optimisation of the collection tours. The number of spots on the street where household waste can be placed in advance of the collection tour was reduced, with the effect that the number of stops decreased, which makes the collection more efficient.

The rail company charges per container (independent of the weight). Because of this, and because of the generally higher efficiency of the collection tours, compactors are used to fill the containers.

The performance of the concept is well monitored in terms of performance, cost, modal share and efficiency.

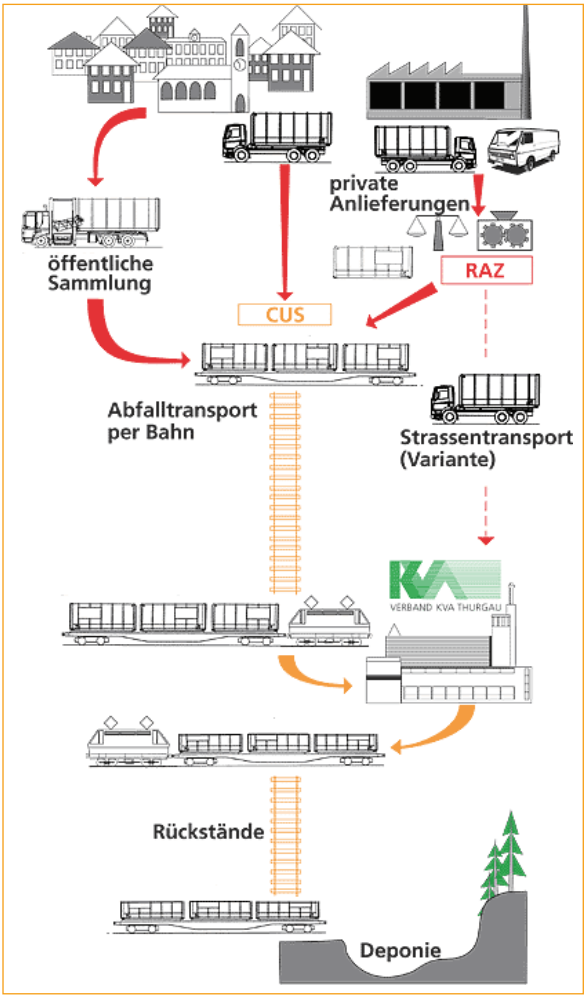


FIGURE 26 - INTEGRAL WASTE DISPOSAL SYSTEM

2.3. (Expected) Difficulties and their solutions

During the introduction phase, the following obstacles occurred:

- opposition from the population near the central incineration plant (concerns about air quality and traffic volumes),

- political opposition against increased costs for rail transport (which were actually lower),
- opposition from the road transport industry against modal shift to rail.

Because of this opposition there was an urgent need for cooperation between different stakeholders and a well prepared information campaign for people living near the central incineration plant.

After a period of time, the population got used to the new collection regime (less spots to place waste, only on right side of the road etc.).The overall logistics concept is well accepted by staff, road transport operators, and operators of the incineration plant.

In the first year 15 companies had a waste press with a container at their site. This number was increased up to 24 in 2008.

3. Effect(s)

As the rail transport is charged per wagon (three containers on one wagon), costs can be reduced when the filling weight is as high as possible. The average filling weight was at around 10.7 tons per container in the year 2007.

Before the introduction of the concept there were 17 vehicles for the collection in operation. Since then only nine vehicles are needed, a reduction of almost 50%. The reasons are:

- shorter transport distances from collection area to trans-shipment place;
- higher collection performance by reducing the spots where people can place their household waste;
- roughly twice as much load in a container than in a conventional waste vehicle.

The truck kilometres travelled during collecting tours could be reduced from 2,680 km to 2,150 per week (reduction of 20%). Overall reduction of truck kilometres of 600,000 km per year.
Overall costs for waste collection and transport could be reduced compared to the old concept (two incineration plants within the area, truck transport only).

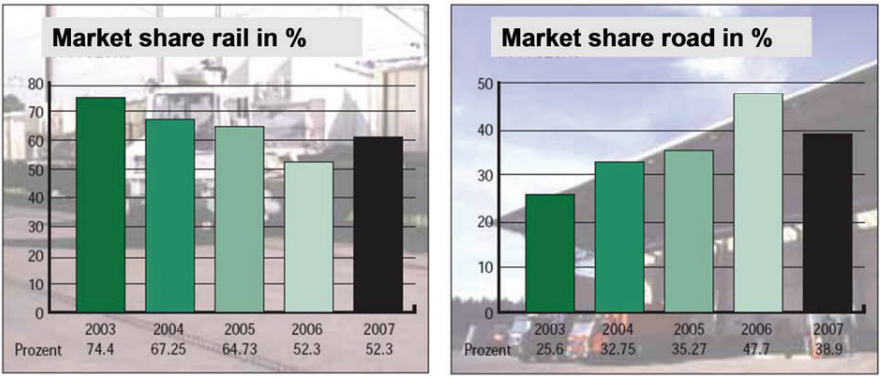


FIGURE 27 - PERCENTAGE OF TONNAGE DELIVERED AT PLANT BY RAIL AND ROAD

4. Other things to be noted

Benefits:

For stakeholders:	environment friendly concept, overall lover cost and higher efficiency
For service providers:	integrated system with concentrated activities in collection, transport, incineration and landfill
For the public (inhabitants):	cheaper fees for waste disposal, less traffic (esp. near the incineration plant)

Success factors and failure factors:

Success factors:	positive effects for all stakeholders; higher efficiency and lower costs for waste handling; less noise and air pollution
Failure factors:	none
Lessons learned:	experience transferable to other situations and projects

Road - rail integrated concepts can be successful from an economic point of view and from a political environment view as well.

5. Sources

- http://www.kvatg.ch/logistik-ies-001-040202-de.htm
- www.bestufs.net àð BESTUFS II - Best Practice Handbook 4 Update 2008 Part III, Waste transport and logistics in urban areas
- http://www.actsag.ch/

6. Document handling

Rapp Trans AG, Cornelia Petz, 22.11.2010