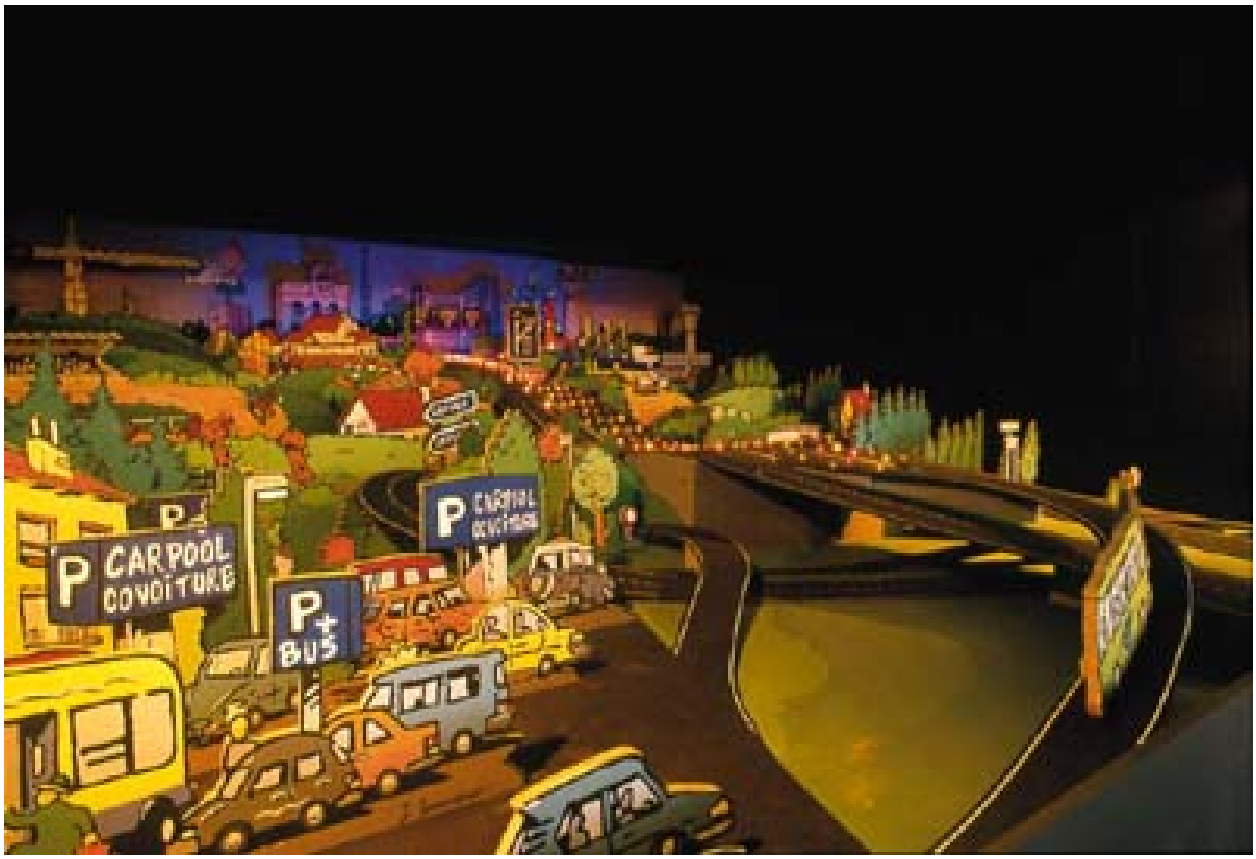
PARKING POLICIES AND

THE EFFECTS ON

ECONOMY AND MOBILITY



REPORT on COST Action 342
August, 2005

Technical Committee on Transport. Action 342

PARKING POLICIES AND THE EFFECTS ON ECONOMY AND MOBILITY

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LIST OF CONTRIBUTORS:

The results of the Action are presented according to the following sub themes, coming from 6 different working groups during the Action:

a. Institutional and legal aspects, leader: Mr.Y. Heinrich (initially Mr. J. Bridgeman)
b. External policies influencing parking and parking policies, leader: Mr. T. Kesthelyi
c. Public parking, both off- and on-street, leader: Mr. J. Legaignoux / Mr. M. Pickett
d. Private parking, leader: Mr. M. Wacker
e. Park and Ride (P+R) , leader: Mr. J. Dionisio Gonsalez
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The chairs of the working groups produced the reports on the themes they chaired.

Final text editing and conclusions and recommendations: Mr. T. de Wit

Chair of the Action was Mr. T. de Wit, and secretary was Mr. Ph. Stalins / Mr J. Spousta (COST). Coordinator of the different working groups was Mr. B. Patrice.

In this report themes a and b are presented under the heading 'Policy, planning and legal powers'. In this chapter both the general policy developments that may influence parking are touched upon as is attention to the legislation that steers parking policies and parking management.
Themes c, d and e are presented together under the heading 'Demand and supply'. The three items in fact discuss questions of meeting demand and controlling supply of parking spaces, yet from different angles.

Finalisation of the report is more than a year later than anticipated. This is partly due to administrative changes within the COST organisation. Another reason is the fact that it took much more time than originally envisaged to come to a mutual understanding of terms and definitions.

Acknowledgement

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CONTENT

ANNEXES


(photo CROW)

A modern automated parking garage as to be seen (among others) in [this one] Tübingen (Ger.); Budapest (Hungary); Istanbul (Turkey); New York and more other places.

Application for public use so far is rare. The public is a bit unsure and operators are wondering about running costs.

Yet they have one big advantage, the car is protected from theft and vandalism.

PREFACE

Not before many years parking used to be a problem. A problem to be solved at relatively high cost.

Today parking can provide economic opportunities and generate a positive revenue. When dealt with properly parking will form a valuable economic asset for the local community.

A distinction must be made between smaller cities on one hand and the larger towns and conurbations on the other. In the smaller towns there will be no problem in supplying ample parking space. In the larger towns meeting parking demand turns out to be difficult and may change into a problem.
Yet when managed properly and under a well founded parking policy (as part of an overall transport policy) parking will be an asset instead of a headache.

Because of scarcity on one hand the car driver is willing to pay a reasonable market price or he is willing to accept alternative facilities like Park and Ride and shuttle services.

All this leads to a situation where parking will be able to support both accessibility and liveability of our towns and cities.
Yet to realise these ambitious goals carefully selected and tailor-made solutions will be needed.

What we have learned is that in spite of initial fears and prejudice parking policy and parking management can support the economic viability and liveability of any town while also supporting sustainable transport and the parking business itself.
There is no need for any community to let itself be frightened and accept excessive demands for parking places by companies that threaten to settle elsewhere. Both lose; cities will suffer from an over demand of traffic and companies lose money in creating too many parking places.

The experience brought together teaches us that all towns in principle follow the some evolution in their reaction on parking demand.
Measures and effects are to a large extent the same.
Differences are based on city size, building density, car-ownership, availability of alternatives, etc. and a bit on regulations. Take these differences into account and the same measures show the same effects.
Parking discs or in some places called blue zones are known almost everywhere and the reaction of the parker is the same everywhere. It is questionable whether a restrictive measure like ‘trip-maximising’, as found in Zürich (CH), will soon be found in North America. Yet in London we see ‘congestion charging’ emerging due to the unsolvable congestion problems.

Park and Ride solutions are found almost everywhere and do work everywhere. In all cases commuters use the facilities. In those areas where parking demand and pressure of traffic is high visitors are also successfully targeted as customers for the P+R facility.

It took some time before the notion emerged and was accepted that we all are on the same line of evolution when talking about the reaction to growth in parking demand.
The members of the Action also realise that clear scientific research results are scarce. Yet we believe that the material brought together provides enough empirical bases to support this concept.

More research is strongly advisable because that will make predictions on effects to be expected .

Parking enforcement through parking wardens. Often disputed but inevitably coming up more and more.
French experiences (Dijon, Nantes) show that there can also be a very positive side at enforcement.

(photo: Parkeer Groep Nederland)

1. INTRODUCTION

COST is an organisation within the EU that promotes and supports cooperation between experts from the different European countries.
In a COST-Action this cooperation actually comes to life around a specific topic. The support takes place in the form of refunding travel costs and costs for daily expenditure, secretarial support, production of the final report and some cost of expertise. In COST Action 342 'Parking policies and the effects on mobility and the (local) economy' results of research and experience in this topic is brought together. In the Action representatives from 18 European countries participated as well as representatives from the European Parking Association (EPA), the Canadian Parking Association (CPA) and the Institute of Transportation Engineers (ITE), the National Parking Association (NPA) and the International Parking Institute (ITI) all three from the United States of America.

This report has been prepared by the members of COST Action 342 (COST342)
The members of this Action set out with the following goals:
- create an inventory of knowledge;
- present examples of best practice;
- come up – if possible – with guidelines and
- advise on further research.

Not all the aspirations of the Action have been realised. Many difficulties had to be overcome in going forward: complete research on measures and effects is relatively rare in all countries; available information is difficult to compare because of differences in definitions, parameters, etc.
Some remarks are made on best practices. Interesting examples are presented in marked boxes throughout the report. Given differences between countries on regulations etc. it was decided not to present these as the only way to act.

We formulated our recommendations as clearly and specifically as possible despite the national differences referred to earlier. In doing so we expect to give enough guidance for national and local policy makers to develop a parking policy and the related parking management measures that are both effective and acceptable.
In the annexes an overview of the material brought together is presented in a loosely structured way. This to help people interested to search

The chapters 4 (Policy, planning and legal powers), 5 (Demand and Supply) and 6 (Communication and acceptance) reflect the day to day situation on parking in real life.
We (as car-drivers) get confronted with results of some parking policy. These policies come to life because there is a too large difference between supply and demand. In order for these policies to be successful the (local) authority has to pay much attention to communication in order to get acceptance.

Working on the Action itself is very much appreciated by all participants and we strongly believe that the results as mentioned above are valuable.
Independent from how one wants to rate the scientific value of the work presented here it is the first Europe-wide effort to try and study parking policy measures and their effects on mobility and the economy.
The important general result is the recognition that everywhere parking management (in the absence of any parking policy) will shift from 'following demand' to 'controlling supply' and that each country or city is situated somewhere on the same line of evolution that describes that shift.

A second important result of the Action is the creation of a body of knowledge formed by all the participants in the Action.
This report is based mainly on information provided by participants in the Action. Some additional information was gathered during the period the report was produced. Especial use was made of the possibility to draw on the presentations made on the 11th European Parking Congress 1-3 October 2003 in London.

In the table below a picture is painted of the input per participant in relation to the relevant items of the Action.

Table 1.1 Input in COST Action 342 per participant

COST INPUT				
Country	Input on:			
	Legal and institutional background	Parking system	Effects on mobility	Effects on local economy
Austria				
Belgium				
Czech Rep.				
Denmark				
Finland				
France				
Germany				
Greece				
Hungary				
Italy				
Latvia				
the Netherlands				
Norway				
Portugal				
Spain				
Sweden				
Switzerland				
United Kingdom				
EPA				
Canada				
USA				

Marked fields in the table show the provision of input. The darker grey, the more information provided.

2. CONCLUSIONS AND RECOMMENDATIONS

2.1 Conclusions

Parking policy and parking management play a very important role in urban mobility, both in enhancing accessibility and in competing urban congestion. In modern 'mobility management' parking is the largest single management tool.
Eventually any parking policy will aim for a change from long stay parking in urban area's to short stay parking in urban area's. This to facilitate visitors and business trips and to prevent commuters occupying parking places intended for visitors and consumers, specially on street due to the visual impact. A well organised parking policy will certainly have a mitigating effect on urban car-mobility. Such a parking policy set out carefully will support business and economy instead of harming them as is often suggested.
A simple and profound explanation of these conclusions is given in par. 7.2.
That a successful parking policy must be supported through a well carried out parking management aiming for quality and being service oriented goes without saying.

2.2 Recommendations

National policies and land use planning
National transport policy is very general and unspecific on parking.
Main influences come from land-use planning and some from environmental legislative issues. The setting of parking standards for new developments is based on national legislation or guidance. Standards are mostly local or regional, often based on national guidance.
It is advised that parking should be mentioned in the national transport policy as an important instrument that can (provided it is properly used) play an important steering role in car mobility.
In the field of land use planning the application of maximum parking standards is recommended. The exact values of these standards must not be fixed in national legislation but brought as a guideline or guidance paper. This to facilitate adaptation to regional differentiation.

Environmental policies
Environmental or energy related policies parking is mostly not or at the most indirectly mentioned. These policies do have a relationship with road traffic. In order to minimise the negative effects of car traffic, these policies have led to measures aimed at reducing car-usage. In this sense parking is more and more recognised as an important tool to influence urban mobility.
Specifically legislation on 'Air quality' has led to measures aimed at reducing car usage or car-mileage and traffic calming. Mostly by introducing P+R facilities or at least making it possible. Also transport demand management should be mentioned in this respect. This in some cases results in less parking at the company be it through cash out measures (USA) or company mobility plans (Swiss, the Netherlands).
Parking signage systems as part of traffic management systems showed to have some effect on car mileage within urban area's. Here the project 'Infostadt Köln' (Cologne, Germany) should be mentioned.

Legal powers on the national level
In general there exist no great differences between the countries. Yet some recommendations are useful. National legislation should put liability for parking offences with the car-owner.
National legislation should set a framework for defining the level of payment for paid parking and for the setting of parking fines but should not set specific values.
Powers for enforcement should be delegated to the local authorities in ways comparable to the Dutch, Spanish or UK approach. Legislation also must make it possible that income from parking fees and – fines are made available to the local authority, being the authority in charge of enforcement. Also being the authority that carries the burden of urban car-mobility
This legislation should also provide for the possibility to contract the actual work out to private parties.

Legal powers on the regional level
Regional powers with regard to parking are small and scattered. The latter mainly because the existing differences in government systems throughout Europe. The need for regional powers depends also on the density of a region. This need is higher in The Netherlands than in France or Germany. Based on Dutch, German and French experience it may be concluded that a regional body can play a coordination role in the setting of parking standards and in the setting of parking fees.
Bodies like the Dutch provinces or the French 'Departments or regions' seem to be the proper level.

Legal powers on the local level
Parking measures that need control do not work without proper enforcement.
Parking enforcement though may pose problems, especially in those countries where the collection of non-paid fines is a matter for the judiciary. Judicial authorities prefer to concentrate their actions on more serious offences.

Basically rules for parking policies are set out by local authorities, based on national legislation. Yet small distinctions exist between countries, mixing local powers with national powers.
National legislation in many countries empowers the police to enforce parking regulations. However in Austria, Czech Republic, Finland, France, Norway, Portugal, Switzerland, Spain, UK and the Netherlands local authorities are empowered to enforce regulations relating to pay for parking. Where enforcement of paid parking is not the first priority of the police the use of other bodies has been demonstrated to be very effective in the UK. In all these countries, excluding UK, Spain and the Netherlands, these bodies still do have some relationship with the police which inhibits the local authority from fully exercising the enforcement needed to accomplish the goals of the local parking regulation. Only in the Netherlands and in the UK can this enforcement be organised differently. These differences stem from a difference in the basis for this enforcement. In most countries this is based on (parts of) the Highway Code or traffic legislation in general.
In the UK parking is 'decriminalised' and in the Netherlands and Spain enforcement of paid parking can be brought under fiscal law and the enforcement of illegal parking can be dealt with under administrative legislation.

Where in most countries police have to play an important role in this enforcement this need not be the case in the UK, Spain and in the Netherlands. The result is that enforcement of parking rules need not compete with the other priorities of the police and so get the priority that is needed.
Also this situation introduces the possibility of contracting out the task of enforcement. Thus providing possibilities to set priorities in a practical way, to achieve a reasonable cost-benefit ratio and at the same time maintain flexibility in operation.

Types of regulation
There is experience on car fee areas throughout all member states. There are no negative experiences reported.
Priority zones for residents exist in some form throughout Europe. The need rises if parking demand lacks supply. Introduction of some kind of resident's parking scheme turns out to be the best way to solve the need of residents for parking.
A licence that allows the resident to park in a given area (independent from whether it is a paid parking area or not), is the most practical approach. The number of licences per household depends on the local situation.

Disc Zones / Blue zones
Parking discs are applied throughout Europe to control short-term parking. Small but recognisable differences exist.
A general conclusion is that these systems work best in areas with a moderate demand. In all countries enforcement lies with the police, who put a low priority on the enforcement of parking. This means that when tight enforcement is needed it is better to introduce paid parking.

Disabled parking
The principle rules for parking for the disabled are more or less the same.
The provision of public parking spaces for the disabled is advised at around 1 per 50 public spaces.
The rules for acquiring a licence for disabled parking seem to be roughly the same.
Differences exist as to who applies those rules.
The suggestion emerges that it is more effective to delegate this to an independent body and not to the family doctor.

Parking for commercial vehicles
Both from the perspective of safety for the truck and from a perspective of townscaping a development towards secure parking for vans and lorries is recognisable and advisable.

On street parking control devices
Individual parking meters are more and more being replaced by pay and display machines.
The upcoming in-car parking meter and other ways of controllable payment might eventually alter that.

Payment methods
Cash payment will, in reasonable time, be substituted by cashless payment methods, most likely by chip based cards for on-street payment and debit and credit cards for off-street payment.
Techniques like payment by mobile phone are coming up. Yet today these techniques are applied in a very small proportion and their speed of introduction is difficult to predict.
It is advised that local authorities work together to define general functional specifications for this service which providers that want to introduce such a service in their town have to comply with. In doing so they support cross-town user-friendliness and prevent finding themselves tied too strong to one provider

Parking Tariffs
The introduction of paid parking and the level of the parking fees are both expected to grow.
Levels of € 5,- per hour for on-street parking are to be found already (Lyon).
Parking tariffs for on-street parking should in principle be higher than in off-street facilities. If this is not the case you have needless numbers of cars on street and a bad financial situation in the facilities.

Financing enforcement
A related point is the question to which party the income from paid parking will flow. Following the experiences from the UK, Spain and the Netherlands it is advisable to organise this so that the local authorities who carry the burden of parking also get the revenue of the related income.
National regulations will see to it that this is done in a reasonable way.
Other enforcement measures
When the legal basis for enforcement is weak French experience leads the way to a successful alternative. Change your traffic warden into the host of the visitors to your city or quarter who tells motorists where they can and cannot park and informs them on the possibilities of the area and illegal parking will drop, income from paid parking will rise and in general you have a much better controlled parking situation.
The (once) popularity of wheel clamping is declining. The tendency is either to shift to tow away or to collect due payment at the moment when the driver applies for some licence.

Public parking off street
Private non residents parking off street is recognised as a problem everywhere when dealing with parking control. The number of these places roughly equals the number of public controlled parking places.
It is advised that local authorities are (eventually) provided with tools to extend their control over these places also.

Private parking
Parking standards for new developments or redevelopment should be set as a maximum and not as a minimum. The level of that maximum may be defined locally or (better) regionally. In doing so the authority in charge provides itself with powers to prevent an abundance of parking places. If the standards are defined as minimum levels there is no way to control.
It is advised that shared parking be promoted as a means of preventing an oversupply of parking.

Park and Ride (P+R)
Park and Ride facilities can be a good measure to help solve the accessibility problems and parking problems of a central area. The facilities must be easily accessible by car and provide easy and fast egress by other means of transport.
Park and Ride is usually aimed at commuter-traffic, but has been known to be effective for inner-city customers as well (Cologne, Oxford, Utrecht, , München)

Communication and Acceptance
Any introduction of parking policy measures must start with comprehensive communication actions. If this is not done carefully the measures will fail to be accepted, and even the image of a well-accessible inner city may be destroyed for a long time.
A positive approach towards the public will lead to a better compliance to the parking rules.
Enforcement of parking measures, as part of the work of 'city-hosts', is more effective then just repressive enforcement (eg. Oslo).

When considering parking measures not only should the effects on the parking situation be investigated and evaluated but also the effects on mobility and the local economy. An evaluation scheme for this approach can be found in the annex to this report.
It is recommended that developments in parking, mobility and local economy in an area be monitored periodically. Thus the interrelationship between these aspects can be followed, allowing the proper measures adjusted to the local situation, to be taken.

Effects on mobility
Commuter parking may be controlled relatively easily.
Residents parking can be succesfully channelled through the introduction of a residents permit parking scheme.
Visitors parking is facilitated by a well carried out paid parking scheme.
In general a proper parking management scheme will result in less search traffic, and a better use of available parking space. It will to some extend bring long-term parkers (commuters) to park at longer distances or use other transport modes. Despite all verbal complaints about tight parking management measures, these measures always turn out to be positive.

Effects on economy
Parking measures should always be tailor-made, the size and scale of the measures should be in line with the existing parking problems and the specific local situation. Introducing new parking measures in a commercial area may initially lead to a decline of shop turn-over, as a result of customers reconsidering their transportation habits. Providing the size and scale of the measures taken was right, after a period of turbulence a new equilibrium will be settled, resulting in equal or higher turn-over.
Regional (or local in the case of big cities) coordination of parking measures in the sense of taking the proper measures in the right place will avoid economic shift, either in parking income or in retail turn over. Evidence brought together clearly indicates that proper parking policy measures support the economy rather than hamper it.
Introduction of paid parking results in a higher turnover, creating space for more customers. Free parking changes visitors (short term) parking into long term places occupied by workers instead of residents.
Introduction of a free starting period at paid parking locations results in more traffic movements, more costs and not more customers.

Further Research

Although the results of the action can be regarded as reasonable suggestions that support our findings, at the same time we must conclude that more and better data will be more convincing.
Also the available material clearly suggests relationships which need a better understanding and more scientific support.

In Annex 1 a framework for research is described. This framework was designed to help bring material on cases together.
One of the conclusions of this Action must be that available material hardly if not at all – fits this framework.
Given the need for more evidence and data the members of the Action advise:

- to support any parking policy measure with pre- and post implementation research
- to clearly identify the primary, secondary and tertiary effects of measures in the research
- to relate any research to a quantitative description of the environment within which measures are taken.

We advise strongly that future research be designed following the suggestion from the framework we developed.
In order to maintain and develop the knowledge base created thus far we suggest a continuation in order to bring together additional and new material and thus support a better understanding of parking and parking behaviour.

(photo: Witteveen + Bos, the Netherlands)

P+R lot in Newbridge (UK)

3. THE DEVELOPMENT OF PARKING POLICIES

With relatively few cars per household and sufficient space in which to leave a car parking is not a major issue. In many member countries car use has been growing consistently for many years and the need for adequate parking facilities has increased accordingly.

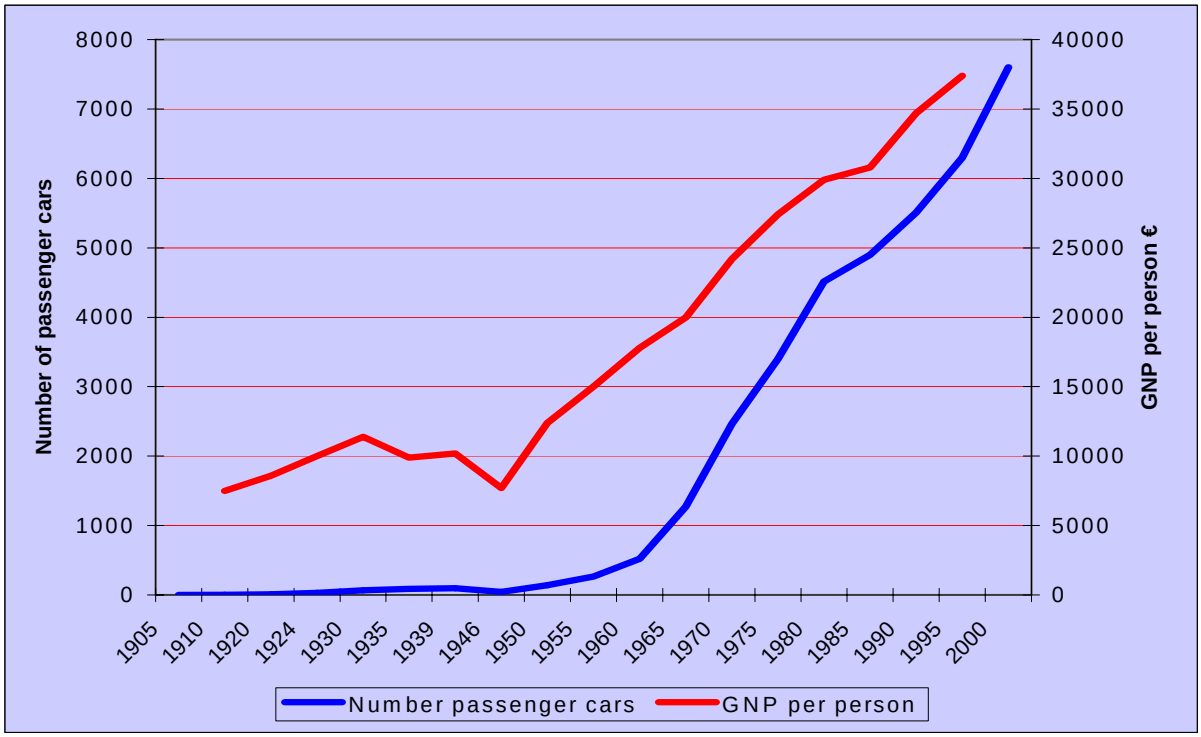


Figure 3.1: Growth in the number of cars in the Netherlands compared to GNP per person (Source: ANWB / Groningen growth and development centre)

In some countries it became apparent about twenty years ago that fulfilling the ever increasing demand for car-parking space was not going to be possible. The continuing increase in the supply of parking was questioned because it was seen less as an indicator of growing wealth but more seen by some as a traffic generator. It is only recently that this notion has changed. Rather it is the journey function and lack of controls such as congestion charging, parking fees etc. that attracts traffic not the parking place.
Because of the shortage of parking space and the possible negative impact on the attractiveness of an area and the effects of car-use in general parking supply became more discussed then before. The question that remains is if traffic (visitors) will continue coming in.

To understand this mechanism we must realise that most towns and cities develop in stages. One can recognise:

- the old (historical) centre
- late 19th and early 20th century development
- a post war ring and modern suburbs
- Industrial areas, office blocks and shopping malls outside this area.

In some countries development further away from a town/city centre can accommodate cars, whereas areas in the centre of towns do not have sufficient space for all those wishing to park a car.

LATVIA/ Riga: A country at the start of the parking-evolution

In Latvia two typical situations concerning parking problems and parking policy exist. Medium sized towns, such as Aluksne, Dobele, Cesis, Jurmala and Liepaja, don't have special parking policies or special parking authorities, because these towns encounter yet the parking problems similar towns in Western Europe encounter. A certain amount of paid parking has been introduced in those towns.

Riga on the other hand has all the parking problems which are typical for cities with a population of 500.000 to 1.000.000 inhabitants, such as congestion, search-traffic, illegal parking, low traffic safety. Riga has a (slowly decreasing) population of around 800.000, with a fast growing car-ownership and increasing employment in the city. Parking demand will therefore grow in the near future.
Public parking in Riga consists of paid parking, free parking and reserved parking. In many cases there is a lack of geographical homogeneity (e.g. paid parking lots within a free parking area, or vice versa). In those cases the users' understanding and respect of the parking regulation decreases strongly.
The municipal government is responsible for parking policy, management and control. This responsibility mainly concerns on-street parking. No clear entity seems to be in charge of regulating and controlling off-street parking. Off-street parking is considered a matter for private enterprise. Issuing building permission is mainly considered on grounds of urban development; parking and traffic generation plays hardly any role. Once building permission is issued there is little or no control on how the off-street parking is run. This situation hampers the possibilities to execute a coherent parking policy.
In theory Riga City Council has adopted a policy that regulates and controls the access of automobile traffic into the city centre Old Riga):
The Old Riga Committee approves long term (6 months) permits to enter Old Riga. A driver being inside Old Riga may park where this is allowed. Parking outside Old Riga (approx. 1,5€ per hour) though is much cheaper than buying a single permit (€ 8 per permit per hour) to enter Old Riga and park there with no extra charge.
Long term permits may be purchased by residents of Old Riga and workers. The latter only on strict conditions.
The municipal company 'Rigas autostavvietas' is responsible for the organisation and enforcement of paid on-street parking and for the entrance-control into Old Riga. The municipal police enforces illegal parking for the whole of Riga.

The pressure caused by increasing levels of traffic manifests itself as parking problems and can create competition between city centre and the outer areas. In some cases shopping malls on the outskirts of a town compete very successfully with the centre. If there is a lack of interest in preserving the quality of the inner city this may happen very easily. The city of BRNO in the Czech Republic shows an example of this unintended development.
Yet there are examples where city centres have fought back and regained attraction and visitors. Today in some cases shopping malls imitate old city centres to enhance their attraction.
When comparing parking policies of different towns on a regional scale it is important to keep in mind their relative weights (and their uniqueness) within that region. The main town of a region will rarely suffer significantly from competition from other smaller towns. Regional centres can often set strict guidelines on parking without damaging their economic viability too severely. If most towns in a region are of comparable weight parking will to some extent explain their relative attraction.

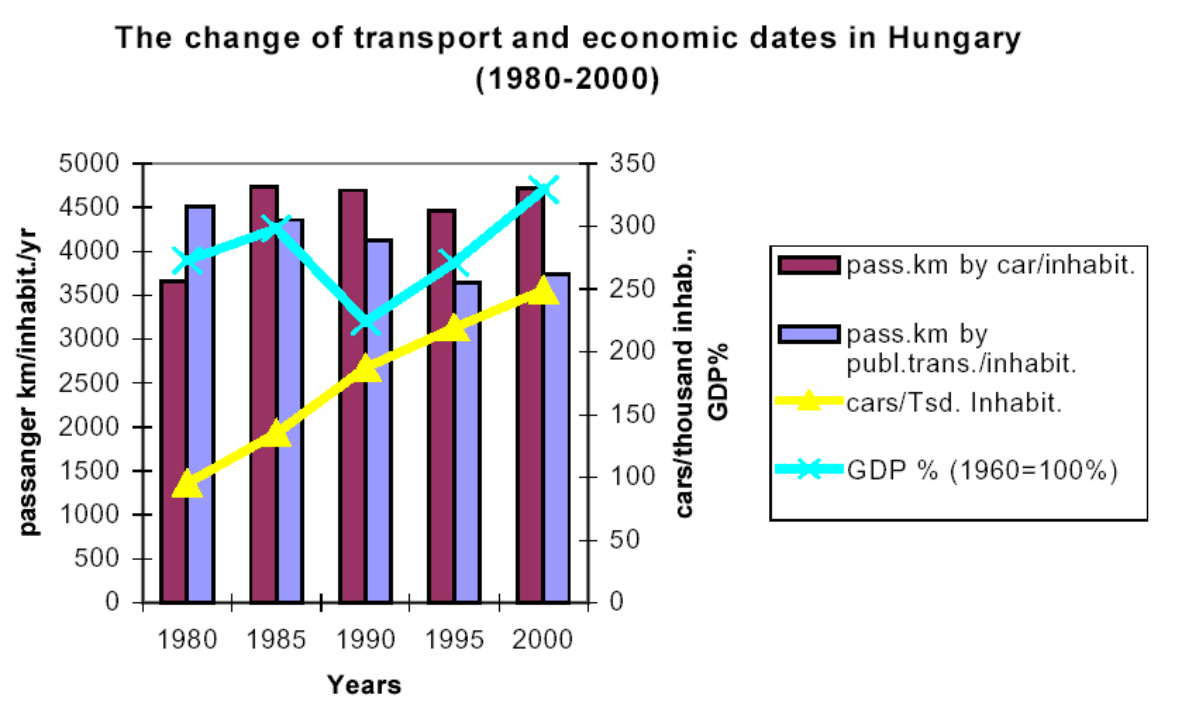
Another point to be aware of when discussing parking policies is the question which user group is targeted. Commuters, visitors and residents all have a different reaction to parking measures.
In principle commuters are not dependent on the car unless they need it for business-trips. Also if no good alternative transport is available car use by this group will increase.
Finally one must be aware of the fact that parking policy measures are (relatively) easily applied to parking spaces operated by local authorities. The regulation of parking spaces operated by the private sector is much more difficult to influence. Yet in many towns some 50% of all parking places are privately operated.

Hungary; Increasing parking pressure leads to regulation

The Hungarian cases deal with some districts of Budapest (total number of inhabitants of Budapest 1.930.000), and the cities of Pécs (159.613 inhabitants) and Sopron (55.212 inhabitants). In all these cases the introduction of car free zones and the implementation of paid parking is at issue. In the districts concerned in Budapest paid parking was implemented over the whole area. In both other cities paid parking is only limited to a part of the total inner city on-street parking supply (Pécs 20% of the total supply, Sopron 90%).

The middle European countries suffered from a decrease of the Gross Domestic Product around 1990. The number of inhabitants in these countries has been decreasing since the eighties.
At the same time Hungary has seen increasing urbanisation since the sixties. The pressure from density of population, as well as the traffic- and parking pressure in the cities, has therefore been growing.
The share of the population living in urban areas has stabilised since 1990, the central position of towns on the other hand has still been growing steadily. The intensity of commuter traffic (primarily by cars) keeps growing.

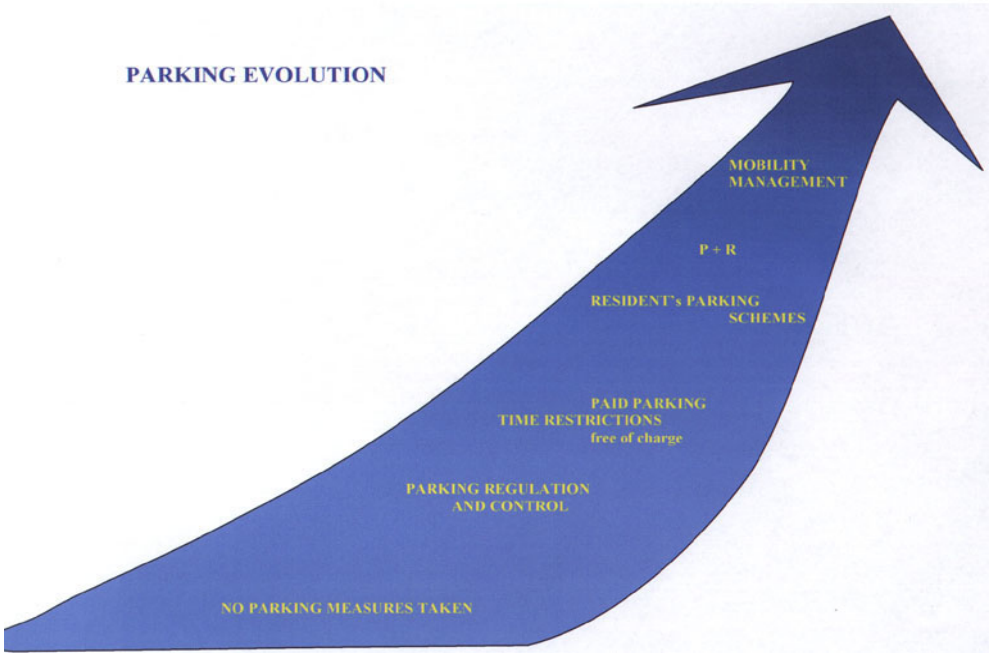
In 20 years the average car ownership in Hungary has tripled; from 80 cars per 1000 inhabitants in 1980 to 250 in 2000. The dip in GDP in the early nineties had no noticeable effects in this respect. The car share in transport therefore shows an increasing tendency.



This leads to a growing parking pressure in Hungarian towns, resulting in a growing demand for parking regulation. The Hungarian point of view is that providing parking spaces connected to the working places in an area is not primarily a task of the local government; but that the local government – within reasonable limits- will have to meet the parking demands related to visitor and shopping traffic.

The increasing parking pressure in Hungarian towns has been the driving force behind the implementation of paid parking in several Hungarian cities.

Nevertheless the development in the reaction to parking demand follows a similar pattern everywhere as visualised in the diagram below.



This reaction usually follows the next stages:

1. No formal action required, available parking space is used until the level of parked cars has a negative impact on the attraction and quality of the area.
2. Parking regulation and control will be the first step taken. In certain streets parking will become prohibited and in other locations the parking places will be more clearly marked, creating a more efficient use of available space.
3. With continuing lack of available space the concept of time restriction in parking will be introduced. In this way available space is used more efficiently by increasing the turnover of cars. This measure encourages long-term parkers (mostly commuters) to look for other spaces that were often further from the town centre or another mode of transport and visitors and shoppers to park time-efficient. In this way more motorists can be served by the same number of places. Initially control is often carried out by means of a parking disc (in some countries called blue zone), eventually the time restriction will be achieved by a parking fee.
4. As parking control becomes tighter resulting in an overflow of parkers to neighbouring areas that were often residential areas. Residents parking schemes, involving the resident satisfying a set of criteria and paying a permit fee will often be introduced to alleviate the situation. These schemes allow residents to park in preference to non residents.
5. As parking demand grows further and the accompanying need for more control, paid parking will be introduced as a means of control. The (differentiated) parking tariffs then becoming the key to control the use of parking spaces.
6. Given the ongoing growth in car ownership and use of cars with, at the same time, the slow down or even reduction in the provision of parking spaces in city-centres and at other important points of attraction the concept of the provision of parking places at greater distances will become apparent. The concept of Park & Ride (P + R) was introduced as a means of attracting motorists (initially commuters, eventually also visitors) to park on the outskirts of a town. In most countries this involves the provision of a parking place at the outskirts of town or in the region at railway or light rail stops. In the United Kingdom Park & Ride sites are usually serviced by a dedicated fleet of high specification buses that operate a fast and frequent service between the P&R site and the town/city centre. This concept is a particularly attractive concept for historic towns where the provision of extra parking spaces

could detract from the architectural heritage of the area. This type of service is attractive for commuters and also works for visitors and shoppers.

7. More recently the concept of 'mobility management' has been introduced in some countries. This concept involves, as related to parking, the combination of private and public transport in order to provide an acceptable mobility-chain for travellers. This is aimed at maintaining and enhancing the accessibility of towns and cities for visitors and not necessarily only for car-traffic. Within this concept, parking is an important element. If car-users are to use public transport for part of their trip it must be possible for them to park their car easily somewhere on their journey in order to travel onward by public transport, trying to achieve the so-called 'seamless journey'

The key assumption in this report is that this chain of development in parking is the same in all member countries.
This development is mainly driven by the following factors:

- Increasing car ownership and car use
- Increasing populations
- Less available space for car parking
- Less available road infrastructure
- Available alternative means of transport.
-

This development is also illustrated in figure 3.2.

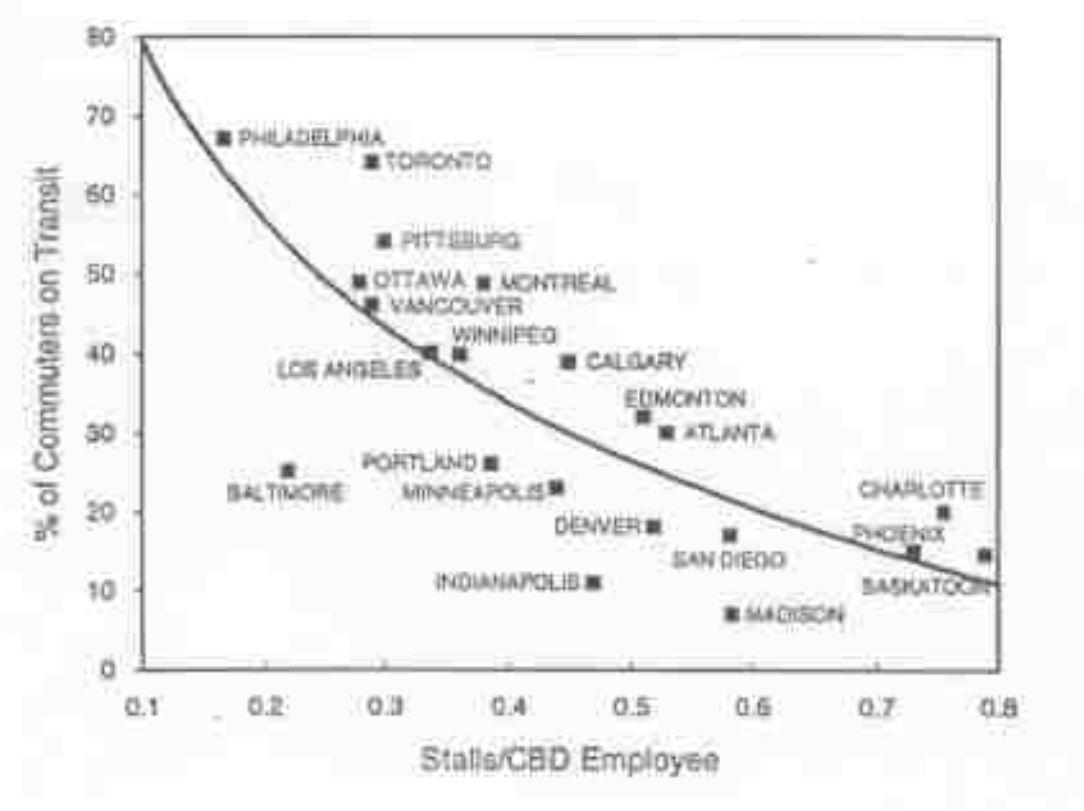


Figure 3.2 The number of available parking places in the CBD related to transit use by commuters for larger cities in Canada and the USA.

The higher the supply of parking places, the lower transit rider ship is. The larger the city the lower the supply of parking spaces. The figure describes the North American situation. In Europe the same mechanism can be recognised.
Despite more national oriented elements that will have an effect the mechanism is the same everywhere.

Finland; parking problems are not very urgent yet

Finland, with its surface area of 337.000 km2, has some 5.000.000 inhabitants. About 20% of them live in the Helsinki area. Outside of the Helsinki region the country has, in comparison to other European countries, a rather low population density. The more important regional centres there have a population of 100.000 to 200.000 inhabitants. Therefore the car takes an important share of the modal split outside the Helsinki region.
Ìn the development of parking management the greater part of Finland finds itself in the stages between free parking and (in the more important regional centres) introduction or optimisation of paid parking. In the inner cities (Kuopio, Tampere, Oulu) alongside public, paid parking spaces one can find great numbers of free and private parking spaces. In the inner cities of these towns nevertheless the consequences of growing parking pressures can be noticed; in Kuopio a system of parking permits for residents will be implemented, and Vaasa aims at building parking garages in order to reach a shift from on-street parking to off-street parking.
The Helsinki conurbation counts more than 1 million inhabitants, and consists not only of Helsinki (551.000 inhabitants), but also of the cities Espoo, Vantaa and Kauniainen. 30 km north of Helsinki is Kerava, which also is part of the Helsinki region. In Kerava there is no paid parking.
In the modal split of traffic in the inner city of Helsinki car traffic, public transport and bicycle/ walking have roughly equal shares, with 36%, 32% and 32% respectively. Public transport therefore has a considerably stronger position in Helsinki than elsewhere in Finland. Car ownership in Helsinki is therefore the lowest in Finland. Parking policy in central Helsinki is aimed at keeping the share of public transport in commuter traffic (now 69%) as high as possible, and increasing it in future to 75%. Initiatives that have been taken to reach this goal are the design of a vast P+R-net, maximizing parking norms for companies in the central area and introduction of car share systems. Helsinki thus has taken the first steps towards a multi modal approach of the parking problems.

Worthwhile mentioning are the remarks made by keynote speakers at the EPA-congress in October 2003 in London as they are in line with the developments in general as expressed in the cases and the conclusions. These remarks can be summarised as follows:

- Parking must be integrated in the urban mobility system.
- Public space in streets must be recovered on the parked car in favor of pedestrians and to enhance the quality of public transport.
- Both parking and public transport form part of the urban mobility system.
- On-street parking must be more expensive than off-street parking
- Private management of parking can provide to public authorities the possibility to invest elsewhere.
- Parking must change from a product-oriented industry to a service driven industry, because modern customers demand quality and service.

So we see both in the public area as in the private area the same development towards integration and quality in mobility policies and mobility services.

4. POLICY, PLANNING AND LEGAL POWERS

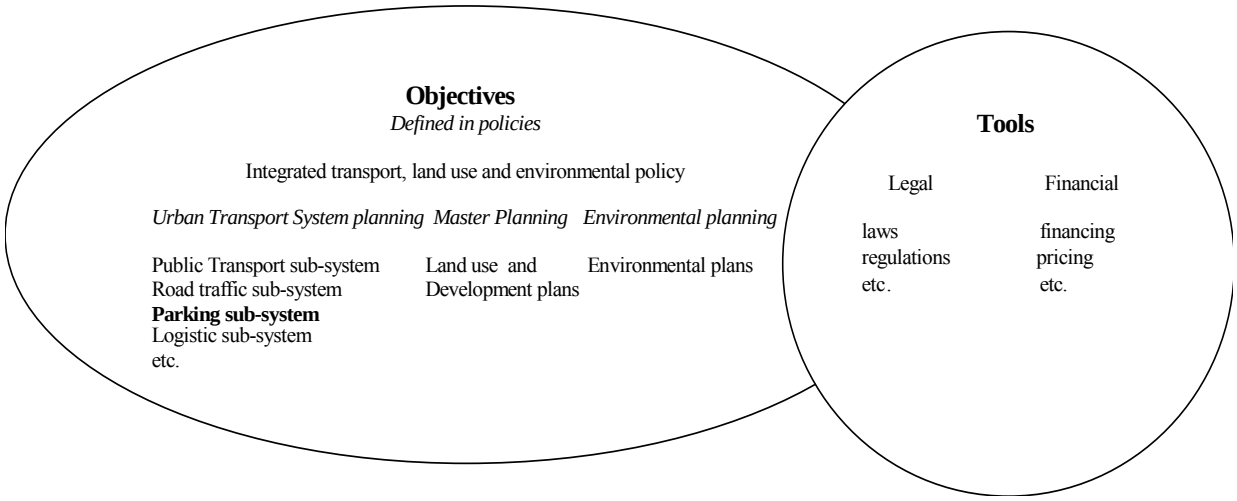


Figure 4.1: Global scheme of policy objectives and tools

4.1 Transport Policies

The aims of most National Transport Policy frameworks are often similar around Europe and North America. The following issues are currently most frequently mentioned in National Transport Policies among the participating countries:

- The need to reduce car use thereby minimising traffic congestion;
- Encouraging travel by sustainable forms of transport (such as cycling and walking);
- Improving public transport and thereby decreasing dependence on the car, especially in larger, historic cities (with special attention for Park and Ride)
- Safeguarding the environment
- Ensuring accessibility of transport services for all regions and social strata

Where day to day parking management policies is a responsibility of the local authorities parking is not specifically mentioned in any national transport policy.
Yet some attention is paid to parking in this respect:

- In the UK development of a parking strategy is one of the measures local authorities are required to consider in preparing their local transport plans. These plans form the basis for provision of Government capital funding for local transport. Also, legislation was introduced in 2000 to enable authorities to impose a levy on workplace parking places, but to date no schemes for doing so have been introduced.
- In Austria local authorities do have the power to tax private parking places. Yet this power is not applied. In Swiss the so called 'Ecotax' provides the same.
- In the Netherlands on the national level parking is identified as an important tool to influence mobility. In the framework of transport planning no direct policies are developed.

In France an important tool in transport as set at the national level is the 'Versement de transport'. This tool is aimed at the development of Public Transport. Indirect this may influence the parking situation. Local authorities or the authorities of 'conurbations' may charge companies or organisations (there are some types of organisations exempt) with more then 9 employees and located in a community with a population over 10.000 or if they are located within the service area of a public transport company.
The charge is aimed at financing the local and/or regional transport facilities.
The level of this charge varies between 0,55 and 1,75% of the total salaries.
On December 31, 1999 182 regional authorities, comprising 22,8 million inhabitants had installed this taxation.

SPAIN: parking policy is determined within frameworks on land-use and transport

Each municipality in Spain develops specific local regulations on traffic and parking policies and organisation, within the national and regional legislative frameworks on land-use and transport. The overview of Spanish cases distinguishes three groups:
Metropolitan areas.
Parking problems are widespread in the whole city. Normally the measures are forming an integrated package, consisting of a controlled area in the city-centre, P&R in the metropolitan area and specific policies on resident parking.
In the metropolitan area of Madrid there is no regionally coordinated parking policy. Each municipality defines its own parking policy. City-centre car parks and P&R-facilities are run by different operators.
Another factor influencing the effectiveness of parking policy was the low efficiency of the control system and lack of legal measures to enforce it, although this in changing during the last years
Medium-sized cities:
These cities offer a wide range of local solutions for parking problems, sometimes innovative. The specific character of the city (industrial, tourist, standard of living) influences the measures taken. In particular Zaragoza and Vitoria are two cities in inner Spain with a high quality standard of living, where city-councils have been committed to environmental measures related to traffic and parking.
Historical centres:
Cities like Granada and Toledo have an important historical centre with many tourists during the whole year. The topographical restraints of both cities have also influenced the general transport and parking policies.

4.2 Land use planning

Within the framework of land use planning there is guidance on parking provision for new developments in all participating countries. This guidance specifies the number of parking places that have to be provided for any new development.

The force of this guidance varies from country to country.
In Switzerland the guidelines produced by Regional Government have the force of law.
In Belgium the State issues policy advice and guidance on parking provision for new developments, which also have a force of law.
In Norway the developer has to provide ‘adequate’ parking facilities and local authorities establish, through by-laws and plans, what is ‘adequate’ in the specific area.
In the United Kingdom the Government issues a series of planning policy guidance (PPG) notes which local authorities are expected to comply with in drawing up their local development plans. PPG 13 on transport sets out maximum parking standards for specific types of development while PPG 3 on housing deals with off street parking provision for new housing developments.
The Dutch situation is similar to the Norwegian situation.
In the Czech Republic, Finland, Latvia and Hungary the state also issues some kind of guidelines, but these are only advisory. Nevertheless, for example in the Czech Republic, those guidelines, which are published as part of technical standards for design of urban roads are widely used by local authorities as compulsory.
In Austria, Canada, Germany, Spain, Italy and the USA similar guidelines exist on a regional level although these are only advisory.

A specific example in this respect is the Dutch so called ‘A-, B- and C location policy’. Under this policy locations for development could be identified as either A, B or C.
A locations are easily accessible by public transport so only a very limited number of parking places were allowed to be provided.

C locations are mainly accessible by car, so a higher number of parking spaces are allowed here. B locations are in the middle. For other locations reference is made to general guidance papers on the provision of parking places.
The concept behind this policy was that companies with a low amount of person-mobility but a high dependence on the car (trucks) should be situated on C-locations and that companies with many workers and visitors should be situated on locations easily accessible by public transport.
The legislation got many comments by all involved. Yet most local authorities applied it stating they had to. Most companies gave in appreciating the cost reduction effects the policy has on the cost of developing.
Due to the long lead time (over 10 years) of these planning processes the positive results only recently come to light. Yet, due to the ongoing complaints the tight parking standards will soon not be compulsory. The decision on the parking standards to be applied is then left to the local authority.

Table 4.1.: Legal basis for parking standards in Land-use planning (about 1999)

Austria	Regional applied guidance papers
Belgium	National legislation
Canada	Regional applied guidance papers
Czech Republic	National applied guidance papers (commonly applied as compulsory)
Finland	National applied guidance papers
Germany	Regional applied guidance papers
Hungary	National applied guidance papers
Italy	Regional applied guidance papers
Latvia	National applied guidance papers
Netherlands	Local bylaw based on national guidance paper
Norway	Local bylaw based on national guidance paper
Portugal	Local by Master Plan
Spain	Local by Master Plan
Switzerland	National legislation
United Kingdom	Regional applied guidance papers
USA	Based on regional applied guidance papers

4.3 Environmental policies
In almost all participating countries environmental concern leads to transport issues. The legislation on air quality and (rational use of) energy as put forward in among others, France, the United States and Switzerland and other countries also touches on or relate to transportation issues.
In the Netherlands local authorities do have the power – based on national legislation and as a part of measures to protect the environment against pollution – to force a company that applies for a licence to start to minimise the amount of mobility it generates. As a part of this it can be asked to take measures to reduce the number of parking spaces made available for workers and visitors.

4.4 Legal powers on the national level
Central Government is responsible for the Highway Code (Strassen Verkehrs Ordnung) and Traffic Signs Code in all of the member countries. The state is also responsible for setting out the powers to the local authorities to enable them to control traffic and parking.
National legislation dealing with roads and traffic mainly plays a supportive role concerning the provision and regulation of parking.
National legislation though is important where it allocates the power to enforce, defines the liability of the driver and sets the general rules of enforcement.

ITALY; a legal basis to stimulate parking management

In the past in Italy parking was not considered as a component of a comprehensive vision on urban mobility, but was only dealt with as a town-planning rule, prescribing how many parking spaces were to be built to provide adequate parking space for social-economic urban development.
This changed with the 'legge Tognoli' from 1989. This law introduced the notion of mobility as one of the most important items of human activity.
There is a widespread shortage of private (residential) parking spaces in most of the Italian towns. The legge Tognoli gives an impulse to the construction of new private parking, allowing real estate owners to build parking facilities for residential use, even in derogation from general urban planning rules.
On the other hand public parking has been restricted. In the period 1985-1990 consciousness grew on the negative mobility-related effects on the urban environment, leading to urban degradation and threatening a main Italian tourist-attraction, the historical heritage of the city-centres. This resulted in large public support for the Italian policy of Traffic Limited Zones (Z.T.L.), which have been implemented on a large scale in most medium and large towns and many smaller villages. In 1995 technical recommendations were issued by the Ministry of Public Works, establishing the legal power for local authorities to declare 'zones of particular public interest'. Among other things paid on-street parking can be introduced in these zones, without the obligation to provide an equivalent amount of free parking for residents.
The legge Tognolli proved to be a stimulus for the development of car-parks. A special fund was created, aimed at building new public parking facilities. By 1998 there were in total 84.800 places built or under realisation, mainly in northern and central regions.
The introduction of this vision on parking, and the problems encountered implementing these new laws, underline the fact that a successful parking policy must be supported by a clear vision on the parking needs, and a proper coordination of initiatives.

Liability for parking offences
With the exception of the Czech Republic and Switzerland the owner of a vehicle is legally responsible for the parking offences in all other participating countries. Nevertheless the driver is initially responsible with the owner assuming responsibility if the driver is not known or traceable.

Table 4.2.: Level of penalties / fines for on-street parking offences (2002)

Austria	21 Euro
Belgium	25 – 125 Euro according to the severity
Czech Republic	6 – 30 Euro according to the severity
Finland	up to 33 Euro
France	11 – 33 Euro depending on severity
Latvia	17,5 Euro
Netherlands	ca 50 Euro
Norway	37-62 Euro
Portugal	25 Euro
Spain	60-90 Euro
Sweden	29 – 82 Euro
Switzerland	26 – 80 Euro
United Kingdom	129 Euro discounted to 64.5 Euro inside London 96 Euro discounted to 48 Euro outside London (the discounted penalties apply to payment of penalties within two weeks of receipt)

Payment for parking
In most countries national legislation defines the rules according to which the tariffs for public paid parking (mainly on street parking) must be set.
An exception here is Spain where all the parking regulation relies on municipal authorities. Another exception is Germany. Central government legislation defines the maximum tariff for on street paid

parking. Due to the long lead time to alter national legislation on street parking prices lag behind the economically viable parking tariffs in garages. Thus preventing the preferable situation where on-street parking incurs higher tariffs than off-street parking.
Central government also sets the level of the fines for illegal parking. This may lead to a situation where illegal on street parking also tends to be cheaper then legal paid off street parking. If national legislation does not follow the development of off-street parking prices this might become the case.
As an illustration of differences between countries in the validation of paid parking and of the speed in adoption of legislation to economic development we present (table 4.2) the different level of fines as they exist in Europe.
The level of fines or penalties for parking offences varies from the country to country; and also within countries. The penalties are higher in the larger cities and also for 'dangerous' parking.

4.5 Legal powers on regional level

Dealing with parking regional authorities hardly seem to play an important role.
In Germany the 'Länder', in Switzerland the 'cantons' and in the Netherlands the provinces play a role in controlling parking standards as set out by local authorities. The provinces tend to follow local authorities because of the perceived economic relevance of the local standards.
In the UK responsibility for transport rests with local councils which include the English county councils. These county councils are sub-divided into a number of districts. District councils are themselves allowed to provide and operate off street car parks and many do.

BERN (CH); parking policy to slow down mobility-growth overruled

In order to reduce the flow of car-commuters entering the city of Bern each day the people of Bern decided by referendum in 1990 to accept a more restrictive parking policy. The main parking regulations demanded by the initiative were:
* New multi-story car-parks must not be built in or close to the city-centre
* define a maximum number of parking spaces for new building projects.

The first objective especially caused a lot of public discussion, the local economy and the Chamber of Commerce were opposed. In 1997 a compromise was reached; the overall number of public parking spaces should remain unchanged, whereas in the old part of town public parking spaces above ground were to be reduced.
In 2000 however the strict parking policy of the city was overruled by the canton. In the new cantonal parking-regulations it was stated that regulations of municipalities that are stricter than the cantonal (as is the case in Bern) cease to be valid after a transitional period of three years!

4.6 Legal powers on the local level

Parking is a matter mainly for the local authority with the exception of Park and Ride systems, which are mostly the shared responsibility of the regional and local level.
The local authorities have powers to implement traffic management and parking measures such as:
- One way streets,
- Pedestrian streets,
- Banned routes for lorries,
- Bus priority lanes or schemes
- Regulation of on-street and off-street parking
- On-street charging for parking,
- Residents' parking schemes
- Restrictions of loading and unloading

In Belgium it is the local Mayor who is responsible for setting out the powers of the local police to enable them to control parking and traffic. In the Netherlands and Spain it is the city council. This also the case in the Czech Republic and Latvia for the cities with a Municipal Police Force.
In seven other member countries (Czech Republic, Finland, Norway, Portugal, Switzerlandand United Kingdom) the Police are responsible for illegal parking enforcement unless local authorities have

assumed these powers under national legislation which allows for decriminalised parking enforcement (DPE). For example, DPE was introduced in the United Kingdom under the Road Traffic Act 1991. This led to parking enforcement in London being completely decriminalised in 1994. Since then more and more authorities outside London have also taken on DPE powers. Under DPE the police can still take action against dangerous obstructive parking.

CZECH REPUBLIC, the problems of paid parking in a developing society

In different towns in the Czech Republic paid parking has been introduced during recent years. Of the cities mentioned here Olomouc (103.000 inhabitants) introduced paid parking in 1993, Kromeríz (30.000 inhabitants) in 2000 and Liberec (100.000 inhabitants) in 1999, after an earlier experiment with scratch cards.

Many of the implementation schemes for paid parking in Czech towns originated from behind the desk, and were based insufficiently on a thorough analysis of the existing parking situation. Together with the complicated and inconsistent legislation the measures that were implemented show many legislative flaws. This is for instance the case in the historic town of Kromeríz.
Hardly any Czech town possesses a comprehensive parking policy, and if a parking policy was developed hardly any towns stick to it completely.

The areas in which paid parking was implemented are too intransparent <Don't Understand> to car drivers, and contain many escapes where free parking still is possible. As a result of a too great a number of different tariff zones parking opportunities are incomprehensible. This also makes operating the paid parking system complicated.
To save on costs there are often too few ticket machines available, which leads to long walking distances for car drivers to reach a ticket machine. Liberec at first introduced a system of paying for parking with scratch cards, which proved to be inoperative. The regulatory effect was almost zero.

Management information, such as overviews of the occupancy rate or the observance of paying regulations, are often lacking. In the Czech Republic parking is often a political rather than a professional matter. This often results in a lack of effort from the (municipal) operator of the paid parking system, and to inefficiency.
When a city has more than one operator of parking facilities they very seldom succeed in cooperating in the interest of an optimal parking system.
Observance of parking measures is low; in Olomouc only 53% of the people in parking area parked there according to the rules, 47% had parked illegally, or had paid too little or nothing at all.
Mainly as a result of the inaccurate and complicated legislation, an efficient enforcement is very much depending upon the interpretation of the legislation of the individual parking warden. This leads to inequality in the execution of enforcement.

These factors cause a high pressure on the –insufficiently performing- on-street paid parking, whereas the parking garages have too low an occupancy. This is partly caused by an unbalanced system of parking charges, but also psychological barriers play a role. Czech citizens are very reluctant to use parking garages.

In Austria, Czech Republic, Finland, France, Netherlands, Norway, Portugal, Spain and United Kingdom local authorities have powers to assume responsibility for enforcement instead of the police. In Finland local authorities are not allowed to use private contractors for enforcement.

In the Netherlands parking regulations, including paid parking, can be controlled by the police but also by another agency given the powers to do so.
If paid parking is brought under fiscal law enforcement is the responsibility of the local authority itself. It can be carried out by its own personnel or contracted out.

A quick overview of the allocation of powers is presented in the table below.

Table 4.3: Overview of the allocation of power (related to parking) over the different levels of government

Country	National	Regional	Local
Austria	Liability for parking offences 1)	P+R is defined regionally mostly	Implementation of parking measures Parking enforcement Loading zones Disabled parking
Belgium			
Czech Republic			
Denmark (n.a.)			
Finland			
Germany	Setting parking-tariffs	Controlling p. standards	
Greece (n.a.)			
Hungary	National authorities define rules for parking tariffs to be applied by local authorities with the exempt of Germany 2) and Spain 3)		
Italy			
Latvia			
The Netherlands		Controlling p. standards	
Norway			
Portugal			
Spain			
Sweden			
Switzerland		Controlling p. standards	
United Kingdom		Parking management	
Canada			

1. With the exception of the Czech Republic and Switzerland the owner of a vehicle is legally responsible for the parking offences in all other participating countries.
2. Central government also sets the level of the fines for illegal parking. This may lead to a situation where illegal on street parking also tends to be cheaper then legal paid off street parking. If national legislation does not follow the development of off-street parking prices this might become the case.
3. In Spain all the parking regulation and management relies on municipal authorities, with the assistance of local police or companies .

Dealing with foreign drivers

In some parts of Norway there are increasing numbers of foreign cars, whose owners are difficult to trace. Some municipalities use private debt-collection agencies with departments in other countries, to trace owners and collect the charges. There is a similar problem in Switzerland and United Kingdom especially in London. To overcome that, London authorities are seeking help from European countries on information on names and addresses of foreign registered vehicles. At present no powers exist to pursue unpaid fines abroad.

The recently introduced intention to cooperate within Europe in the cross border execution of fines on speeding might turn out to be a starting point for the cross border execution of parking fines.

4.7 Enforcement

Enforcement of parking regulations has primarily been the responsibility of the police. As police resources available for the enforcement of parking regulations has progressively declined and the demand for parking spaces has increased governments (both national and local) have sought other means of enforcement.

In the table below an overview is given of the allocation of power to enforce the different countries in Europe.

Table 4.4: Overview of the allocation of power to enforce at the local level

Country	National police	Local police	Local authority	Private
Austria			**4**	
Belgium	**1**	**3**		
Czech Republic	**2**	**3**	**4**	
Denmark (n.a.)			**4**	
Finland	**2**			
France	**1**		**4**	
Germany				
Greece (n.a.)				
Hungary				
Italy				
Latvia		**3**		
The Netherlands			**4**	**5**
Norway	**2**		**4**	
Portugal	**2**		**4**	
Spain		**3**	**4**	**5**
Sweden			**4**	
Switzerland	**2**			
United Kingdom	**2**		**4**	**5**

1. On street parking enforcement (both illegal parking and paid parking) is entirely a matter for the police in Belgium.
2. In seven other member countries (Czech Republic, Finland, Norway, Portugal, Switzerland, and United Kingdom) the Police are responsible for dealing with illegal parking provided local authorities, or local police, have not taken powers on decriminalised enforcement. In all cases the Police can enforce and are responsible for very serious and dangerous parking offences.
3 In Belgium it is the local Mayor who is responsible for setting out the powers of the local police to enable them to control parking and traffic. In the Netherlands it is the city council. This is also the case in the Czech Republic and Latvia for the cities with Municipal Police Forces.
4. In Austria, Czech Republic, Finland, France, Netherlands, Norway, Portugal, Spain and United Kingdom local authorities have powers to assume responsibility for enforcement instead of the police. In Finland local authorities are not allowed to use private contractors for enforcement.
5. In the Netherlands, Spain and in the UK parking regulations, including paid parking can be controlled by the police but also by another agency given the powers to do so.

In general in most countries the police give low priority to parking enforcement.

France

To try and overcome problems with illegal parking and the problems of the lack of police-capacity to enforce parking regulations, in the cities of Dyon and Nantes on an experimental basis so-called 'parking hosts' were introduced. These people had the task of addressing car-drivers who were looking for a parking space or intended to or parked illegally and to guide them to an available parking place, provide them with information if needed and in doing so prevent illegal parking and non-compliance to paid parking.
Both experiments turned out to be successful. Both compliance with parking regulations and income out of paid parking rose significantly.

Switzerland

The local police are responsible for the management, including enforcement, of on-street parking places. In Zurich fines have been increased up to three times the original amount. These increased

rates have led to more revenue and fewer offences. In Bern a private company has been controlling parking for over six years. Parking discipline has improved as previously the police did not have the capacity to regularly enforce parking regulations. It is anticipated that other cities will follow Bern's example.

United Kingdom

In the UK local authorities were able to establish Controlled Parking Zones (CPZs) where they (or their agents) were empowered to enforce regulations relating to permitted parking places.
Further legislation was introduced in 1991 which enabled Local Authorities to introduce a Special Parking Areas (SPA). A Special Parking Area (SPA) is an area in which most non-compliant on-street parking acts have been decriminalised. Enforcement of most of the on-street parking regulations is then the sole responsibility of the Highway Authority rather than of the police. Non-compliance is treated as a civil offence rather than a criminal offence - non-payment of any penalties ultimately being registered as civil debts and collected by authorised debt collection agents. .

There were four main objectives behind the Government's introduction of decriminalised parking enforcement (Edwards, 1996). These were:

Management of the conflicting demands on the limited highway capacity

Growth in traffic levels and the limited scope for building new roads mean that traffic engineers have to make more efficient use of the urban network. In order to improve traffic flow, parking may have to be reduced on heavily used roads, especially in residential areas where some commuters prefer to park rather than use car parks, park & ride, or public transport.

Reducing pressure on police and traffic warden resources

If there are some tasks that can be effectively undertaken by other agencies, it might be more appropriate to relieve the Police of responsibility for those functions.

The creation of effective local authority parking policies

Guidance given to local authorities preparing TPP bids stresses the importance of demand management measures. These include the use of parking controls as a means of restricting traffic movements in towns. The decriminalised enforcement powers contained within the Road Traffic Act 1991 should enable local authorities to regulate parking more effectively. Many local authorities have decided not to introduce new parking restrictions because of doubts over whether they would be effectively enforced.

The need to increase accountability of local government

Traffic authorities are responsible for introducing parking controls by order. They should be responsible, and answerable to the local community, for all aspects of such schemes.'

Local Authority actions when establishing a SPA.

When seeking authorisation to introduce a SPA the Highway Authority is required to demonstrate that it has reviewed *all* parking regulations in its area. In practice, council and business tax payers, police and other interested parties need to be consulted on a council's plans. Many authorities also take the opportunity to introduce new parking regulations (including residents' permit schemes) and remove unnecessary regulations. The time required for this consultation process should not be under-estimated.
When developing a proposal to introduce a SPA the Highway Authority needs to consider whether enforcement should be undertaken with in-house staff or contracted out and whether some categories of non-compliant vehicle should be clamped or removed to a secure pound pending payment of a release fee and associated penalty charge.

OXFORD (UK), decriminalised parking enforcement

The Road Traffic Regulation Act 1984 made a division between parking enforcement in off-street car parks and enforcement at on-street parking. Off-street was a responsibility of the operators of these car parks (often local authorities); on-street parking enforcement was primarily the responsibility of the police.
The Road Traffic Act 1991 enables local authorities to enforce most parking offences themselves under a decriminalised parking enforcement regime. The local authority retains the proceeds from the penalty charges, which they use to finance the adjudication and enforcement systems. Any surpluses must be used for transport related purposes.
The Road Traffic Act 1991 makes a distinction between Permitted Parking Areas (PPAs), where contraventions relating to permitted parking, such as on meter bays, are decriminalised, and Special Parking Areas (SPAs), where other parking offences, such as parking on yellow lines, in a bus lane or at local off street car parks, are decriminalised. In a SPA off-street parking enforcement thus can be brought into a decriminalised regime. By combining PPAs and SPAs, with the same boundaries, local authorities get a hold on the complete parking enforcement.

Oxford was one of the first towns outside London where decriminalised parking enforcement was implemented. It was part of a comprehensive package of measures aimed at controlling the intense traffic problems in Oxford, including for instance a system of P+R-accommodations, and introducing a permit system for residential parking. Asking a price for residents' permits met with so much public resistance that the County Council retracted that proposal. For the time being residents are allowed – without costs- two permits per dwelling.
Introduction of the new parking system, including local authority enforcement, resulted in the following effects:

* drivers park more often, but for a shorter time, at double yellow lines. Illegal parking at taxi ranks also increased,
* In permit holders' parking bays activity fell by 30%, while the average duration increased by 67%. This is an indication that resident get more opportunities to actually use these spaces.
* Compliance to parking time limitations in the city centre increased,
* Walking distances increased, and
* Occupancy in off-street car parks has increased.

In the economic sense there are indications that the parking policy, including introduction of a SPA, in Oxford has contributed to a prospering economic situation. The amount of unoccupied floor space in Oxford decreased strongly from 1996 to 2000, footfall in the centre increased and unemployment has decreased steadily since 1993.

The Netherlands

In the Netherlands the possibility of parking enforcement under fiscal law instead of enforcement under the 'Highway Code' was introduced in the late-eighties.
Payment for parking is seen as a local tax. Both the parking fee and the (eventual) parking fine come available for the local authority.
Appeals can be made to the local authority (first step) and in the second phase before a court on fiscal legislation.
Compared to the situation before when paid parking was regulated under the highway code and non-payment treated as a criminal offence this change led to the following positive effects:

- the income of paid parking and of the fines now goes to the local authority and not to the ministry of justice;
- enforcement became the first responsibility of the local authority and not of the police
- money became available for local authorities to actually enforce
- non payment of fines can be treated more effectively resulting in a high compliance of payment for paid parking and a high percentage of paid fines.

- Enforcement can either be carried out by employees of the local authority or can be contracted out. If this suits both parties the local authority may also contract the police to carry out the enforcement. In that case the priority is guaranteed under this contract.

As a successful enforcement need to be based on proper regulation and careful execution in the Netherlands a guideline was developed to enhance the quality of both regulation and execution of on street parking.
In Annex 10 a summary is given of this guideline.

Belgium

The system of fiscalised parking (parking fees as a local tax) was in fact invented in Kortrijk. At first it was introduced as a dual-tariff system. The driver could choose between tariff 1; a fixed (high) parking charge or tariff 2; opting for short-stay parking by buying a timed ticket at the ticket machine. Unless proof is provided that tariff 2 has been chosen (by displaying a parking ticket), the driver is considered to have chosen for tariff 1. This could be paid in advance at the municipal payment desk, but usually the driver receives a request by the traffic warden to pay the sum at the municipal desk within 48 hours.
Non-payment of this fee is considered an offence in terms of the highway code and is thus subject to a fine. Being a criminal offence, payment is generally requested as an alternative to going to court. The fixed fee is still owed however, and is subject to a recovery procedure by civil means.
The procedure to recover the amounts owed is cumbersome, and related to the amounts to be recovered very costly. Only a small part of the money collected from fines and transactions (7,5%) is returned to the municipalities. Tariff 1 therefore only has a very low recovery rate.
In principle the system can be considered as a precursor to the system of fiscalised parking as it has been introduced in many Dutch municipalities.
Insufficient enforcement of the system and its ambiguous character ultimately resulted in a relatively low willingness of drivers to pay for parking. The city of Kortrijk therefore recently revised the system, by specifying the parking fee as a local tax independent of the service provided, making it possible to use a much more easy tax recovery procedure. The enforcement is carried out by a dedicated organisation (PARKO) that falls under the jurisdiction of the local authority.

Sweden

To overcome the main problem in Sweden with paid parking, namely an unwillingness of the car-owner to pay for paid-parking, the levy execution has been introduced.
Resulting in a simplification of the rules to collect payment and fines for non-compliance with paid parking. This again leads to a much higher level of payment and a better compliance with the parking rules.

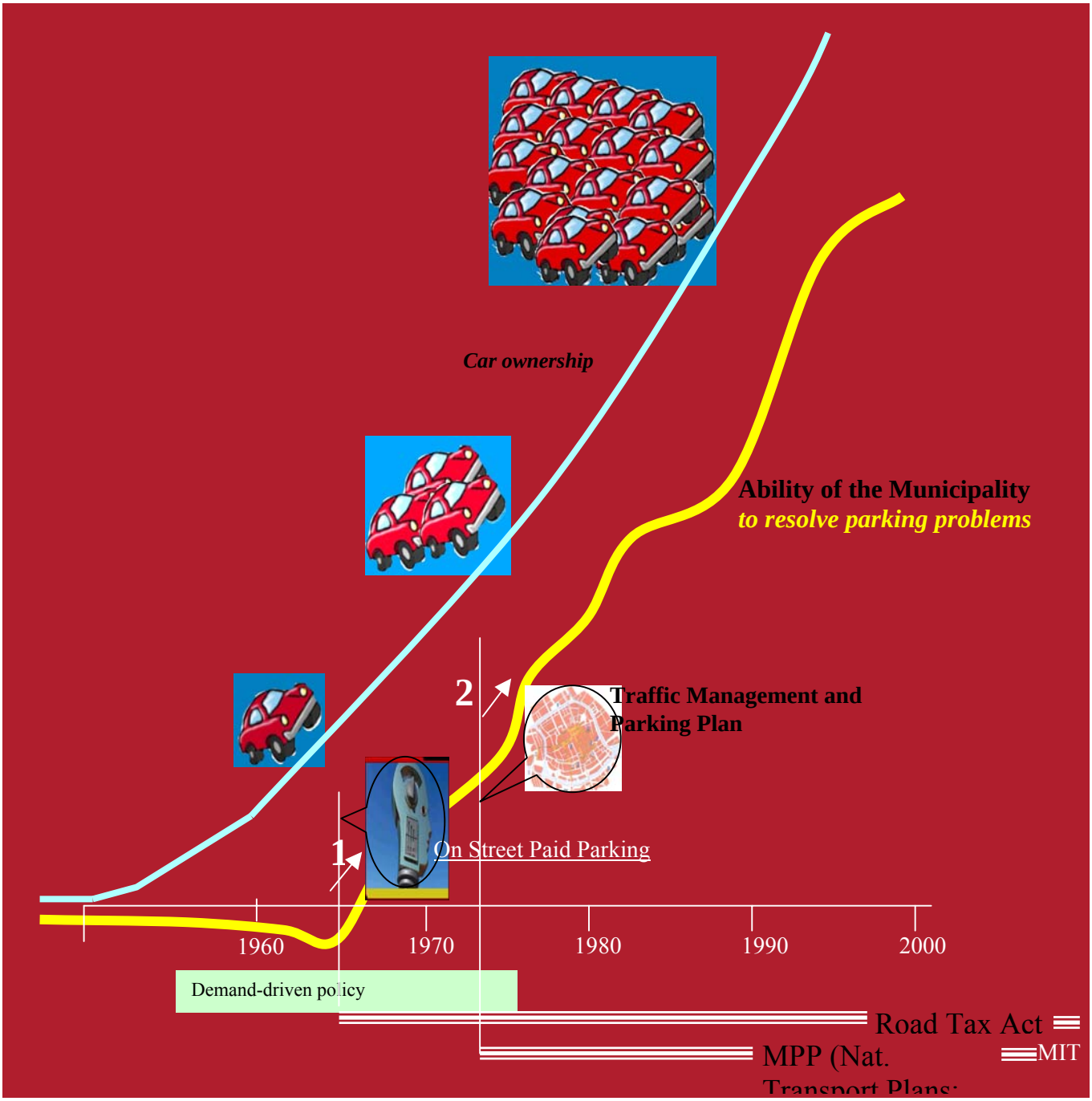
Portugal

Legislation was recently introduced to allow the local authorities to wheel clamp and remove vehicles. Under this new legislation, a driver has to pay for all the unpaid bills whenever he/she goes to renew their driving license or takes the vehicle for inspection.
This resulted in an enormous growth in the payment for paid parking and parking fines. Much higher then before when the legal process to collect payment for parking and parking fines for non payment was too complex and took too long to be successful.

Spain

Payment for parking is seen as a local levy. Both the parking fee and the (eventual) parking fine come available for the local authority, enforcement became the first responsibility of the local authority and not of the police, non payment of fines can be treated more effectively resulting in a high compliance of payment for paid parking and a high percentage of paid fines.

Enforcement can either be carried out by the police, employees of the local authority or can be contracted out



(source: C. Harteveld / GoudappelCoffeng the Netherlands)

An illustration, based on the Dutch situation, of the effects of national policies on local policies. A more upward movement of the yellow line – depicting local powers to influence parking – is shown specifically when decisions on national level create clear tools for local policymakers in this respect.

5. DEMAND AND SUPPLY

5.1 Public parking on street

5.1.1 Types of regulation

The regulation of parking can form an important part of any traffic management policy. Traffic is continuing to grow throughout Europe, US and Canada. The ability to park all vehicles close to their occupants' destination is proving to be increasingly difficult in many countries. One means of achieving this is through the regulation of the use of parking spaces both on and off street.
Policies for achieving this vary throughout Europe although in most countries the goals are the same. Policies that restrict parking too severely can adversely affect the economic viability of a business district whilst no restrictions could also adversely affect trade.
Forms of regulation can consist of restricting the time periods during which a vehicle may be parked as well as regulating by use of the pricing mechanism.
Many countries have introduced regulations specific to local circumstances without regard to experiences and perceived best practice from elsewhere.

With an increasing number of vehicles seeking to use the limited road space on which to park there are increasing demands for some form of regulation to ensure the most efficient use of the available road space. There are also safety issues involved in limiting parking to the most appropriate places as well as the need to reduce congestion by limiting the ability to park at will at one's destination. Politicians are often required to make decisions about the overall level of parking to be permitted and where parking facilities should be provided. This inevitably leads to lobbying by parties likely to affected by any introduction or change.

BERN (CH): private initiative to realise parking management system

The realisation of a comprehensive electronic management system for the city of Bern would have cost Sfr 3.700.000, and was rejected by the city-council. Main reasons stated by opponents were the high costs of the project as well as the fears that the system would prove to be ineffective.
The private owners of the city car-parks however installed an area-wide parking guidance system in Bern (total costs Sfr 2.500.000), which was financed by raising the parking fees in their car parks by Sfr 0,10/hr. This resulted in more customers in the car parks and higher revenues than expected.

GÖTEBORG (S); The use of a parking-guidance system

P-in is a parking information system, which became operational in Gothenburg (Sweden) in May 1999. Its objective is to contribute to reducing the amount of vehicles searching for parking spaces, to reduce noise and exhaust emissions and a more efficient use of the car parks.
The use of the system was measured by comparing before and after-studies on Heden, a large parking-accommodation in central Gothenburg. This showed that after implementation of the guidance system the share of car-drivers using the most suitable route to this site had risen from 57% to 66%. The change in choosing a parking-location was much less, in most cases Heden was the preferred parking-location from the start. Traffic searching for a parking space (about 10% of the interviewed drivers) experienced a decrease of the average 'searching distance' from 750 meters to 585 meters.
Motorists are well aware of the existence of the parking guidance system, but only about 50% of them really use it when looking for parking spaces.
With regard to the actual design of the system experience showed that it is most important to put clearly understandable information on the information signs. It is difficult to know what 'Centrum S' and 'Centrum N' actually mean, and as a result people are not confident enough to fully trust the system. The parking-rates should also be included in the signing.

In practice the use of kerbside parking spaces in urban areas is usually time limited with or without the use of some form of pricing mechanism. Some towns and cities are also reducing the amount of kerbside space available for parking as a means of improving the local environment and/or encouraging the use of other modes of transport.

Many towns and cities in Europe now regulate the use of on-street parking spaces as a means of managing demand. This is undertaken by use of a pricing mechanism or parking time limitation. Time limitation can be more difficult to enforce than paid for parking. In the Netherlands the police refuse to enforce time limited parking regulations. In some Italian towns different tariffs are used in the evenings to stimulate use of cinemas, restaurants.

GÖTEBORG (S); No-square parking

Gothenburg has introduced a new way of marking kerbside parking spaces on which a parking fee is levied. The painted squares and the parking meters at each parking space have been removed (hence the name no-square parking). Instead it is permitted to park anywhere alongside the street within a certain stretch, except in front of gates etc. The different parking regulations are also connected within continuous sections. A large and clearly visible sign at the beginning of the street nowadays shows which rules are applicable within that section.
These changes in rules and in physical street marking result in a more efficient use of on-street parking. The capacity increases by up to 14%. The parking behaviour differs slightly in different types of street; in streets with purely residential parking cars are parked with less space between the vehicles than in streets with mixed (residential/ commercial) use.
It takes some time for motorists to get to understand the new regulations. Interviews showed a great uncertainty among the motorists about which specific regulations were valid at their chosen parking space. 20-30% of the people interviewed were uncertain who was allowed to park, and where it was allowed to park, within the street section.
Summing up it can be said that the advantages of no-square parking outweigh the disadvantages. The on-street parking capacity increased, and the system is much more flexible than the previous system with marked parking spaces and parking meters at each parking space.

The type of regulation deployed will often be dependent upon the size of the town. Equally the effectiveness of any regulation will be dependent upon the level of enforcement resource deployed including the recovery of any penalty income due. It is recognised that there is little merit in issuing penalty notices if any penalty income due is not collected.

Car Free Areas
Car free areas, or areas reserved specifically for the use of pedestrians, are increasingly being introduced as a means of improving road safety for pedestrians, improving the environment and encouraging the use of other modes. These are used particularly in shopping areas where there are large volumes of pedestrian flows. This can inevitably put extra demand on the remaining on-street parking spaces and off-street car parks.

Priority Zones for Residents
Many residential areas in the proximity of business districts are used by motorists for parking when there is insufficient parking capacity within the CBD or it is less costly to park in the residential area. This applies pressure on residents when wishing to find somewhere close to their residence to park. Increasingly on-street parking spaces in residential areas are reserved for the sole or joint use of permit holders – permits being issued to residents and other sectors of the population such as medical practitioners. There are instances in Singapore and Tokyo where the issue of permits is limited as there are insufficient parking spaces for all those wishing to park who live in an area. In Italy a resident is required to demonstrate that they do not have an off-street parking place when applying for a permit. The same occurs in Spain: residents are required to demonstrate that they do not have an off-street public parking place when applying for an on-street permit.

BERN (CH); paid parking at large public events

In Bern, as in other cities, large events such as exhibitions and sport events often cause congestion problems on the access-roads. An improved public transport system is the most important instrument to avoid traffic jams. Free buses and trams for holders of an entry-ticket were quite successful in Bern, but with a high quantity of free parking spaces in the area around the exhibition hall and the sports stadium available, not successful enough. Therefore in these areas parking fees were introduced (Sfr 5 per half day).
In the most strained residential areas around the exhibition hall and the sports stadium more restrictive measures were taken. These areas will be subject to time restrictions 24 hours a day, 7 days a week. Cars without a special allowance are not permitted to park for more than 1 hour at a time. Residents can buy permits, allowing them to stay longer.
Another new measure is being examined in Bern for the Wankdorf area: a study will examine the possibility of introducing a reservation system for parking places, so as to guarantee place only to the owners of pre-paid parking cards (similar to the system used at the World Exposition 2000 in Hannover).

Blue Zones and/or (Parking) Disc Zones
Blue Zones have been introduced in a number of European countries. However the definition of a Blue Zone seems to vary across Europe.
In Switzerland the blue zone (recognisable by blue marking) means that in that area only short stay parking (1 – 1,5 hours) is allowed. Residents though may purchase a license allowing them to park longer.
In the Netherlands exists the same definition. The difference with Switzerland is that residence-licenses have no meaning within a blue zone.
In the UK the name ‘disc-zone’ is applied.

In general this regulation requires the driver to display a disc behind his screen indicating when he arrived. Sign posts tell him/her how long he/she is allowed to park. Control on whether the parker exceeded the allowed parking time is relatively easy. In principle no payment is involved.
In some countries the area in which this system is applied is depicted by markings in blue (explaining the name blue zones).
In general parking management starts with the introduction of the parking disc. Local authorities are afraid to chase visitors away when they introduce paid parking.
Experience though shows that this system only works in specific situations or with relatively low demand (smaller towns and cities).
Enforcement must be carried out by the police, the police tend to give this low priority, so if parking demand is high this system collapses because of lack of control.

A survey of Parcopolis (France, 1997) in 175 cities revealed that 29% of these towns had introduced blue (or disk-) zones. Yet only 4% of the controlled parking places were controlled by a parking disc. The remaining 96% was controlled by paid parking systems.

Madrid Blue and Green Zones
It was on 3 November 1980 that Madrid City Council first introduced a municipal parking system. Known as ORA, it was based on time-restricted zones and the sale of parking coupons or vouchers.

On 1 November 2002, in a venture that has proved to be very successful, three private operators were awarded an 11-year contract to manage parking in the centre of Madrid (S.E.R. zone) through the use of pay and display machines. Since then the parking tickets sales/year have reached 22,3 millions (2004) and 20 million last 2003, in comparison with the 17,6 millions sold during the former 20 years period. Thus, the current Mayor is on the verge of extending the regulated area.

There is a total of around 40,000 parking places regulated by the SER, 75% of which are reserved for residents (green) even when non-residents (blue) could use them during one hour paying double. Service period runs from Monday to Friday (9.00 am – 8.00 pm) and on Saturday (9.00 am – 3.00 pm), being surveillance staff some 800 workers.

This initiative is in keeping with Madrid City Council sustainable policies in respect of parking in the streets of Madrid's old quarter and the reduction of street parking, via the construction of underground parking facilities for the residents of neighbourhoods with severe parking difficulties.

Each blue parking place (non resident) has a rotation of 4 cars/day with an average parking time of 93 minutes. On the other hand, each green parking place (resident) is used by a non-resident with a rotation of 1,5 cars/day with an average parking time of 50 minutes.

Disabled Parking
Some members of the population with mobility problems are allocated a permit (usually in the form of a blue badge that is displayed on the vehicle's dashboard or windscreen). This entitles them to park in spaces reserved specifically for their use or in other regulated areas. Entitlement to receipt of a badge is usually determined by a medical practitioner.
The table below provides an overview of the different approaches for the provision of parking spaces, disabled badges an the proof of medical condition.

Table 5.1.1 Overview of national approaches of disabled parking

Country	% P-spaces for disabled on-street	Authority providing a disabled badge	Authority confirming physical condition
Austria	n.a.	Local authority	General Practioner
Belgium	Ca. 1%	Local authority	General Practioner
Czech Republic		Regional authority	
Finland		Police	
France	2	National authority	General Practioner
Italy	5	Local authority	Local authority
Latvia	5	Road safety Director	General Practioner
the Netherlands	5	Local authority	Local medical authority
Norway		Local authority	
Portugal	No fixed percentage	Local authority	Central authority
Spain	2	Local authority	Local authority
Switzerland	may park anywhere	Local authority	Local authority
Sweden	No fixed percentage	Local authority	General Practioner
United Kingdom		Local authority	General Practioner

Remark
Apart from the presented information, one has to be aware that more differences exist. Based on local policies in some towns disabled may park free on paid parking spaces and in other they are confronted with reduced tariffs.

The provision of a sufficient number of disabled parking spaces is becoming increasingly difficult as the number of people receiving a badge increases. In the UK disabled associations have argued that they do not wish the disabled to be positively discriminated by providing dedicated parking spaces but rather to enable the disabled motorist to be assured of the availability of a parking space whenever required. It is also recognised that the number of applications for disabled parking permits is a function of the parking conditions in one's locality.
In general the on-street parking concessions given to the disabled to enable them to park close to their origins and destination in all the countries. Mostly very similar to that outlined below from Finland.

Possession of a parking badge for the disabled entitles the holder to certain exemptions from parking restrictions (e.g. allowed on no-parking bay, no charge on paid parking bays, etc.). Additionally, parking bays can be provided specifically for the disabled. This provides parking to cars displaying a badge, however all cars with a badge have the same priority. They are not available for use by other cars.

Loading Zones
The delivery or collection of goods to/from commercial premises with street frontage is contributing to increased congestion on street. Zones for the loading/unloading of goods are increasingly being introduced but despite this there appears to be a lack of suitable roadside space.

Goods delivery innovation (loading/unloading areas)

Barcelona's reputation as an innovator in the field of goods traffic management started with 'Multi-use lanes'. MIRACLES has moved this innovation to a new level, with extensive operator participation as part of the Mobility Pact sub-group. The Municipality's objective of achieving a more agile urban goods delivery are being pursued through two new measures – nightime deliveries using adapted lorries, and a web portal known as 'Active Guide'. The former was realised during 2003 and the latter will be piloted in the first half of 2004.

Barcelona Municipality, within the MIRACLES-CIVITAS project, has realised trials to demonstrate unloading at night using an especially-adapted lorry. This is an innovative collaboration between the Barcelona Municipality Road and Traffic Department SVP, and Mercadona, a chain of supermarkets. The project-surveys identify that the main freight operators of the city are interested in realising deliveries outside the regulated hours of 08.00 – 20.00. Within this context, a pilot experience has been realised on the street frontage of a supermarket located in the central area of Barcelona, between 22.00 and 24.00 h. To minimise the main negative effect, the noise, the lorry is equipped with a carpeted floor, the lifting system works with a low-noise pneumatic technology and the carriers to transport goods have low-noise rubber wheels. Initial results are that noise levels differ very little from ambient conditions (an increase of just 0,3 dBA). Up to seven (peak-hour) deliveries are substituted by two night-time deliveries using the quiet larger vehicle. These results demonstrate a great efficiency of this scheme and open new perspectives for the improvement of urban freight operations.

Parking for Commercial vehicles.
The problems caused by commercial vehicles parking on-street either when loading/unloading, parked overnight near the driver's abode has exercised some members.
In the Netherlands the local authorities have introduced regulations that restrict the type(s) of vehicle that can park in a residential area. Local authorities do, in those cases, provide secure parking for vans, trucks and lorries.

5.1.2 On-street parking control devices

Controls are usually introduced when available parking space is insufficient for the demand. These controls can be based on regulation by time or payment although it is recognised that enforcement is more efficient if charges are levied for the use of parking spaces. Parking discs were deployed first where motorists would display their arrival time in a parking space using a clock face on the disc. This progressed to parking meters for individual parking spaces and now pay and display machines seem to be the preferred mechanism with highway authorities. With the development of IT and cashless payments systems there is a wide range of options in the control and payment mechanisms that can be deployed. Many of these are covered within this section although with a rapidly developing market it is inevitable that some of the newer devices will be excluded.

Parking Meters
Parking meters were the first type of payment mechanism introduced to control parking. They were first introduced in the United Kingdom in central London (Mayfair) in 1958 when the use of parking spaces need to be regulated.
Each space has a meter which records the time remaining for the parking act based on the money inserted into the meter. Unused time from a parking act can be used by another motorist as the meter does not zeroise when a vehicle departs from a parking space.

Pay & Display
Pay & Display is a control concept requiring a motorist to purchase a ticket with an expiry time calculated either from the unit parking fee per hour (or per minute) and the amount of coinage inserted or the fixed fee (say £2.50p per day). The motorist displays this ticket on the inside of the vehicle windscreen to enable enforcement personnel to check the validity of the parking act.

Pre-paid parking vouchers
Pre-paid parking vouchers are purchased from local shopkeepers, garages, council offices etc. ideally prior to the commencement of a parking act. Once a car has been parked and before the motorist walks away he/she is required to score pressure sensitive areas on the surface of the voucher to indicate the commencement date and time of the parking act – the maximum permitted duration being calculated from the value of the voucher(s). The voucher is then displayed from within the vehicle for checking by traffic wardens or parking attendants.

In-car parking meter
See under payment methods (par. 5.1.3).

Charleroi (B):Vigiville, paid parking tailor-made

One of the arguments that is often used by entrepreneurs in trade and industry against regulations limiting the time people are allowed to park is that this would lead to a hurried behaviour of customers because their parking time nearly expires. They therefore often ask for systems where you can pay at the end of the parking time. In off-street parking this usually can be achieved relatively easy, but with on-street parking self-regulating systems are less easy to accomplish.
Charleroi therefore developed the Vigiville system. Parking spaces have been fitted with a locking-device. As soon as a car enters a free space magnetic sensors activate the operating system and the gate rises. Upon payment for the parking time used the gate is lowered immediately to allow the customer to leave.
50 of the 2000 on-street parking spaces in Charleroi have been fitted with this system. The experiences with the system have been mainly positive, although some users felt uncomfortable about this new technology, and initially a few technological problems in the system had to be solved. The main problem however appeared to be insufficient enforcement and too low parking fees at the other on-street parking spaces, which puts Vigiville in a disadvantageous competitive position.

5.1.3 Payment methods

Until recently most parking acts that required payment depended upon the motorist paying by cash. Bank notes are generally not acceptable nor is the provision of change giving.
A number of initiatives have been launched to facilitate payment by cashless payment media. These have been accepted very slowly with different technical standards being prevalent. Gradually more payments are possible by cashless media.
Cashless payment systems have been in use in the United Kingdom for the payment of parking fees for at least fifteen years although this is still at a very low level. These have ranged from pre-paid parking vouchers to chip-based smart cards that can be used to pay for a number of different services including parking fees.

A recent development in Europe and elsewhere is the use of mobile phones as a means of recording the commencement and termination of a parking act thereby facilitating the payment for parking via the user's mobile telephone account. Currently there are a number of trials operating in various countries. Technically the trials seem to be successful although the take up rate and the interface between user and enforcement agency does need careful consideration. To date it has not been possible to quantify the effects of this new system on mobility and the economy.

Specific pre-paid magnetically encoded parking cards
This type of parking card has been in use in the UK for over ten years. It involves the motorist purchasing the card for the face value of the monetary value of the card or for a discounted fee. The motorist then uses the card when paying a parking fee with the value of the parking fee deducted from the value remaining on the card. This type of card avoids the need for the motorist to always ensure that he/she has sufficient coinage to pay a parking fee. This is particularly convenient for those motorists that have to regularly pay to park for long periods (eg commuters).
Many of these problems have since been overcome with more sophisticated control equipment and/or cards. Smart cards have also superseded a number of magnetic card-based schemes as they are more versatile and secure.
A related type of scheme has been tested in Clitheroe, Lancashire (UK) where Pay & Display machines were adapted to accepted payment with a British Telecom (BT) Phonecard. This trial is reported to have been a technical success.

Electronic purses
Electronic purses, which are charged with value from a user's own bank account, have been tested by UK banks in two trials, one in Swindon and another in Leeds. The electronic purses were designed for use instead of cash in the payment of low value transactions including the payment of parking fees.

Both trials have now finished and the banks are currently assessing how these systems might be taken forward. Electronic purses did not prove to be as popular with users as had been anticipated.
In the Netherlands in Rotterdam and in Purmerend currently chip-based cards (electronic purses) are obligatory for the payment of on-street parking. People without such a purse (foreigners, visitors from other towns) can either purchase a preloaded purse at certain shops or go to a parking garage where cash payment or credit card payment also is possible. A recent change in legislation permitted local authorities to restrict on street payment to the use of this electronic purse without enabling a motorist to claim an infringement of human rights.

Bank credit/debit cards.
The payment of parking fees by bank credit/debit cards were first introduced in the UK at Gatwick Airport in 1990 (Hulme P, 1991). Most payments at Gatwick were of relatively high value because a high proportion of parking acts were undertaken by holidaymakers that had flown off for a week or more. As a result the cost of processing each payment was a smaller proportion of the parking fee than it would have been for the payment of most parking fees. Having introduced the system the car park operator was able to reduce its complement of staff required to operate the airport car parks.
The use of these cards has subsequently spread to a number of european airport car parks and, more recently, station car parks. NCP Ltd has started introducing this payment option into all of the car parks it operates.
Each credit/debit card payment has to be validated by the banking community before it can be accepted. This involves linking every piece of equipment (such as Pay & Display equipment) accepting this type of payment by telephone or data link to a central validating point. This validation process can delay the payment of the parking fee (by a few seconds per transaction) and also results in a relatively high processing charge for low value payments such as parking fees.
As the cost of parking increases it is anticipated that this payment medium will become increasingly popular since most motorists already have a bank credit/debit card. This will then negate the need for the motorist to ensure that he/she has sufficient coinage to pay a parking fee. It is also satisfies the motorist's aspiration (as determined in Rushmoor) that one cashless payment medium should be available for use in all car parks.

Charge cards
These cards were introduced to circumvent the requirement of the banks (and the associated time delay) to validate each payment. The Charge Card issuer takes the commercial risk for non-collection of fees due. This risk is considered to be very low. Charge Cards were originally introduced for use in the post-payment of low value transactions. Each Charge Card is linked to the holder's bank account. The Charge Card account accumulates the values of every transaction made with the card. Each month (or other predetermined period) the Charge Card account is paid by direct debit from the Charge Card holder's bank account.

Chip-based Smart Cards
This type of pre-payment medium consists of a plastic card (usually the size of a bank credit card) with a chip embedded in it. This chip can be programmed to allow use in certain circumstances or to collect data on usage. For instance, in the parking context, it could be used to permit parking in specific car parks at certain times of day for a reduced parking fee. It could also be used to register usage in a car park and provide free parking for every ten parking acts paid for by the card. Cards need to be restricted for the payment of just one service. They can be multi-functional. As these types of card become more widespread in our everyday life it is anticipated that they will be more widely accepted for the payment of parking fees, like in Madrid with very good results so far.

There are a number of different formats currently available. The card issuing industry is seeking to produce a standard that will be applicable to most smart cards issued. Until this happens some of the parking equipment manufacturers are providing facilities that permit the processing of different card formats by the same parking control device. This payment medium is superseding pre-payment magnetically encoded cards.

In-car parking meters

These parking control devices were introduced into Israel, France, Scandinavia and the USA some years ago. A motorist purchases an in-car meter that is about the size of a pocket calculator. Each in-car meter is charged with a monetary value. At the commencement of a parking act the motorist would, by depressing keys on the meter, enter details of the parking zone and then depress the 'Commencement of Parking' key. The meter would be affixed to the windscreen to enable a parking attendant to interrogate the meter by infra-red reading device to determine that the parking act was being paid for. The value on the card would then be deducted per unit of time whilst the vehicle was parked. On his/her return the motorist would press another key to indicate that the parking act had finished thereby ensuring that further value was not deducted from the card. Once there was no (or little) value remaining on the card the motorist would either dispose of the meter or have it recharged with monetary value.

In France this system (called Piaff) has been in use for more then 10 years now. More then 200.000 users in some 60 cities are counted. The system is also available in 30 towns outside France.

In Germany recently a large field test of a similar system (Parc-o-pin) was carried out in the Stuttgart region.

Helsinki introduced in-car parking meters in 1994. There are currently 25,000 meters in use. Drivers using these meters receive a 20% discount off the parking tariff and only pay for the actual time parked. The in-car meter and smart card costs 535 FIM.

Mobile phone and GPS-based payment systems

These systems have only recently become available. They are operated by an agency that would be contracted by a local authority to collect on-street parking fees using this system. The system is based on the use of the mobile telephone network.

On arrival at an on-street parking place a motorist, who had pre-registered in the scheme, would telephone a central call number and by using the mobile telephone keypad indicate that they had commenced a parking act in a particular location. This information would then be relayed to parking attendants notifying them that the vehicle had had a parking fee paid. On his/her return the motorist would use their mobile phone again to inform the parking control centre that the parking act had terminated. The appropriate fee for the parking act would then be calculated and added to the motorist's 'parking account'. Once a month (or more frequently by agreement) the total value of all the parking acts would be debited from the user's bank account.

A pilot scheme was introduced in **Helsinki** in September 2000 and is still running today.

Similar schemes are running in (among other places) Stockholm (S), Oslo (N), Den Haag, Haarlem, Rotterdam, Gouda (here with the application of a dedicated in-car box), Delft and Rijswijk (NL).

Also in Dublin (Irl.) payment by mobile phone is made possible, yet in a slightly different way than the former examples. In the UK recently schemes are started in Edinburgh and the London Borough of Wandsworth.

To help local authorities in their negotiation with providers of this service in the Netherlands a set of requirements for the introduction of mobile phone payment for parking was introduced recently.

In Annex 11 a summary of these requirements [CROW brochurereeks ‘Van Parkeerbeheer naar mobiliteitsmanagement’ brochure nr. 3] is presented.

5.1.4 Tariffs for paid parking

Table 5.1.2 gives an impression of the level of parking fees as they exist in larger towns in Europe .

Table 5.1.2 Price for on street parking in different European cities (2002)

Country	**City**	**Fee / hour** (€)
Austria	Vienna	0,87
Belgium	Brussels	0,50
France	Paris	1-2-3
France	Lyon	1,50 – 5,00
Germany	Bremen	0,60 – 1,50
Germany	Cologne	1,00 – 2,00
Germany	Stuttgart	0,20 – 2,00
Germany	Munich	2,00 – 2,50
Ireland	Dublin	1,00 – 1,90
The Netherlands	Amsterdam	1,60 – 2,50
The Netherlands	Maastricht	1,40
Portugal	Lisbon	0,50
Spain	Madrid	0,60 – 1,20
Spain	Barcelona	0,90 – 1,20

(source: Parking Trend 16, Volume 3 December 2002, page 17; L.A. Bannerman)

On-Street Tariffs
A Parking Benchmarking Initiative operated in the United Kingdom by the Transport Research Laboratory has found a wide range of costs and income per parking space. Many local authorities were found not to include all associated costs of an on-street operation – the same also applied to off-street operations.

BERN (CH) and MADRID (E): on-street cheaper than off-street

Strangely enough the fees for on-street parking in the city-centre are much lower than the hourly parking-rates in the (privately owned) multi-storey car parks in the city. Initiatives to raise the fees for on-street parking didn't succeed, due to opposition from local trade and industry. The city of Zürich encountered similar problems when they wanted to increase parking fees, which resulted in a compromise on a lower increase.

Special tariffs for residents or companies
Residents who have no alternative but to park on street are often issued with permits by the highway authority for use when parking in a paid for parking space. The annual charge for a permit (which can sometimes be zero) is usually cheaper than paying for each individual parking act. Permits are either limited by price (with the first permit being cheaper than the second etc.) or in absolute numbers. In the London boroughs of Westminster and Kensington & Chelsea residents can avail themselves of cheaper parking off-street during holidays or when road works prohibit the use of on-street parking spaces.
In the London borough of Sutton residents of the local area can use a card to pay lower parking fees in that area.

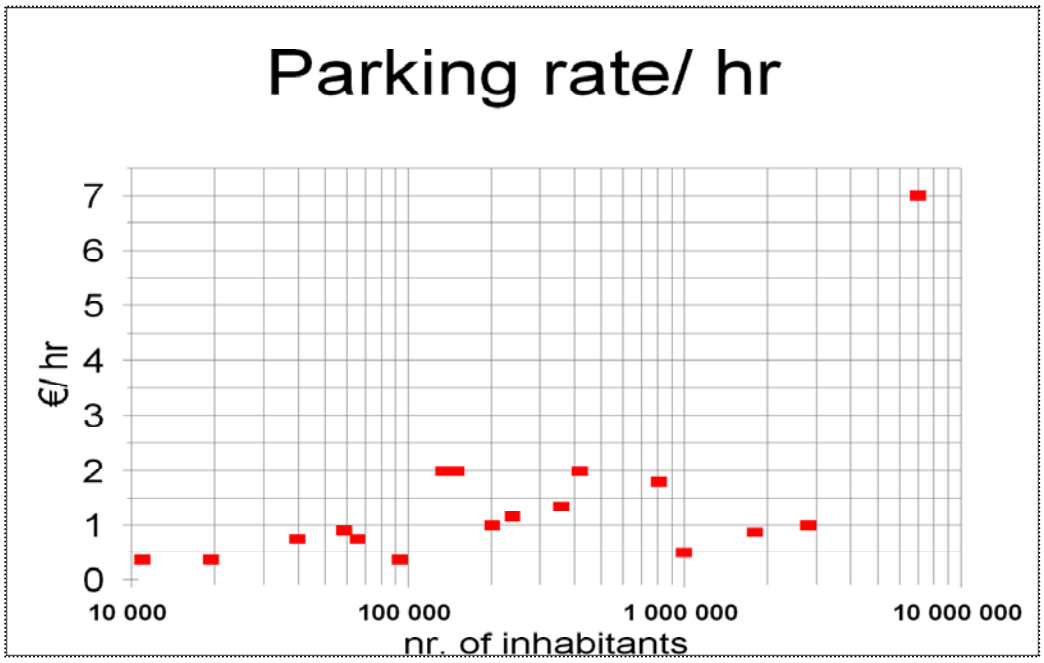


Figure 5.1: **Hourly parking tariff related to city-size**
(based on information from COST 342 members)

The larger the town, the higher the demand for parking places and thus the higher the fees. To illustrate this in figure 5.1 we present the hourly parking rates (as made available by the members) related to city-size. The general relationship is unmistakable. The value in the top-right corner is the tariff of the London borough of Westminster.
The suggestion from this graph is clear: the larger the town, the higher the fees.

As another illustration of the fact that parking fees are not independent from city-size we present below an overview of Dutch paid parking tariffs as they existed in 1999 in the Netherlands according to the number of inhabitants of the town. The available figures support the assumption on the relation between parking demand and hourly fee. The larger the town, the higher the demand for parking space resulting in higher fees.

Table 5.1.3: Tariffs on paid parking in the Netherlands dependent on city-size (1999)

Number of inhabitants of town	percentage towns with paid parking	average parking tariff per hour	maximum tariff found
up to 20.000	10%	0,75 Euro	1,02 Euro
20.000 to 30.000	18%	0,76 Euro	1,59 Euro
30.000 to 50.000	55%	0,78 Euro	1,36 Euro
50.000 to 75.000	86%	0,88 Euro	1,59 Euro
75.000 to 100.000	100%	1,36 Euro	2,72 Euro
100.000 to 200.000	100%	2,18 Euro	1,82 Euro
over 200.000	100%	2,10 Euro	2,27 Euro

Source: Van B naar A, maatregelen en projecten voor goederenvervoer in nederlandse steden' (Platform Stedelijke Distributie, 1999)

SWITZERLAND; pay for parking at the work-place

Car use by commuters depends strongly on the availability of a parking space at the workplace. Most of the parking spaces are privately owned. Since 1999 there is a legal basis in Switzerland for public authorities to force private companies to realise parking policy measures on existing car parks. The position of public authorities to implement such policies however is very weak, therefore the intention in Bern is to sign voluntary agreements on parking policy measures with private companies. Also the public administration decided to show a good example: a parking fee is charged for visitors and commuters at the parking facilities at hospitals, schools and municipal office buildings.

In 1997 the government of the rural canton of Thurgau (Switzerland) decided to levy parking fees on all of its governmental properties (administration-offices, hospitals, colleges, museums etc.), where parking was free previously. The main goal was to generate revenues and to eliminate an inequity between employees in the public and private sector; the latter had to pay for parking at the workplace in most cases. It was hoped that the workplace parking levy would also influence the employees modal choice and reduce commuting by car.
The measure was introduced at the central administration of the canton and at its two cantonal hospitals.

The first goal, the generation of revenues, has been achieved. The use of the parking facilities has stayed constant after introduction of a parking levy of Sfr 380 per year, bringing in a total amount of Sfr 600.000 per year.
The parking levy has not led to a reduction of car-use by commuters; a majority of commuters (50% - 80%) in these rural districts have no alternative mode of transport to go to work, and the amount to be paid for parking is quite reasonable.
Even though the parking levy is quite low, in the opinion of many employees it has reduced the attractiveness of the work-place. Many employees consider the parking levy as a reduction in salary.

Visitor parking at the cantonal administration office is still free; at the cantonal hospitals visitors have to pay a modest parking fee. Most visitors to the hospitals consider the fees as quite fair, nevertheless they try to avoid them by searching for free parking at a longer walking distance. 10%-30% limits the duration of their visit to half an hour, for which there is no parking fee.

An interesting exception in this respect is Germany. In Germany the maximum hourly fee for on street parking is currently fixed through national legislation [right now this is being investigated].

In some German cities trials have been undertaken to make parking in multi-storey car-parks more attractive by making the first half hour of parking free. The number of users of the car-parks increased strongly, but these were mainly people staying only a very short time. The revenues from parking dropped dramatically, the amount of traffic in the area increased, and the positive effects on the local economy were minimal. In general this does not seem to be a very effective measure.
For the city of Krefeld it was found that raising the existing parking fee (on-street) by about €0,5 per hour resulted in more visitors. Instead of the expected annual loss of € 50.000,- an income gain of € 200.000,- resulted.
In the city of Herford free parking for the first half hour was introduced. The related financial loss for the operators was compensated by the city. What happened: no rise in gross sales; a rise of 75% in the number of parkers parking less then half an hour. Overall result: more traffic, much more costs for the community then calculated and no rise in sales. Market research in the city of Herrenberg teaches that free parking (together with a relatively high demand) result in much search traffic and less available spaces. Same findings were done in Pforzheim, Gelsenkirchen and Münster.

A few years ago Oslo abolished paid parking on Saturdays completely, the idea being that commuters would not take parking space on Saturday. The parking spaces were however taken by long-stay parking (among others shop-keepers). Visitors could hardly find a free parking space and accessibility

of the inner city suffered. Although the number of trips in the inner city decreased, this was not the result that was aimed at, and paid parking on Saturday returned.
A few years ago in Rome paid parking and parking control was widely extended and controlled. This also resulted in a higher income. The same is happening in Madrid since November 2002 when three private operators were awarded an 11-year concession that is proving to be very successful to manage parking in the centre of Madrid.

5.1.5 Financing Enforcement

Finance is a key issue when dealing with enforcement. In Austria, Belgium, Finland, Latvia, Netherlands, police enforcement is financed entirely from central or local taxation.
The enforcement is partly financed from fines in Czech Republic (weakly used and still under discussions if even allowed), Portugal, Sweden and Switzerland (included the money from paid parking charges).
Enforcement is entirely funded from both parking charges and fines in Norway.
In Finland the municipality gets all the revenue from penalty charges, both issued by the city and the police. The revenue goes 'to the big revenue bag' of the city. The enforcement unit gets the operational funds as all municipal institutions. This happens also in Spain.
In Latvia the State police are paid from the state budget. The eventual municipal non-profit company is paid out of the income from parking charges.

When established by the UK Parliament it was envisaged that decriminalised parking enforcement in Special Parking Areas would generate sufficient income to cover its costs. Local authorities may retain any income generated rather than having to submit it to the Exchequer as occurs when fines are levied by the police traffic warden service. Any excess income generated can then be used by the highway authority for the improvement of public transport, minor road improvements etc. once the cost of enforcement has been recovered.
Under the United Kingdom system of decriminalised parking enforcement income from parking penalty charges is retained by the local authorities to fund the enforcement operation. Payment of the penalty is encouraged by offering a 50% discount if it is paid within 14 days of the penalty charge notice (PCN) having been issued. If the penalty remains unpaid after 28 days a notice to owner (NtO) is issued reminding them about the penalty and that the full amount must now be paid. If the penalty is not paid within a further 28 days than the authority can issue a charge certificate increasing the penalty by 50%. If the increased penalty is not paid within 14 days it can be registered in court as a civil debt and enforcement action can be taken against the owner to obtain payment. This may mean taking possession of some of their goods to sell to pay the debt and meet the costs of the enforcement action. The system ensures authorities achieve collection rates of up to 80% of the PCNs issued. The DPE system allows recipients to appeal to the authority against the issue of a PCN and there is recourse to independent adjudication if an authority rejects such representations.

PARKING FEES TOO HIGH? (EPA)

Wherever policies of reducing parking charges, with the aim of increasing retail activity, have been tried, these have been unsuccessful. The opinion of many politicians and retailers that the decrease in the number of visitors to the inner cities is the result of high (or, indeed, any) parking fees has been disproved. An analysis of the German Bundesanstalt für Strassenwesen (BAST, published in 2000) concludes that the effectiveness of parking fees as an instrument in controlling parking space demand is clearly limited if the price is not right and the time restrictions are not applied.

Introducing free parking in *Oslo* (Norway) on Saturdays and Sundays to enhance the economic viability of the retail trade in particular had the adverse effect. The occupancy-rate rose to nearly 100%, the average parking time increased by 30% and there was less circulation on the parking spaces. The majority of shopkeepers, and other public attractions like museums, were negative about free parking, because their customers could not find any free spaces to park. Therefore the free parking was abolished in 2000.
In *Herford* (Germany) a scheme was introduced where visitors could park free of charge for the first 30 minutes. As a result the number of parking operations in the car parks increased by almost 15%, mainly due to new customers parking less then half an hour, and contribnuting very little to the local economy. On the other hand traffic volume increased, with its detrimental effects on mobility and environment.
In *Apeldoorn* (Netherlands) parking fees were increased. Simultaneously a special cheap public transport ticket for peak shopping days was introduced. These measures have caused a significant increase in the use of public transport, but were absolutely insignificant with concern the use of the inner city parking spaces. The shopkeepers reaction can be summarised as: 'customers choose on grounds of quality and not on grounds of parking fees'.
In *London* (UK) and *Madrid* (E) limitations on parking supply, high parking charges (up to EUR 7 /hr in the heart of central London) and rigorous parking enforcement appear to have had no detrimental effect on the economy and, in particular, the retail economy. Studies indicate that there is no correlation between parking supply and economic well being. Parking supply and charges play a very small role in the relative economic success of some parts of London compared to other. The more important factors are the quality of the environment, the range of goods and services on offer and the overall accessibility.

5.1.6 Other enforcement measures

Vehicle Removals
In most of the countries the police have powers to remove illegally parked vehicles. This power is widely used in Finland, Norway, Portugal, Spain and Switzerland. The police don't have adequate power only from the participating countries in Latvia. In the UK local authorities can remove vehicles where decriminalised parking enforcement powers permit it.

Wheel clamping
In the Czech Republic, Finland, Latvia, Netherlands (larger cities), Norway, Portugal, Spain, Switzerland and United Kingdom the Police and also in some countries the municipal police, have powers to wheelclamp illegally parked vehicles. To overcome problems with illegally parked vehicles clamping is widely used in Czech Republic and Finland. In the United Kingdom local authorities with decriminalised parking enforcement powers may also wheelclamp vehicles that are parked illegally. However, in practice, these powers are not exercised very frequently as enforcement agencies prefer to remove vehicles from the roadside in order not to inhibit the flow of traffic along a street.
Recently in the Netherlands, application of wheel clamping powers is declining. More and more it is regarded as hostile to visitors. A balanced paid parking system and a tow away policy targeted at serious offenders and proper enforcement should do the job.

THE NETHERLANDS: Regional parking policies, will it work?

Introducing paid parking, or raising parking fees in cities often leads to strong opposition from local entrepreneurs. They fear that their customers will reconsider their shopping trips, after being forced to pay, or to pay more, for parking.
One of the solutions that is often proposed to prevent a shift of shopping trips to other shopping areas is the introduction of a regional parking policy. When parking measures are taken in the inner-city all competing shopping areas should take similar measures, so that shifts in shopping-trips -from the inner city to competing areas- would be avoided.
Thus the main goal of a regional parking policy is to maintain the regional stability between competing shopping areas, or at least not disturb this stability by parking measures.
In the Netherlands a few studies (Zuid-Limburg, Noord-Brabant, Arnhem-Nijmegen) were undertaken to investigate what the effects of a regional parking policy might be.
Although some of the conclusions from these studies seem contradictory, most of them can be explained by regional-economic differences between the surveyed areas. That leads to the following general conclusions regarding the design of a consistent regional parking policy:

- Parking is not primary an attracting factor of shopping areas. People decide to visit a certain shopping area primarily because they are attracted by the size and quality of the shops and other activities in the city.
- When a city possesses a high, and unique, quality of economic activities a slightly tightened parking-situation will have hardly any effect on the economic results of the area.
- Where cities can be considered as comparable in their spatial-economic qualities of their inner-cities, and have overlapping catchment-areas, then the quality of parking may play a decisive role in the distribution of shopping-trips.
- Parking restrictions affect the destinations of customers, and have only a moderate effect on the modal split in shopping trips.

Regional parking policies therefore can't be the same everywhere. The socio-economic structure of the region has to be decisive about which measures to take, and where.
Regional parking policy should never try to obtain uniform parking measures all over the region, but should take into consideration that any commercial centre within the region has its own specific role to play.
The main purpose of regional parking policies should be to obtain mutual fine-tuning of parking measures between the various municipalities involved, in order to avoid a shift in the economical balance within the region. A regional parking policy therefore should always leave room for tuning in to the local circumstances in the towns and cities involved.

5.2 Public parking off street

In this chapter public means accessible to all. It says nothing about the public or private status of the owner of the facility.

Public parking off street is provided either on surface lots or in garages. Some facilities are free (mostly surface lots) in garages one mostly has to pay. If there is no exit control mostly payment has to be done by pay and display machines. In all other cases payment can be done when leaving.
Not much is known about the number of places.

Brussels (B); public- private cooperation in a big city

In Brussels an agreement between public authorities and car park management companies was proposed in order to control the parking problems.
The insufficient quality of many public car parks in Brussels leads to low occupancy and a feeling of insecurity. As regards surface parking, the demand for car parking space often exceeds the available space; only a limited amount of these spaces have paid parking, and then parking fees are relatively low. Many users do not pay and controls are few. There is a lack of motivation with the local police to enforce parking regulations, due to the fact that, also because of a lack of resources, parking offences are not followed up by the courts.
The institutional structure also complicates the management of the problem. Parking in fact falls under the responsibility of the districts, while the Region is responsible for mobility in general.
An additional complication is that many –often privately run car parks fall outside the scope of the public authorities. Concessions –if any exist- offer only a limited means of control.

In order to come to a more consistent parking management policy the initiative has been taken to come to a public private agreement between the Brussels Region, the districts and the private operators of car parks. The agreement on a comprehensive mobility approach comprises chapters on:
* dynamic parking information system
* Making car parks more attractive
* A consistent pricing policy both for on-street parking as well as car parks
* Reinforcing enforcement
* Improving accessibility of car parks
* A media campaign

A French survey (Parcopolis, 1997) estimates that about 1/3 of the parking places will be controlled and that about 48% of that number are located in/on dedicated facilities.

Dutch research (2002) shows the following estimations:

-	public parking places on street:	7.200.000
-	of which controlled	1.400.000
-	controlled places on surface lots	225.000
-	uncontrolled places on surface lots	1.500.000
-	Places in garages	162.000
-	Of which controlled	101.000

Of the total number of public accessible places of about 8.900.000 is about 81% on street, 17% on surface lots and 2% in garages

5.3 Private parking

Private parking mainly comes down to two questions:

1. How many private non-residents parking places exist?
There is hardly any specific information available on the number of private parking places.
The Dutch figures in par. 5.2 suggest that the number of controlled parking (available for non residents roughly) is equalled by the number of controlled parking places. This is supported by the opinion of Dutch experts.
German figures for the city of Lüneburg (1997) state that 38% of the available parking places are private.
In the case of Madrid (Spain) there are some 83,400 underground parking spaces for residents and almost 16,000 rotational parking spaces (2002), most of these in the city centre (see also table).
It is also estimated that there are another 540,000 private parking spaces in Madrid, 200,000 of which are in the seven central districts.

RESIDENTIAL, ROTATIONAL AND MIXED PARKING (2002)

Type of parking	Car parks	Residential spaces	Rotational spaces	Total spaces
Residential	206	73,211	-	73,211
Residential-Rotational	26	10,228	6,860	17,088
Rotational	22	-	9,127	9,127
TOTAL	254	83,439	15,987	99,426

For Helsinki it is estimated that some 50% of the available parking space is on private property. These figures comprise both parking for residents and for non residents.
For the city of Oxford (UK) a number of 7.000 p.places (private non-residents) is stated.
A very rough estimate is that 40 to 60 % of the parking places available for non residents are private and not (or very difficult) to be influenced by parking policies of the local authorities..

2. How do the different countries work with parking standards for new developments.
Regarding parking standards three points seem to be relevant:
a. *Whether or not the parking places should be provided on own property*
In general for offices it is obliged to develop parking places on its own premises. In some cases (in highly developed areas like CBD's) it is possible to apply 'cash in lieu'. The developer pays the authority instead of building parking places. Mostly the authority has the obligation to create parking places at other locations. On some occasions also at larger distances, then served by Park and Ride (P+R) facilities in case of commuter and visitor parking. Parking for residents is always expected to be located at a reasonable (Finland: 200 m) distance.

Table 5.3.1 Parking standards for offices as existing in 1992 (pplaces/100 m^2)

Country	**Town**	**Pplaces/100 m^2**
France	Paris (central area)	1 : 250 / 166
	Lyon	1 : 100 / 43
UK	Central London	1 : 1.115
	Hammersmith (London)	1 : 600
	Croydon (London)	1 : 464
	Bexley (outer London)	1 : 60
	Manchester	1 : 185
	Birmingham Centre	1 : 185
	Birmingham Outskirts	1 : 23
	Glasgow Centre	1 : 250
	Glasgow Outskirts	1 : 50
Spain	Madrid /	1 : 100
	Barcelona	1 : 100
Germany	Hamburg	1 : 40-65
	Frankfurt	1 : 30-50
Belgium	Antwerp (good public transport)	1 : 300-600
	Antwerp (low public transport)	1 : 60-120
	Brussels	Own premises no standard
USA	New York	No exact demands 1)
	Atlanta	1 : 30
	Los Angeles	1 : 600

(source: Healley and Baker, 1994)

1. To some extend small (30 parking places) parking garages on own premises are allowed.
2. In almost all countries 'cash in lieu' is possible, specially in historical (or densely built) city centres.

b. Are the standards maximum or minimum standards
Throughout Europe a development from minimum towards maximum standards can be recognised.
In North America this seems to be on the verge of being introduced.
The explanation for this difference seems to be the availability of space.

c. The level of the standards.
A survey from 1992 revealed the following data on parking standards for offices:
From the national reports we can derive figures as presented in table 5.3.2
Table 5.3.2 is a crude summary of the different data made available. Generally parking standards are presented in more detail than in the table above.
As an illustration we present a table (table 5.3.3) taken from a Dutch handbook on traffic engineering. The table advised parking standards for shops. These figures provide guidance for local authorities. In the Netherlands it is the local authority that sets the standard.

Table 5.3.2 Résumé of parking standards as taken from national reports

County	**Houses**	**Offices**
Hungary	1 pp / house	1 : 10/20 m^2 net floor space
Finland	1-2 pp / family house	1: 50/60 m^2 gross floor space (gfs)
Spain	1 pp / 100 m^2 gross floor space	1 pp / 100 m^2 gross floor space

Table 5.3.3 Parking figures for shops. (as applied in the Netherlands)

land use (functions)	*number of parking places*	*per*
hypermarket	4.2-10.0	100 m^2 gfs (gfs = gross floor space)
	or	
	6.5	100 m^2 gfs
	+ 0.4	jobs
district service shop	3.5-5.0	100 m^2 gfs
	or	
	6.5	100 m^2 gfs
	+ 0.4	jobs
district/town service shop	2.5-3.5.	100 m^2 gfs
	+ 0.4	jobs
neighbourhood shop	1.5-2.5	100 m^2 gfs
	or	
	1.25-2.2	100 m^2 gfs
	+ 0.4	jobs
town, district centre	2.0-2.85	100 m^2 gfs
showroom	1.2	100 m^2 gfs
DIY centre	2.2	100 m^2 gfs
garden centre	2.2	100 m^2 gfs

(Source : CROW-record 11)

All available material imply the following:

- Parking standards must be set as maximum standards although they may vary slightly to fit local preconditions. Minimum parking standards should not exist because they hamper the development of a reasonable and maintainable parking policy in an area.
- It must be possible to set even lower standards in highly attractive and thus densely built areas. Parking at a larger distance must be made available together with good (public) transport between this areas and the parking places.
- Combined use and development of parking places must be promoted or even enforced. Local ruling must not prevent this. It is better stimulated or enforced.
- In the setting of standards combined use and differences in the time of peak-demand must be taken into account. If this is not done properly the total provision of parking places in an area may easily exceed demand. This is a needless loss of money and will create additional traffic.

ZÜRICH-NORD (CH): access contingency

Zentrum Zürich Nord (ZNN) is one of the two large urban renewal projects within the City of Zürich. ABB Real Estate Ltd has conceived for Area D in ZZN a new innovative concept for dealing with the parking capacity within a multi-functional environment, the so-called Fahrtenbegrenzings-Modell (access contingency model). Instead of providing each of the buildings within zone D with its own parking facilities, ABB will operate 9 well-located multi-storey car parks serving the whole zone. Instead of letting car spaces to the tenants of the offices and other buildings, ABB attributes a kind of park space 'user rights'. A user right fixes the number of car rides in and out of the area and the time frame in which these trips can be done. Tenants and visitors get these rights in the form of badges, whereas people coming for shopping pay as usual with short-term parking fees.
Badges have to be renewed every year. Tariffs relate to the intensity of using parking space.
With a few exceptions, no tenants have their 'own' parking space, and most do not have it for an unlimited time-span. Thus multifunctional use of parking capacity is guaranteed.
The final number of car rides allowed is fixed at 9800 per 24 hrs. This number has been negotiated between ABB and the municipality. Measuring the number of car rides in and out is done permanently, but the measuring results will only be consolidated every 6 months. If the number of trips allowed is exceeded ABB has to pay to the municipality a penalty for each trip beyond the fixed total.
ABB operates also a parking guidance system that leads car drivers as close as possible to their destination. The parking facilities are organised in a parking network. In this way a maximum of capacity handling is achieved and search traffic is minimised.

5.4 Park and Ride (P+R)

Introduction
Many of the world's major cities suffer from traffic congestion on radial routes penetrating the urban centre, especially at rush hours.
An increase in road capacity for private vehicle use cannot be the only solution. On the contrary, the trend in the last few years has been towards improving and promoting public transport, cycling and walking.

The proliferation in the population on the outskirts of major cities makes it impossible to build public transport networks or interchanges that can be reached on foot, by bike or by public transport. This phenomenon is accentuated in areas of low population density. Encouraging the use of public transport can indeed be improved by providing drivers with suitable places along or near their routes where they might park their cars and travel onward by public transport. Park and Ride facilities thereby act as an interface between private vehicles and public transport, representing a key element in directing inhabitants of those urban and metropolitan outskirts most inclined to use the car towards use of the public transport system.

In the United Kingdom many rail stations and other public transport interchanges provide parking facilities for cars, motorcycles and cycles. The same goes for a long time already for Germany and Austria.
More recently however park and ride facilities have been provided on the periphery of an urban area from where fast, frequent high quality bus services have been introduced to operate to/from the town/city centre.
These have proved to be very popular with many sites soon exceeding their originally projected patronage levels. It has, however, been found that Park & Ride can generate extra car trips, divert motorists from other business centres and abstract patronage from other public transport services (Atkins, 1998). Another study (Pickett et al, 1999) found that P+R-facilities can promote the use of public transport, relieve urban traffic congestion and reduce the level of car-borne exhaust in city centres.

Mons (B); An example of a multi-modal approach

Mons is the capital of the province of Hainault, and is an important centre for employment (SHAPE, the military headquarters of NATO) and education (about 100 educational institutes, of which 16 colleges for advanced education and 3 universities). The town is in the process of implementing a new transportation and parking plan. As far as parking is concerned, the general objectives of this plan are:
* to ensure quality of life for residents;
* to exclude illegal parking;
* to stimulate local trade;
* to improve conditions for loading and unloading;
* to reduce the pressure of commuter traffic.

In the plan long-term parking will be reduced considerably. Medium-term parking gets better opportunities, by improving parking time control and enforcement policy. Sensitive areas are protected by creating better walking facilities, and park-and-ride facilities, with shuttle minibus connections to the city centre, have been created.
A comprehensive system of measures has been implemented in order to make the use of P+R with connecting public transport more attractive then using private transport and parking in the inner city. Therefore conditions have to be met concerning: **a.** Conditions before parking; the route to the P+R-facility (location, information); **b.** Conditions at the parking facility (capacity, safety, price, adequate connections, minimal waiting time); **c.** And connecting public transport (high quality, rightly chosen destinations, discouraging long-term parking in the inner city).

Car parks first appeared at railway stations in London in 1958 and in Hamburg in 1963.
Growth in recent years has been spectacular, as is suggested in the figures below. They may not cover all participating countries but the suggestion is clear:

Table 5.4.1. Evolution of Park and Ride facilities in Europe (1970 – 1990)

Year	Cities	No. of P&R sites	Spaces	Average size
1970	24	1166	194,213	168
1990	76	3722	849,226	228
Increase(%)	216	219	337	36

The development of Park & Ride facilities in the region of Bern as shown in table 5.4.2. gives a hint of the growth after 1990.

Figure 5.4.1 Schematic presentation of the principle of P+R in relation to Public Transport

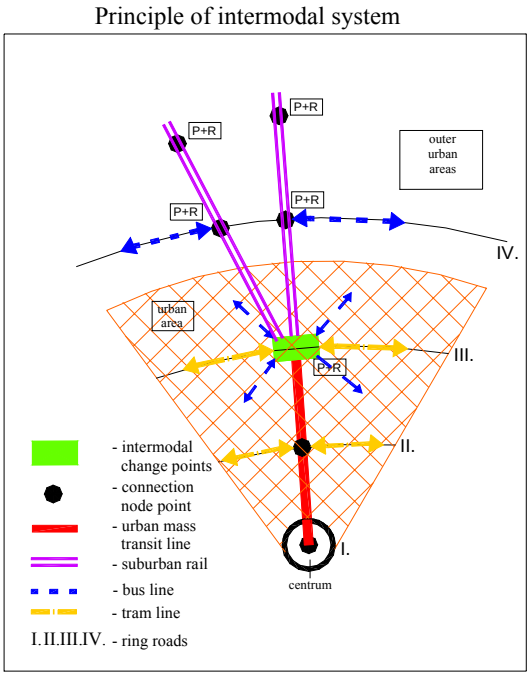


Table 5.4.2: Development of Park & Ride

In the region of Bern (1995 – 1998)

Year	Park & Ride spaces	Bike & Ride
1995	2.690	13.400
1995 – 1998 (abs. growth)	+ 260	+ 2.400
1995 – 1998 (% growth)	+ 9,7 %	+ 17,9 %
1998	2.950	15.800

In 2001 in the UK, Scotland and Canada

	Number of sites	Total P+R places	Number of towns
United Kingdom (2001)	99	57.648	45
Scotland (2001)	110	26.800	28
Canada (1995)	30	68.999	8

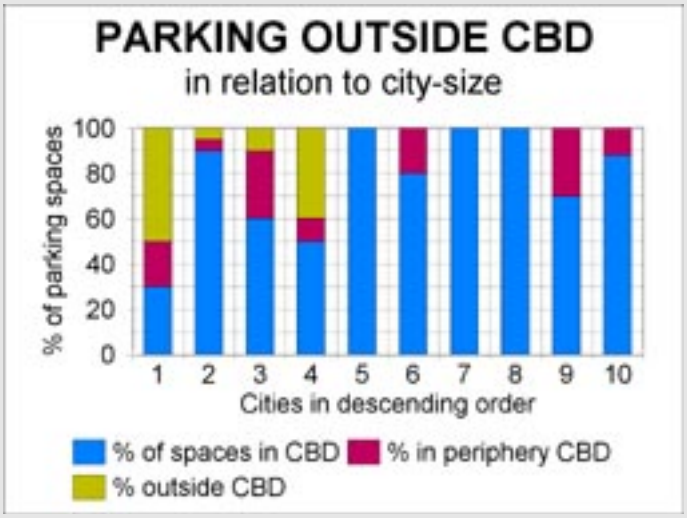
In 2000 Madrid:

CERCANÍAS-RENFE PARK AND RIDE: DISTRIBUTION ACCORDING TO CAPACITY (2000)

Capacity	Number	Percentage
50 spaces or less	9	18.4
51 – 100 spaces	13	26.5
101 – 250 spaces	10	20.4
251 – 500 spaces	7	14.3
501 – 1,000 spaces	4	8.2
Over 1,000 spaces	6	12.2
TOTAL	**49**	**100.0**

CANADA, available space determines parking measures

In the following graph the distribution of parking capacity, divided into parking spaces within the central business district, on the periphery of the CBD and further away outside the CBD, is shown for a number of Canadian cases. The cities are arranged to their number of inhabitants, in a descending order (1 = Toronto, 4 200 000 inh., 10 = North Bay, 65 000 inh.).



Most Canadian cities still have a considerable amount of their total of parking spaces within their CBD's. The percentage of parking spaces outside the CBD is roughly the same as in Amsterdam, which has about 750.000 inhabitants (compared to 4.2 mln in Toronto).
This indicates that when space is sparse parking meaures are taken earlier. This development may also be seen as a stepping stone in the development towards Park & Ride.

Objectives of P+R

The main factors or requirements that make the construction of car parks at rail stations and other public transport interchanges advisable include:

- The development of a metropolitan ring (a ring of suburbs) dependent on a central city.
- Major communication routes with traffic congestion problems on a city's approach roads.
- Insufficient parking spaces within a city centre.
- The existence of a good public transport system that channels large flows towards the centre, necessarily accompanied by a suitable urban network (underground, urban buses, trams, etc.) that does not penalise the user in terms of journey time and comfort.
- Metropolitan zones with low population density.
- High rate of motorisation.
- Employment primarily located in city centres.
- High numbers of visitors and shoppers to the city centre.
- Clearly defined rush hours.

Besides the encouragement and increase in the use of public transport, there are additional objectives :

- A reduction in approach road congestion and, consequently, in travelling time uncertainty.
- A reduction in urban centre traffic.
- A reduction in travelling time, implying lower costs.
- Energy savings.
- Less atmospheric pollution.
- A reduction in illegal parking in cities
- Less formal parking in a city centre

-

Factors to be considered when establishing a P&R facility

a) Location

Railway stations, underground termini or bus stops on the outskirts of a town or city are generally suitable places for the location of car parks.

These installations should not be designed solely for cars either, but also for motorbikes and bicycles, encouraging the combined use of these modes with public transport. In choosing P&R locations, the following factors, in particular, should be considered:

- with relation to fast public transport to the centre:
- with relation to road system connections:
- with relation to functionality concerning home-work mobility:
- with relation to its function as an intermodal centre (focus):
- with relation to parking policy:

b) Design factors

b.1. Demand studies

To construct and set up P&R facilities, it is necessary to know the level of potential demand for the latter, demand forecast therefore being necessary. This potential demand will become reality according to:

- Accessibility to economic activities or areas of interest
- Public transport quality (frequency, comfort, etc.)
- Park and ride car park features (fares, surveillance, etc.)
- The existence of complementary services (news stands, car washes) and other activities (cinemas, shops, etc.)

Demand can suffer from daily, weekly and seasonal variations. Although size is calculated by considering demand on working day rush hours, it is necessary to study other types of demand in order to improve the use, profitability and management of the car park.

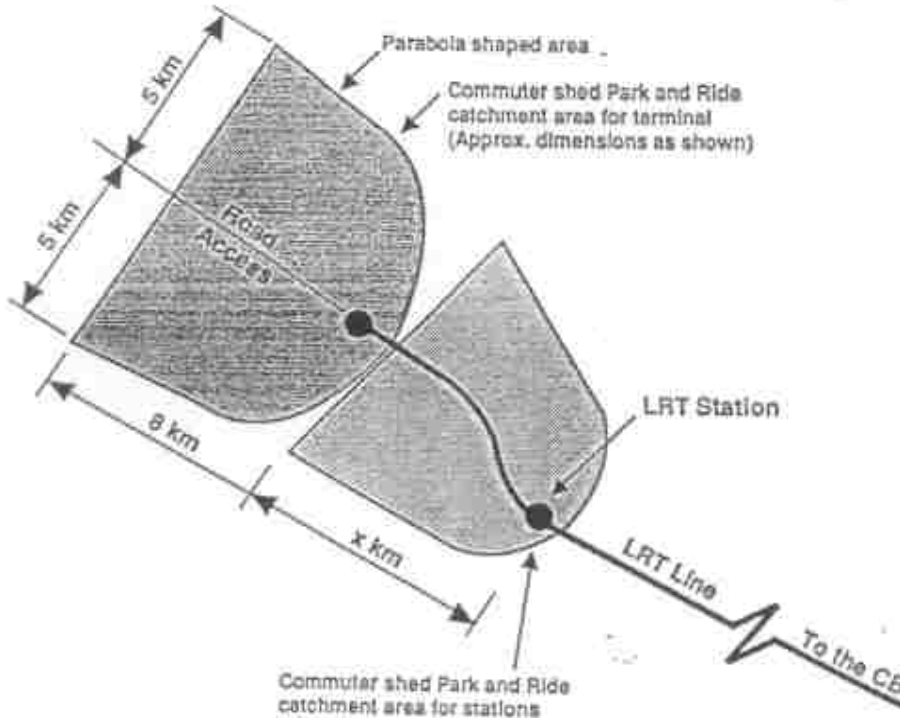


Fig 5.4.2 Commutershed concept for determining the catchment area for Park and ride facilities in USA and Canada (source John Morall ca.)

In figure 5.4.2 a graphical presentation is depicted of the commutershed model as mostly applied in USA and Canada to estimate the demand potential for Park and Ride.
A specific version of this model (EXTRA) as applied by the North Central Texas Council of Governments when applied on 7 P+R lots in the Dallas – Fort Worth area showed a reasonable fit. In 3 cases less then 10% difference, in 2 cases about 30% and in two other cases about 40% difference between estimated and observed values.

b.2. Car park size
Different car park areas will have different capacities, but should take overall integration and functioning into account so that there are no conflicts between different traffic flows. The following zones can be distinguished in parking areas aimed at attracting car users to shift to public transport:

- *Long stay parking zones (P&R)*

This is in fact the zone generally used by people parking their cars at park and ride car parks, going to the centre by public transport and leaving the vehicle parked for a number of hours that exceeds the working day.
It is necessary to consider overall strategy in size calculations with respect to parking policy in the city centre, since, as indicated by STRCL, CETE in Lyon (1980), every two spaces eliminated in the centre involves the construction of 3 additional spaces in the corresponding dissuasive car parks.
The maximum distances to cover should be 100 metres or a 2 minute walk. According to the conclusions of several studies, the distance to walk is a very important factor for the user, it being necessary to study traffic routes and pedestrian walkways.

- *Short-stay parking zones (K&R)*

These zones are usually known as Kiss and Ride (K&R). The public transport user arrives at this zone by private vehicle, but as a passenger, not as a driver. The user gets out of the car and the latter continues on its way without parking.

- Parking zones for motorbikes and bicycles

They should be located very near to the interchange zone with public transport, in a covered area with special surveillance.

- *Road accesses to car parks*

Road accesses and exits are very important for the car park to function well, being designed so that no hold-ups or interference is caused. Entrances and exits should have sufficient capacity for several vehicles in the event that possible hold-ups affect the main roads. If the car park is medium-sized or large, it is advisable for the entrances and exits to be separate. There may need to be height and /or width restrictions to inhibit use of the parking area as a dumping ground, camp site or for the parking of vehicles other than cars.

- *Other flow functions*

The number of walkers using a station can be considerable, especially if the latter are located in towns. Conflicts between pedestrians and those who arrive by car, motorbike or bicycle should therefore be avoided, since the urgent needs of different users to catch the train or the bus could create areas of danger.

Buses that operate in the station area and that are used by people without private vehicles, or by those who prefer not to use them to arrive at the interchange point, should also be considered**.**

c) Functionality
The following functional design factors should be indicated:

- Non-interference between different uses.
- Non-interference between different traffic flows.
- Quick and easy transfers.
- Short walking distances.
- Convenient and easy access.
- Good signposting.
- No long walkways and extended stairway sections.

- Good lighting.
- Large spaces and good visibility.
- Sensation of safety.
- Installations to combat adverse weather conditions.

Park-and-Ride in the USA

The USA is a rather car-orientated society. The majority of US households have two or more vehicles, with an average of 1.66 vehicles per household. All alternatives to driving to work by private vehicle declined between 1980 and 1990. Some alternatives, such as walking and carpooling, declined precipitously, while others, such as transit, declined less dramatically. Only working at home showed growth. The number of car-poolers has dropped by 20% in this period; carpooling is increasingly a household activity, that is the members of a carpool live in the same household.
Park-and-ride systems in the USA have grown in importance over the years and are fast gaining acceptance and recognition as a cost-effective traffic management tool. The park-and-ride system has proven to be an effective means of reducing environmental impacts, and improving public transport.
There are various types of park-and-ride facilities which vary depending on the purpose of which they were intended:

- **Remote park-and-ride,** intercepting the automobile trip near its origin.
- **Local park-and-ride,** an additional stop along an existing local bus route.
- **Peripheral park-and-ride** facilities lie on the edge of the activity centre they serve, usually within 1.5 miles of the ultimate destination.

Park-and-ride facilities have not always been successful. Some facilities had little or no success in areas that were perceived to attract commuters. Others were built along freeway corridors with no effort in planning or estimating potential ridership to those facilities. The success of park-and-ride facilities depends on a number of factors. This has led to the development of park-and-ride demand estimation models that take into consideration a number of factors affecting ridership.
The majority of park-and-ride estimation models assume that ridership attracted to a particular lot is generated from a defined area surrounding the lot known as the 'watershed.' Recent literature, as well as survey results, obtained from the Dallas-Fort Worth region, suggest a water shed that is parabolic in shape, having an axis of seven miles in length and a chord of eight miles.

In addition to the parking installations themselves, there might be some back up systems to improve service quality and make them more attractive to users, special emphasis being given to:

- Signposting: this is important for the car park to function well.
- Information: this should be clear and simple.
- Safety: this is one of the factors that most influences users when it comes to deciding whether to use car parks.
- Other types of complementary installations that will contribute to economic profitability, enabling better overall use of the infrastructure in periods when the car park is under used (night-time, week-ends, holiday times). Examples of different uses that can share installations with park and ride parking installations are shops, shopping centres, cinemas, car washing and lubrication services.

Finance, Management and Operating
One of the main problems faced in the construction of any public infrastructure is finance, whether it be public or private. Furthermore, in the case of park and ride parking areas, much debate will centre on whether it should be those responsible for public transport or the actual road Authorities that should be responsible for financing.
The management of P&R facilities may similarly be public or private, although in the vast majority of cases it is public and included as part of general transport system management. Nevertheless, there are

cases of licences being granted to private companies where the licence's term, causes for cancellation, cleaning standards, maintenance, responsibilities, insurance, etc. should be clearly specified.
If the installation is used exclusively as a park and ride car park, then management is simpler, although less profitable than in the case of different complementary uses.
Some public transport operators in the UK are resisting the provision of extra parking facilities as they do not have the capacity to carry extra passengers during the peak periods when much of this extra traffic would be generated.

Charges
One of the first questions to be asked when talking about P&R installations charges is whether they should exist, that is, if park and ride car parks should be free. Examples of both cases exist and it does not appear to be a factor of great importance, provided that charges are low.
Where charges are set for using the car park, these may be high, with a low fare to travel to the centre, or, conversely, with reduced parking charges and a consequent increase in prices for individual journeys to the centre. Experience in this area has revealed the different occupation levels of vehicles using car parks, 2.82 in the former as against 1.79 in the latter.
It should be realised that the user is prepared to pay a higher charge, if the quality of the service is better, both in relation to transport services and parking safety, so long as these charges are low and, above all, far below those in city centre car parks, even for short trips to the city centre.

Calgary (Can.), the development of a long-stay parking policy

Being located in the transitional area between prairie and the foothills of the Rocky Mountains, Calgary has always had plenty of room to grow. As a result it is a fairly large city geographically. With its strong and prosperous downtown, and low density residential neighbourhoods, car-use has always been high.
Over the past decades there has been a recognition of the need to reduce the number of cars that enter the central business district. In 1972 Calgary introduced the 'cash-in-lieu of parking' policy for downtown Calgary, allowing developers of office-towers and shopping-centres to build only 20% of the required number of parking spaces on site, and requiring them to pay cash to the Calgary Parking Authority the amount equivalent to the cost of providing the remaining parking spaces. The Calgary Parking Authority used these funds to develop parking facilities on the periphery of downtown, thus being able to develop a comprehensive parking policy.
In the early 90s, when the City of Calgary began to prepare an updated, comprehensive transportation plan for the city, one of the many tasks in the development of the plan was to identify the relationship between parking and public transport in achieving the overall balanced transportation goals of the City. In this vision in 2024 Calgary will be a city where people live closer to where they work, and rely less on cars and more on public transport, cycling and walking.
The Parking and Transit study recommends that, although the number of workplaces in the downtown area will increase strongly, the number of long-stay parking space will have to be reduced by 10% in 2024. By doing so, public transport will get a share of 50% for worktrips to downtown. Further recommendations deal with encouraging providing HOV (high occupancy vehicle) lanes and public transport-only lanes into downtown, and continuation of the cash-in-lieu fund.

Public Transport
The existence of public transport is a P+R-car parks' reason for being. The quality of public transport is thus a vital condition for the car park to operate properly and to consolidate the attractiveness and productivity of this system.
An important factor for the user is the possibility of getting a seat, something which influences the dimensions of public transport services. This is simpler for buses, due to their greater flexibility, than for trains.
Experience does nevertheless show that the increase in passengers due to park and ride parking is less than 15%, a figure that does not affect the composition of trains.

Co-ordinated Action Framework
As for all measures related to transport, P&R strategies should be embraced in an integral transport policy, since isolated implementation of a measure does not usually lead to the hoped for results.

Apart from its inclusion in an integral transport policy, urban planning and land development plans should also be taken into account for construction and functioning in the municipalities and geographical areas affected, a regional territorial strategy in other words.

The following basic complementary measures for encouraging the use of park and ride car parks should be considered:

- Co-ordination with priority given to public transport on radial access routes to the centre.
- City centre parking restrictions.
- City centre traffic restrictions.
- Improvement and reinforcement of public transport.
- Increases in public transport service frequency, reductions in waiting times (seamless journey).
- Available services to cater for waiting users (cafés, news stalls, etc.).
- Good access to car parks.
- User information.
- Modal coordination avoiding competition between modes going into the centre.
- The car park's integration with the surrounding area.
- Real time information for road users about P&R places availability.

Effects of P+R facilities
Reports on effects of facilities are relatively scarce when talking about changes in mode. Despite this it can be seen that many facilities are used well.
In the Netherlands a reduction in peak hour car traffic of 1 – 3% has been calculated for 4 out of 9 dedicated facilities. Recently for the Dutch city of Groningen no reduction in incoming traffic into town was measured yet an increase in visitors and workers was reported.

In Oxford (UK) P+R facilities have led to a reduction of more than 3 –9 % in car-traffic.
In Chester (UK) a reduction of 20% of traffic in the city-centre is reported.
For York (UK) it is reported that annually incoming traffic has gone down with 1.1 million cars.
For the city of Hannover (Germany) a reduction of car traffic to and from the centre of some 10.000 car trips is reported.
In Cologne (Ger.) all 21 facilities are used above capacity in weekends.

In Madrid (Spain) some 20.000 incoming cars/day were retained at P&R facilities in 2002 meanwhile in Barcelone this figure reaches 12.000 cars/day.
In France in the city of Strassbourg P+R facilities gave rise to PT-ridership with over 43%.
The P+R system of Vienna (Austria) takes over some 12% of incoming car-traffic.
Calgary (Can.) claims a rise in transit-ridership of down town-workers from 39 – 43% between 1991 and 2000 due to the creation of 5 parking facilities at the outskirts of town.

When forecasting the effect of new facilities it must be born in mind that generally users of new facilities can be divided as follows:

- 1/3 come over from a previous full public transport trip
- 1/3 come over from other P+R-facilities
- 1/3 previously used the car for the whole length of the trip.

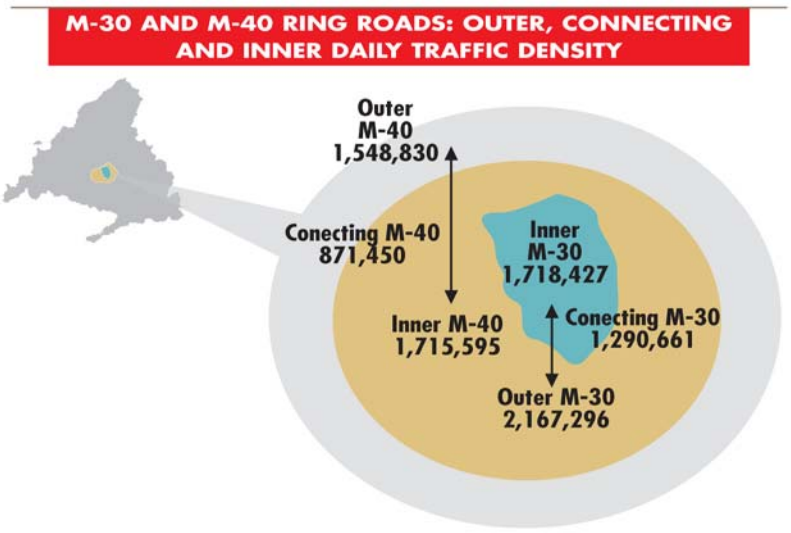


Figure 5.4.3 Daily vehicle traffic in and out Madrid

As the picture above of daily traffic to Madrid suggests there is a potential for the use of Park and Ride. The figures given on the interception of incoming car traffic given earlier support this.
It is accepted that P+R facilities intercept existing car traffic for the whole or part of the trip. Evidence suggests that P+R facilities also induce new trips. In some cases elderly people living out of town afraid to enter the town by car come again by using P+R into town (at least mentioned in some cases in the UK). In other situations where the road capacity more or less equals the amount of incoming traffic research suggests that P+R facilities support the growth in incoming visitors and workers (Groningen, Vienna).
A good Park and Ride policy supports and enhances accessibility.

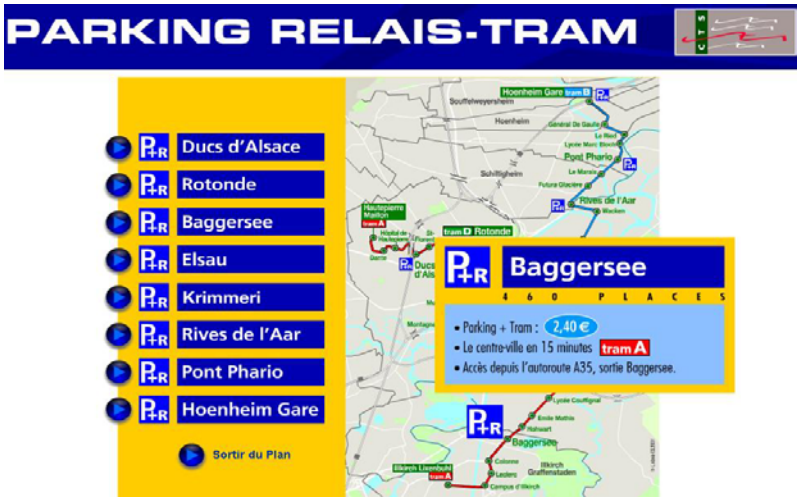


Fig. 5.4.4: P+R facilities on a Light Rail track in the City of Strassbourg (Fr.)
(source Witteveen + Bos, the Netherlands)

The relevance of P+R is clearly presented in the table below.

Table 5.4.3: Number of P+R places related to car-ownership for some cities:

City	Number of P+R-places	Cars / 1000 inh.
Amsterdam	3.166	540
Brussels	2.410	400
Hamburg	13.480	501
Madrid	14.770	414
Milan	12.400	700
Manchester	3.400	369
Munich	20.130	566
Stockholm	11.000	380
Stuttgart	14.924	556
Vienna	33.133	453

source: NÖ Landesverkehrskonzept Park&Ride, Heft 2, October 2002

The effect of the introduction of park and ride (P+R) facilities is general largely dependent on the extent of parking demand and supply at the destination; the attraction of the destination, the accessibility of the facility and quality of transport from the park and ride facility to the destination. High effects (up to 10% of incoming morning peak traffic) are reported in Oxford (UK). Smaller effects are reported in other places.

Some debate was held on the environmental effects of P+R facilities. It turns out to be difficult to come to a firm conclusion. In fact is doubtful whether Park and Ride contributes to the general reduction of exhausts and energy use.
Consensus exists on the fact that P+R contributes to the quality of the city-centre in terms of air quality, reduction of congestion and the enhancement of accessibility.

Figure 5.4.5: A Park & Ride facility at a Light Rail stop in the city of Hannover (Ger.)
(source Witteveen + Bos, the Netherlands)

6. COMMUNICATION AND ACCEPTANCE

Travel behaviour is not solely the product of rational processes. Upbringing, feelings and habits play a considerable role. But upbringing, habits and feelings can be influenced, and when applied appropriately, be used to change travel behaviour. The purpose of this chapter is to present the basic knowledge about communication and campaigns.
Specific objectives are to analyse how to design parking management schemes according to peoples' wishes and to produce recommendations for implementation of parking management. The report is based on the Country Reports and the Case Study Reports within the COST 342-Action as well as on additional information sent by all COST 342 partners. As a result, this report provides an overview of national activities and experiences on the issue 'Communication and Acceptance' on parking management.

6.1 Basics About Communication and Acceptance

6.1.1. Communication Strategies

A communication strategy in general must explain who says what to whom, when and using what medium. The most effective approach is to direct the communication at interested groups and persons who intend to change their behaviour.
Broadly speaking, there are three kinds of campaigns:

- Campaigns to raise awareness,
- campaigns to targeted groups, and
- campaigns to individuals and households.

Campaigns to targeted groups, individuals etc., probably are more effective when public awareness campaigns are carried out in advance locally or nationally, because the public will then be more receptive to attempts at influencing attitudes and behaviour.
To carry out a successful awareness campaign it is necessary to have a basic knowledge concerning peoples' attitudes and on their acceptance of e.g. restrictions on car use. Attitudes vary from major cities to rural districts. If there is a larger potential among some specific groups than others, it is important to identify target groups both with respect to the choice of message and media and also for later use in more targeted campaigns at, for instance, selected companies or households. [1]
Furthermore it is essential to know what stage the general public has reached in the process of behavioural change, as otherwise money will be wasted on campaigns that miss their target.
'The basic goal of communication strategies is to influence the public just sufficiently to tip the balance in the direction of modal transfer and safer behaviour – at minimum expense. Once the balance has been tipped, it is important to maintain the change of behaviour.' [2]

6.1.2 Principles of Communication

In the literature you can find various definitions on the principles of communication. The principles stated below refer to BRÖG [2]:

- Behaviour begins in mind
- Personal concern and social acceptance
- Communication is a process
- Campaign for the campaign

[1] DANISH ROAD DIRECTORATE: Collection of Cycle Concepts. Copenhagen, 2000

[2] BRÖG W.: Changing Behaviour: The Key to the Problem?. ECMT/OECD Workshop. Dublin, December 1999

6.1.3 Communication Process

Public and stakeholder groups should be engaged within all stages of the implementation process. The main stages of this process can be summarized as follows:

- Agreement on problems and objectives
- Scan of options
- Decision on schemes
- Implementation process (policy)
- Post scheme monitoring and evaluation

In general, four forms of engagement can be highlighted within the communication process [3, 4]:
Information: Facts about traffic & environment (air quality etc.)

Campaigning: Aiming at awareness and traffic behaviour

Consultation: Experiences on best practice (alternate solutions)

Participation: Interactive form of communication

The communication process in practice should result in an appropriate mix of communication forms concerning the aspects of information, campaigning, consultation and participation. Furthermore attention has to be paid on the use of appropriate techniques which depends on both, the type of stakeholder and the stage of the process.

6.1.4 Definition of Acceptance

In general a measure is accepted if the receiving of what is offered is perceived with approbation and satisfaction. Based on research, the question whether a measure is accepted or not can be answered through two different approaches.[5]

a) Attitudinal Acceptance

A measure could be considered as being accepted if the target person or target group states it would accept the measure (attitudinal). This definition has a rather hypothetical character and is based on declared positive attitudes towards a measure. Attitudinal acceptance can be assessed by carrying out empirical surveys based on questionnaires, interviews or group discussions etc. A variety of different survey types and methods is available within this approach.

b) Behavioural Acceptance

According to a more rigid approach, it could be argued that a measure is accepted if the behavioural response of the target person or target group proves it. In contrast to the attitudinal acceptance, this is an ex-post point of view, which defines the desired and envisaged behavioural response pattern beforehand.

Both concepts have advantages and disadvantages: '*While the attitudinal acceptance is a rather hypothetical concept and has to rely on declared attitudes, choices and preferences, the behavioural acceptance can easily lead to a misunderstanding of behavioural responses as acceptance although the responses might rather reflect necessities or non-choice (i.e. capture) situations.*' [6]
Furthermore, talking on acceptance we also have to distinguish between different groups stating their acceptance. For this, two different groups can be figured out:
On the one hand side, the individual interests of each citizen and their individual perception of advantage and disadvantage, resulting from the implementation of any policy (e.g. parking policy). On the other hand side, the organised interest groups and their lobbying power both on the public and on political decision makers.

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[3] JONES,P.: Acceptability of transport pricing strategies: Meeting the challenge. University of Westminster, Transport Studies Group, London. Presented at a lecture at the MC ICAM Conference Dresden 2002

[4] Dutch Ministry of Transport: Transferia - a guide to preparation and realisation. Ministry of Transport, Public Works and Water Management; The Hague, 2000

[5] PATS, Final Report August 2001, p.17-20

[6] PATS, Final Report August 2001, p.18

6.2 Main Results in Brief

The main results concerning the aspect of communication can be summarized as follows:
There exists a serious lack of information for citizens respectively car drivers concerning the following three aspects mainly.

- the purpose of revenues
- the whole idea of parking management
- the fact that parking management does not mean an additional tax

On the other hand a successful participatory process on parking policies can be figured out in several cities, such as:

- the 'Werkstadt Basel' in Switzerland, where multidisciplinary groups worked out ideas and possible measures, which resulted in 195 accepted realisable measures in various fields. 61 of them were directly put into action.
- the planning process in Groningen (NL)
- the broad communication process in Delft (NL)

MOBILITY CARD SAARBRÜCKEN (D)

In 1998 the public transport system in Saarbrücken, together with the municipal car-park operator, developed the Mobility Card Saarbrücken. The Mobility Card was a monthly ticket that for the price of ca EUR 30 per month entitled the buyer free use of all means of public transport in the Saarbrücken area plus 8 hours of free parking in one of the city car parks per month.
The action was widely and intensively promoted by free publications, advertisements and leaflets with the help of an adequate promotion budget. Nevertheless only some 30 mobility card have been sold. The project died silently after 1½ years.
Although a promising concept, there proved not to be any public acceptance.

The main conclusions concerning the aspect of acceptance, can be summarised as:

- there have been good experiences in Switzerland due to the practiced system of direct democracy (plebiscites)
- higher acceptance is often due to higher intensity of controls (strict controls), and higher fines (e.g. Zurich)
- an evaluation of implemented measures on parking management is not easy to obtain, due to the fact that parking management is a very young discipline, and there is a need that implemented measures have to be in action for a longer period of time to be able to study the impact of parking measures (3 to 8 years)

Providing information and communicating them in an adequate way is an essential key to achieve acceptance by the different interest groups and among the citizen. Among the simple 'technical information' on the rules of parking management providing adequate information also means to publish in an easy understandable and perceptible design:

a) developments and trends on parking management,
b) results of surveys on parking management, and
c) the use of revenues from parking management as well.

THE BARCELONA MOBILITY PACT

In recent years the appeal of Barcelona as a centre for business, trade fairs, conventions and tourism has increased.
Given the increased complexity of mobility management as a result of this, and as a way of favouring a sustainable growth of the city in its role as a commercial centre and service centre, it was decided that a forum should be created to develop solutions to the problem of sustainable mobility which would involve all political, social and economic sectors of the city. This was how the 'Mobility Pact' came into being in Barcelona.
The Mobility Pact is intended as a tool to enable the local administration, different associations and civic groups to build a mobility model for the Barcelona of today and tomorrow.
The basic principles of the Mobility Pact are:

* sustainability
* accessibility for all
* a rational use of means of transport
* improving safety
* adequate planning processes

The plan of the Mobility Pact involves objectives on public transport, quality for pedestrians, promoting bicycle use, the number of parking spaces and their quality, the system of distribution of goods in the city, traffic information, legal aspects, and road safety.

Summing up, there exist very different standards on dealing with the issue 'Communication and Acceptance' on parking management measures, but not in general between the different countries but rather between different European cities. The research on the aspects of communication and acceptance on parking management measures at present is still on a starting level, and there exist further needs on research. Even though the practical experiences from the countries can provide a basis for some general conclusions and recommendations with regard to getting acceptance for parking management, as follows:

6.3 Parking Policy & Communication

Since the complexity of parking is often not understood and accepted, restrictive measures can lead to a general rejection.
Non-coordinated measures can lead to counter-productive effects. Planner as well as parking and transportation manager have to learn that a careful step-by-step approach is better than going too far too soon.
Communication and understanding among all the partners involved is essential to success. Experts have to seek dialogue. They must find acceptable compromises in order to move, little step by little step, in the right direction. The communication process requires an extensive public involvement, and it aims both, „educating' professionals and public.
Communication and information seem to be the relevant key for further improvements in the field of a more powerful parking policy as a part of an integrated transportation planning process. For this:

1. Information and public relation about parking management in general as a part of communication
It is essential to inform the citizen especially about the idea of parking management and not only about technical parameters (e.g. time restrictions and costs).

- Furthermore good experiences were felt in the Netherlands by providing recommendations to municipalities for the development, implementation, organisation, management and assessment of an effective on-street parking policy.
- For instance in Belgium and in Latvia there are efforts to sharpen the consciousness of the citizen. For this, media campaigns are planned on the issue of parking management too.
- In London, extensive media campaigns on parking were undertaken in 1994, 1996, 1998 and 2001. The objective of these campaigns were both to educate the public about the need for parking controls and to explain the consequences of illegal activity.

2. A broad and early participation of institutions and people involved as a part of communication
A broad (multidisciplinary) participatory process will ensure one considers the opinions and objections of all parties and interest groups involved. Furthermore this will be a good platform for creativity and probably also a basis to work out accepted and realizable measures.

- Amongst other reasons, the fiscal gap resulted from the fact that more and more financially strong inhabitants moved out of the city. The authorities were therefore looking for ways to maintain quality of life in Basel in the long run. Within the project 'Werkstadt Basel' the so called 'Consensus Conferences' were established in the 1990s the urban canton of Basel-Stadt (CH) was faced with financial: multidisciplinary groups worked out ideas and possible measures. As a result of this participatory process, the government presented an action programme for the city's development ('Aktionsprogramm Stadtentwicklung Basel-Stadt') with 195 accepted (realisable) measures in various fields. These measures are categorised as projects, concepts or goals/ideas. There are 61 projects, i.e. measures that may directly be put into action (e.g. appointment of a delegate for parking matters; implementation of a Park & Ride ticket; replacement of parking slots above ground in residential areas by subterranean car parks).
- In Switzerland there is also a focus on voluntary agreements between authorities and private owners to avoid legal disputes. This procedure became very successful (e.g. Publication of a handbook on the 'Implementation of parking policy measures'; 'Access Contingent Model' in Zurich)
- In the Netherlands many actions have been undertaken concerning the participatory process in case of parking policy. There exist several detailed publications concerning implementation strategies (e.g. by CROW). Public discussions and open planning processes were judged as very successful, so that as a result, the awareness of measures on parking policy has been improved as well as the communication between the different parties concerned. Furthermore there was initiated successfully the issue of parking at the company in several Dutch cities.
- In Vienna there has been established a „Parking Area Management Commission' (a platform of involved institutions), by means of which the process of implementation was speeded up. With a total of 27 commissions meetings and over a period of 8 years, large-scale parking management has been implemented.
- A broad participation in general is embodied in the United Kingdom. Local authorities have as well to consult and to advertise their proposals as to consider objections before deciding whether to proceed and make the order. For this, households are informed by leaflet drops and public meetings are arranged.

3. A monitoring process in the course of implementation as a part of communication
A monitoring process can show evidence on economic prosperity, accessibility and the quality of life like the 'Haarlem town centre monitor' in the city of Haarlem (NL). Furthermore, the traffic relevant behaviour of people after implementation of specific measures does not necessarily correspond with the behaviour people stated before the implementation (e.g. Vienna).

- In Vienna a 'Before-After' survey indicates the differences of the stated behaviour and the actual behaviour on the implementation of parking management in Vienna. Summing up, the acceptance after implementation was considerably higher than stated before. For the non-residents the negative attitude decreased from 68 % to 54 % whereas positive opinions increased from 16 % to 40 %. The positive attitude of residents increases after implementation to 67% (from 46 % before implementation), while the negative attitude decreased from 34 % to 30 %.
- In Haarlem (NL) an instrument ('City Center Monitor Haarlem') has been established to test the results of municipal policy, and for this particularly the policy concerning the public space. An agreement on specific parameters has been prepared and traced (e.g. drop in the number of visitors; the share of visitors from outside the region; turnover). In case of exceeding them, joint discussions would have been held to decide whether additional traffic measures are necessary or not. As a result the monitor appears to be an instrument that contributes to the businesslike discussion between market and government. Finally, results of the monitoring process have been moved into action.

4. Management of complaints as a part of communication
There should be a possibility for citizens to state their objections and their worries on the case of parking management (e.g. Linz, Groningen).

5. New forms of co-operation as a part of communication
A new form of discussion is a basis for a new form of co-operation. A co-operative talk on an informal level between politicians and citizen will induce a better understanding for each participant. As a rule it is easier to get a higher acceptance through voluntary agreements than through legal restrictions and punishment.

6. A referendum as a part of communication
A referendum gives a clear vote of the citizens` view, and a clear assignment to act for politicians (e.g. referenda in Swiss and Italian cities). A clearly stated question is a precondition for a referendum.

7. Improvement of public transport and a redesign of public space as a consequence of parking management (as a part of communication)
Due to a redesign of public space (e.g. cycle tracks, green spaces, pedestrian zones) the effects achieved will be visible and acceptable for all citizens.

6.4 Parking Policy & Acceptance
The practical experiences from the countries provide some general conclusions with regard to getting acceptance for parking management[7].

1. Acceptance relates to received information
A cornerstone of acceptance for travel demand management measures is information. In many cities the information content is very often reduced to technical parameters. But people have to know and understand projected measures. They have to be aware of the background (e.g. to pay the true costs of transport - including external costs), the aims (reduce congestion, environmental objectives, safety considerations etc.) as well as the specific way, how the measures are implemented in practice. A main fact also relates to the source (e.g. institution, media), where the information comes from. Is the source or its image accurate enough to the target groups?

[7] Following at the EU-projects PRIMA (PRIcing Measures Acceptance) and AFFORD (Acceptability of Fiscal and Financial Measures and Organisational Requirements for Demand Management)

OXFORD (UK), opinions and communication

Introducing 'decriminalised parking' in Oxford caused at first vehement, often negative, reactions during the public consultations about this subject. Especially the introduction of a charge for residents' permits met with so much resistance that it was decided to abandon this charge.

After introduction of the parking measures most car drivers appeared to be aware of changes in parking enforcement. The measures caused an increasing compliance with the parking rules, and a decreased tendency to park illegally. During the evaluation study comfort appeared to be the main reason to choose a certain parking location, followed by availability and parking duration. The price of parking charges has very little influence on this choice.

Public opinion did not react strongly on the measures taken. Despite negative press reactions public reactions were mainly focussed on other subjects concerning traffic and transport. An initially poor level of communication between the Council and the public, for instance concerning the enforcement of parking regulations during heavily attended public events, caused some bad feelings. However, improvements in the handling of such situations led to better public relations.

2. Acceptance relates to perceived benefits

The traffic problems of the city must be evident and it must be demonstrated that parking management is the best way to complement other measures and thus to handle the problems for users as well as non-users. Parking management should rather be perceived as a 'facilitating' instrument and not as a kind of punishment.

People are used to regard public roads as 'free' goods, therefore there will be strong emotional resistance to any attempt to charge for them. If you want people to accept charging for road use or parking there must be very good and convincing reasons.

Lüneburg, mixture of short-time and residents parking leads to relieving parking-pressure

After extension of parking regulations to the whole city centre of Lüneburg (before only a part of the city centre was managed by paid parking) it appeared that commuter-parking tended to move out of the city centre. The parking opportunities for short-term parkers on-street improved, whereas in public car parks no significant changes of parking space occupancy could be observed.

3. Acceptance relates to availability of alternative modes of transport

The practical experiences in all these countries show that a sufficient supply of public transport should be part of a policy package on introducing parking management.

4. Acceptance relates to the revenue allocation

An important issue with regard to the acceptance of parking management belongs to the use of the money. People often seem to feel that the revenues raised are just another form of taxation imposed on the motorists. They are afraid that the money will vanish into the 'black hole' federal or municipal budget without any evident profit for the payers. Perhaps this is one of the reasons why restrictive schemes like access controls have a higher acceptance than pricing schemes. People want to know what their charges are used for and what is the benefit for them. The revenues should be allocated to the transportation sector (e.g. in order to improve public transport).

5. Acceptance relates to the level of surveillance

The controls on paid parking are often not done very strictly. The consequence is a high rate of non acceptance in the form of illegal parking or the substitution of the motorists destination.

- The privatisation of parking controls in the city of Berne can be considered as very successful. As a consequence to the periodic controls of the time restricted 'Blue Zones' the parking discipline became much better. Before privatisation the police enforced the controls, which were not done as often as they are done right now, due to a lack of capacity to fulfil this task on a regular basis. Furthermore this measure lead to a reduction of control costs of more than 20 %. Due to the good experience with the outsourcing of control and enforcement of parking regulations in the city of Berne, other cities will probably follow (e.g. Biel).
- In London almost all enforcement of parking regulations was delegated to the London boroughs in 1994. An increase in enforcement efforts resulted in the fact that the number of penalties for illegal parking doubled within a period of eight years. As a consequence there was a significant increase in compliance with regulations. Due to that, additionally safety benefits for all traffic participants were observed within Central London.
- Examples of various cities show, that controls on paid parking are often not done very strictly. For this there is a high rate of non acceptance in form of illegal parking (e.g. In some countries parking offences are not followed by the court). Though politicians and experts agree on the importance of parking management implemented in mobility policies, very often no strong efforts are done to realize specific concepts on this issue.

6. Acceptance relates to the level of parking fines

For this, the amount of illegal parking also presents an indicator for acceptance.

- In several cities in Switzerland the parking fines have been raised dramatically in the end of the 1990s (e.g. in Bern, Lausanne, Zurich). In Zurich for instance in 1996 parking fines were doubled. As a consequence parking time limitations are more respected (in residential parking zones) and thus the parking time reduced. The number of illegal parking decreased strongly.
- In U.K. the increased chance of receiving a penalty is considered to be a more effective deterrent to illegal parking than the size of the fine in its own right.

7. Acceptance relates to innovative projects

In general it has to be emphasized that innovative projects (Charleroi, Helsinki, Madrid, Berne, etc.) can contribute to a higher acceptance of parking management due to a higher discipline concerning regulations of payment issues and time restrictions for both, on-street and off-street parking.

- In general it has to be emphasized that innovative projects can contribute to a higher acceptance of parking management due to a higher discipline concerning regulations of payment issues and time restrictions for both, on-street and off-street parking. So new technical developments have to pass the practical test, and for this some systems not always seem to be practical and suitable to the desired demands.
- For parking there have been introduced advanced payment methods with magnetic cards or contactless smart cards in several European cities (e.g. Helsinki, Bologna, Oporto, Madrid). Furthermore pilot projects on payment of parking fees by mobile phone are underway. Innovative measures like those mentioned above aim at reducing the efforts of car drivers in handling the payment procedure for parking; for this it also is expected to increase the payment discipline of the clients.
- In Charleroi (B) the Vigiville-System was tested successfully and will therefore be continued over the next few years too. The advantages of this system exist in the impossibility of using a parking lot without paying because of an automated barrier. For this no additional controls are necessary anymore. Additionally this system offers also a high prevention against the theft of vehicles.
- In Zurich (Zurich-North) a very special project was initiated with the so called 'Access Contingent Model'. The aim is to optimize the use of capacity from several car parks located on a new urban development area. For this the purpose of these car parks is a multifunctional one, this means for the usage of different user groups. To fulfil this aim the number of slots is not limited anymore, but the number of in-going and out-going cars per day. A bonus/penalty system for the operator of the car park regulates the system. The 'Access Contingent Model' is based on an agreement between several partners. Today all partners share the opinion that the model is a success and meets the needs of landowners, investors and customers, as well as the local authority's policy on traffic management.
- Berne: It is planned to implement a so called 'Integral Traffic Management System' (TMS). With this new system the city of Berne tries to achieve the objectives of avoiding, shifting and guiding motorized traffic. The aim of the TMS is to measure the traffic flow already at the outskirts of town, to protect residential areas from commuters, to maintain traffic flows on the basic network and to shift parking places in the pedestrian areas of the central business district of Berne to car parks.
- Several positive effects have been achieved due to the installation of a dynamic parking guidance system (e.g. Helsinki, Göteborg, Madrid, Vienna, Berne). The time needed to get a free parking slot could be reduced and for this customers are using the car parks more often (e.g. Berne).

8. Acceptance relates to the communication efforts

Communication efforts should already be initiated in the very beginning of the decision making process. The starting point for introducing parking management should be a political and public discussion on traffic problems and a discussion on general objectives of the urban transport policy.

- A broad communication process has been established in the city of Delft (NL). The local authority has been working on improving the city centre in close co-operation with local residents, retailers and private companies.
- An open planning process for a duration of one year has been initiated in the city of Groningen (NL), consisting of several building blocks, starting with a performance (a Political Theatre). The idea of the Political Theatre was to give an insight of the political decision making process to the public.[8] Furthermore a complaints counter was established.

9. Acceptance not mainly relates to the level of charges

Experiences from cities indicate that acceptance does not mainly depend on the level of charges.

[8] COST 342/18 Rev.1 NL, p. 45-57.

10. Acceptance of parking management schemes depends on earlier parking management experiences.
EU-support for activities aiming at dissemination of experiences between cities and countries is an important fact within this issue.

Interesting supportive evidence on the relevance of communication can be drawn from an analysis of the Dutch cases as presented in figure 6.3.1

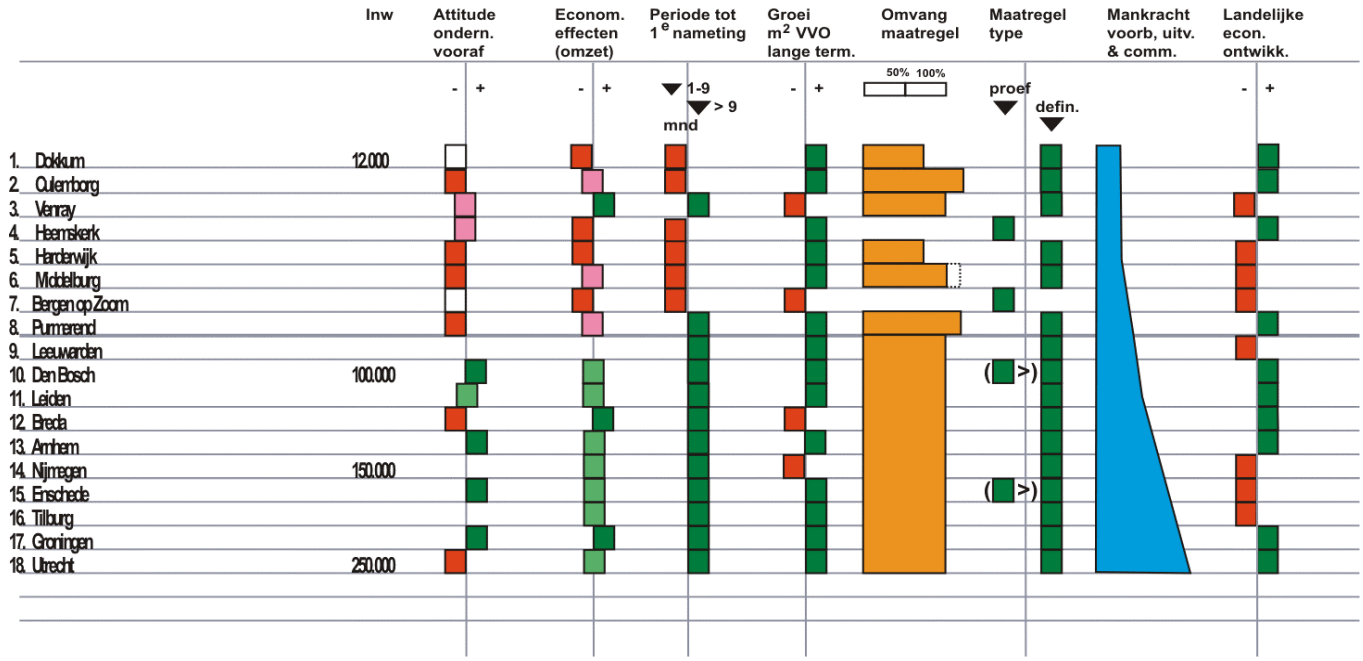


Figure 6.3.1. Effects of parking policiy measures in 18Dutch cities (source: CROW-publication 159)

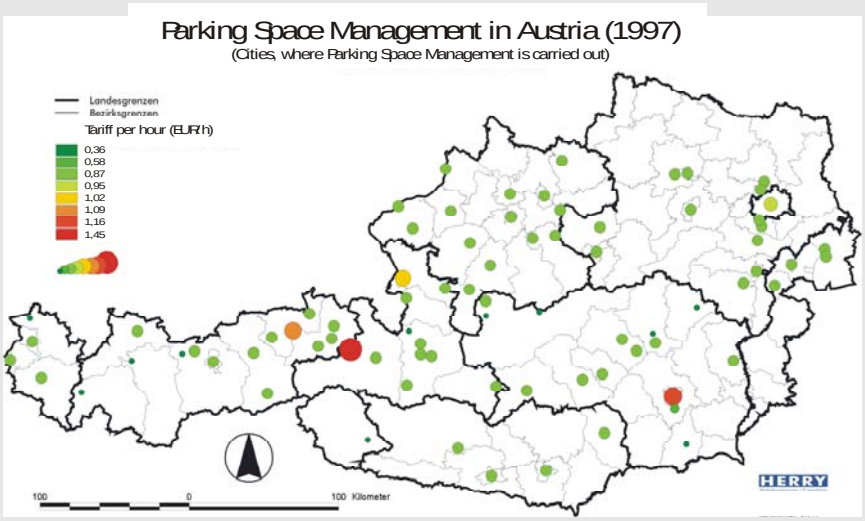
1st Column	Names of cities in climbing order of number of inhabitants
2nd Column	Number of inhabitants per town
3rd Column	Attitude of entrepreneurs before measure
4th Column	Initial effects of measure on gross sales
5th Column	Time passed between actual measure and first ex-post evaluation
6th Column	Long term growth of gross floor space
7th Column	Carrying out of measure: 0% = taken back; <100% = only partly implemented, >100% = measures extended)
8th column	Measure type: temporary (left) permanent (right) and two (row 10 and 15)turned from temporary into permanent
9th Column	Indication of available manpower for development, implementation of and communication about measures at local authorities
10th Column	Indication of national economic development at the moment of implementation of measures

The conclusion one can derive from this picture in terms of communication is that it is important to have enough manpower available to develop and promote the measures.
In the larger towns there were hardly any (initial) negative reactions and all measures were carried out in full.
In smaller towns there is much opposition from the start resulting in alteration or turning back of measures.

An explanation seems to be that because of shortage of manpower the preparation and the support of the measures lacks stamina.

7. EFFECTS ON MOBILITY

AUSTRIA; Area-wide parking management leads to better functioning parking facilities
The increase of motorisation and shortage of parking capacity, as well as requirements of business and shopping related traffic made an area wide management of inner city parking facilities necessary in many Austrian cities.



Usually the main characteristic of area wide parking management is the introduction of paid parking. Residents and entrepreneurs of the zones under management are entitled to apply for an exception permit. The objectives of area wide parking management in cities as Wiener Neustadt, Graz and Linz were to decrease long-term parking, to decrease search-traffic looking for a free parking space and to offer an improved parking situation to residents and short-time parkers. In most cases paying for parking is obligatory on Monday to Friday (morning and afternoon) and on Saturday-morning.

In Wiener Neustadt a survey was undertaken to find out what impact the introduction of the new management scheme had had. This led to the following findings:
* Residents applied for slightly more exemption permits than was expected before introduction of the scheme, but this did not lead to essential changes in parking behaviour.
* Of the employees who were used to park their car in the area before, after introduction of the scheme 38% had parked in a neighbouring area, 33% shifted their parking location to a private carpark/ -garage, 23% used other means of transport (in Wiener Neustadt, with its 40 000 inhabitants these were mainly walking and bicycling), and 8% still parked on-street illegally.
* Visitors were the main beneficiaries; they used the short-time parking zone and private parking-structures. In less cases than feared beforehand they diverted to neighbouring areas that still had free parking.
* The average occupancy rate of the parking facilities in the area decreased from 91% to 70%, resulting in better operation of the parking capacity and decreased search-traffic.
* Visitors have a mainly positive opinion with regard to the measures taken, whereas employees were mainly negative. Residents have mixed feelings: 53% were positive because it has become more easy to find a parking space, but 40% were negative , mainly because of the costs, without getting a guaranteed parking space in return.

In spite of this mainly positive opinion the majority of each of the groups rejects an enlargement of the restricted area. An important consideration is that the situation in those areas is not urgent enough to introduce parking management there.

Parking policy measures definitively do have an effect on (car-)mobility. The extent must neither be over- nor undervalued. Yet in general a reducing or mitigating effect is found. An interesting result on research on how parking management influences mobility comes from Vienna.

7.1 Vienna experience: 'intensive parking management = better mobility

In order to find out the effects of parking management in Vienna ('Parking Space Management') on the traffic behaviour of the persons affected, extensive interviews were conducted in the form of 'before-after' studies.[9] Before and after the introduction of management of parking places the same persons thus were asked (residents, employees, persons taking care of private or official business) who have been going by car, own one and park it in the public street space. Separated into residents and visitors (the latter including persons on errands and employees) the intended change in behavioural patterns was compared with the real change.

Figure 7.1.1: Declared change in behavioural patterns due to Parking Space Management in the 'BEFORE' survey (inhabitants)

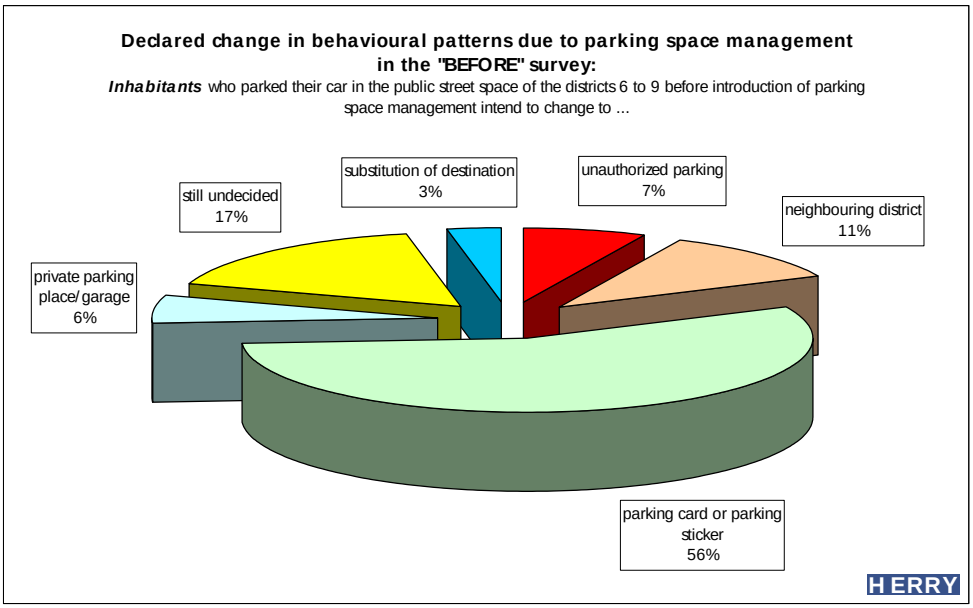
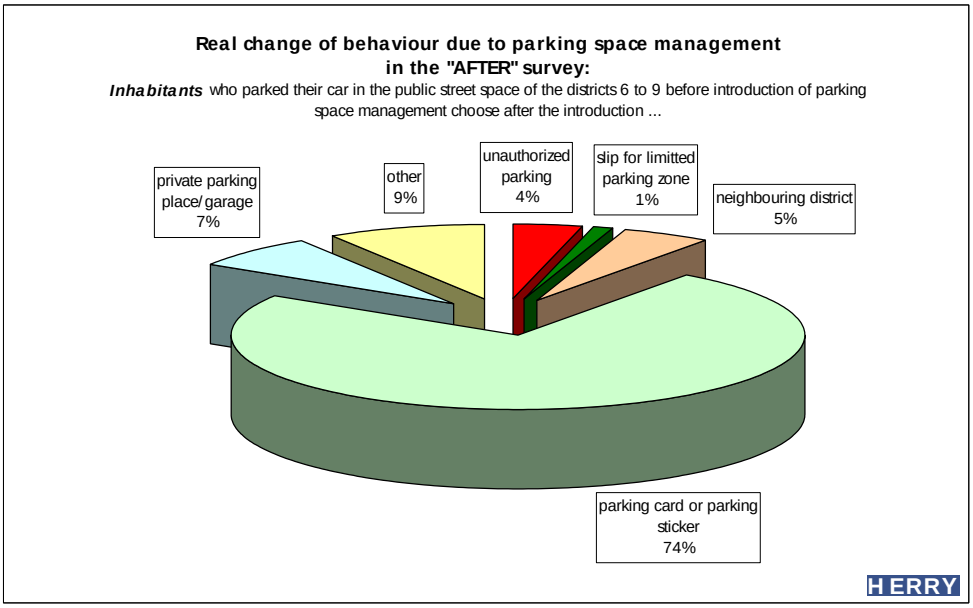


Figure 7.1.2: Real Change in behavioural patterns due to Parking Space Management in the 'AFTER'-survey (inhabitants)



[9] COST 342/18 - A Rev. 1, p. 62.–68.

Figure 7.1.1 shows the results of the ‘before’ questioning, with the reported changes in behavioural patterns as a result of management of parking places. This concerned residents who have been parking their car in the public street space of the districts 6 to 9.

Figure 7.1.2 shows the results of the ‘after’ questioning of residents affected in the same district. What it tells us that the people that parked their car in public streets – regarding their parking behaviour - much better live up to expected behaviour then they suggest in a ‘before situation’.

Figure 7.1.3: Declared change in behavioural patterns due to Parking Space Management in the BEFORE-survey (visitors)

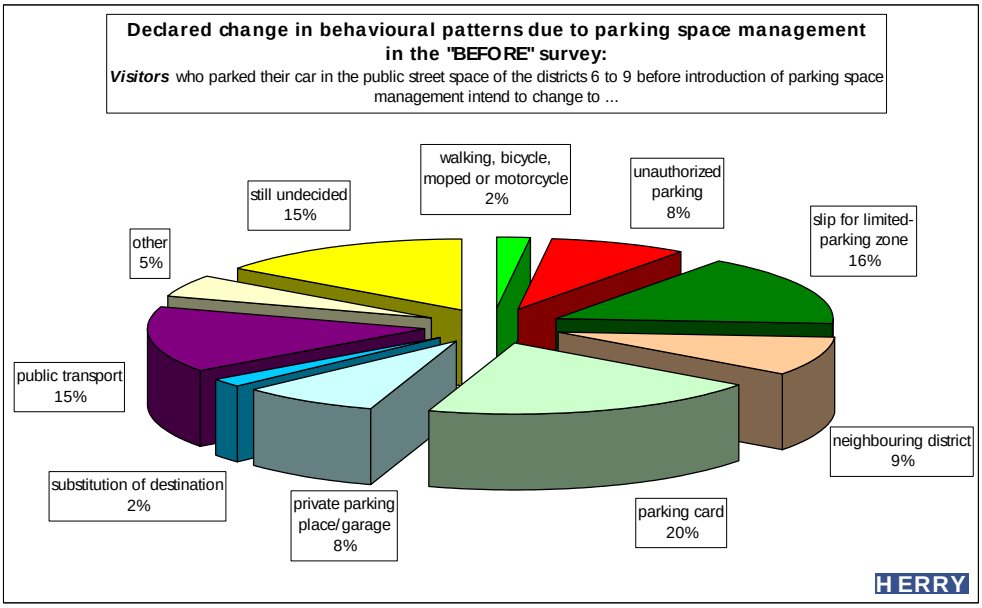
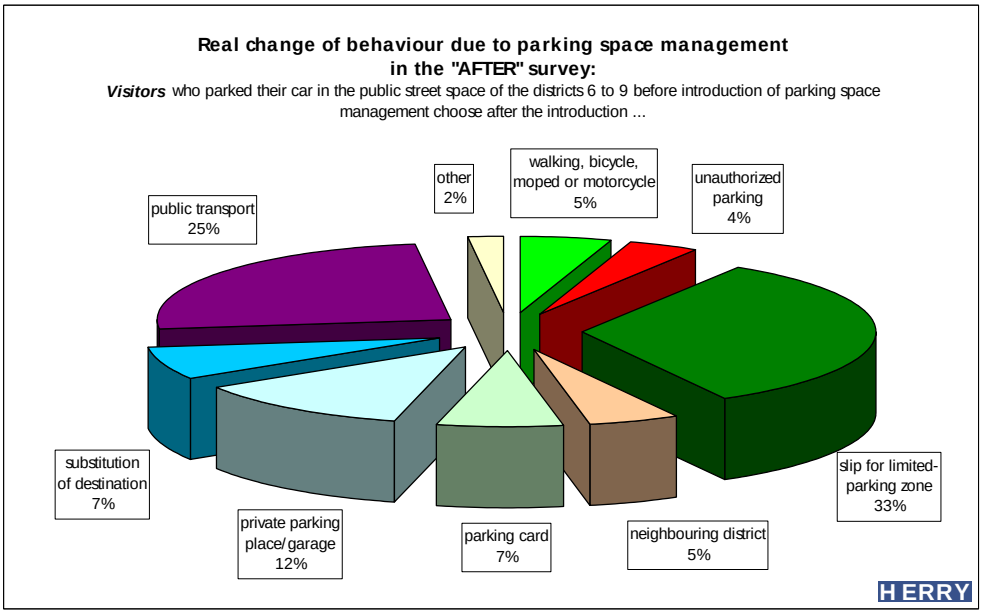


Figure 7.1.4: Real change in behavioural patterns due to Parking Space Management in the ‘AFTER’-survey (visitors)



Also the figures 7.1.3 and 7.1.4 show that people act much more 'law abiding' the is indicated in the before. We see change to alternatives modes of transport and much less illegal parking then expressed in the before situation. The same general message as presented in figures 7.1.1 and 7.1.2.

Figure 7.1.5: Visitors by car, INTENDING to go by public transport after introduction of Parking Space Management

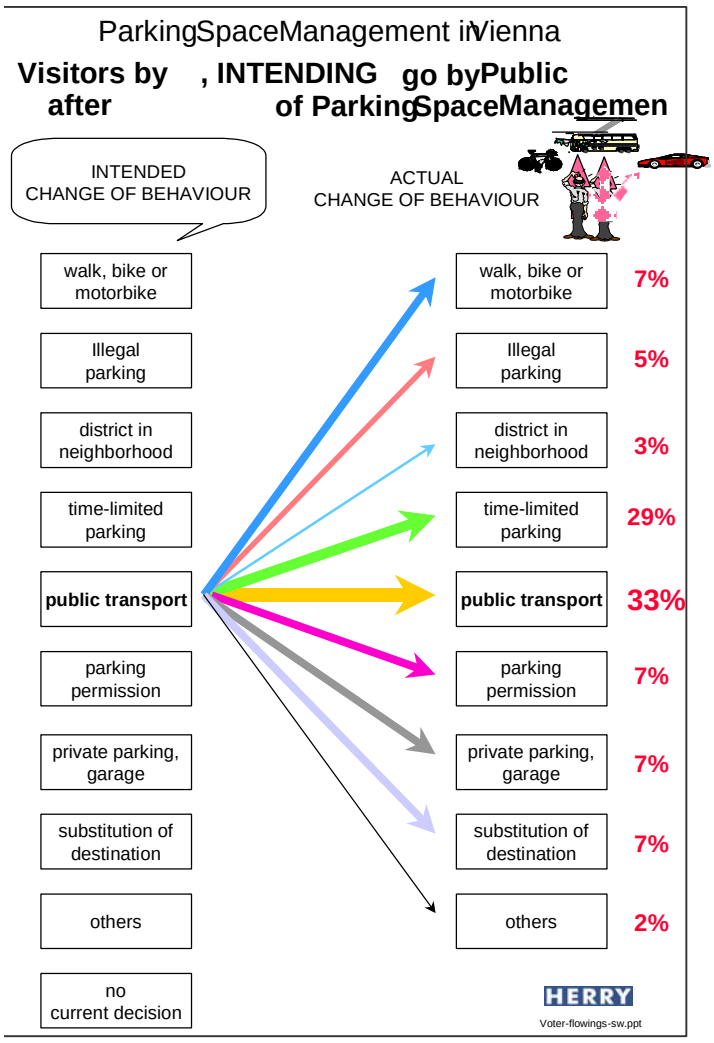
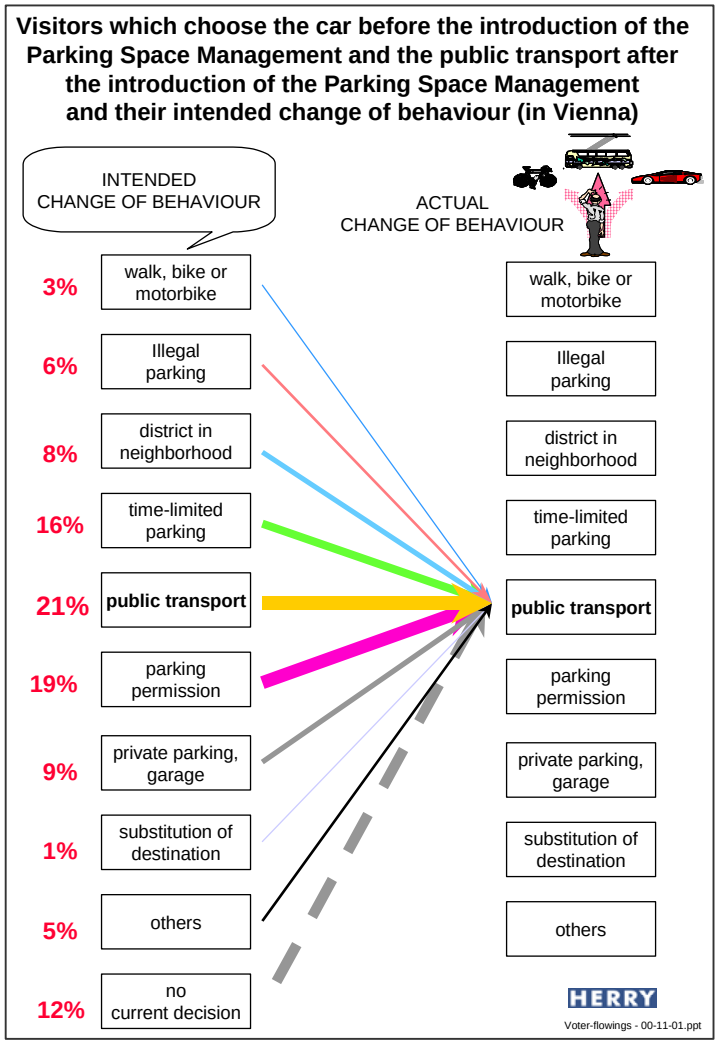


Figure 7.1.5 and 7.1.6 show:

- what decision was really made by those visitors who after the introduction of the management of parking places stated that they would go by public transport and
- what traffic behaviour was intended- before the introduction - by the users of public transport for the time after the introduction of management of parking places.

The real reorientation to the means of public transport by the visitors (employees and persons with errands) after the introduction of management of parking places in the district 6 to 9 amounted to 25%. This shows that public transport is now being used by one quarter of the drivers who before the introduction of the system had come by car to these districts.

Figure 7.1.6: Visitors who choose the car BEFORE introduction of Parking Space Management and took public transport AFTER introduction of Parking Space Management and their INTENDED change of behaviour



However, only 5 % of this has been contributed to by those drivers who had stated before the introduction of management of parking places that 'thereafter' they would go by the means of public transport. There is thus a rather vast difference between perception of reality and 'real' reality.

The effects of the management of parking places concerning the extent of utilization can be summed up as follows:[10]

- In the morning (between 9:00 and 11:00) use of the parking places has decreased by about 25 % in all the districts under management;
- In the evening (8:00 to 10:00 p.m.) this reduction amounts to about 10 %;

It is a striking fact that the 'after' extents of utilization are roughly the same in all the districts, despite different 'before' extents of utilization. They amount to about 70 % in the morning hours and to about 90% in the evening. An exception to this rule is the 8th district with an extent of utilization by between 5 and 10 % larger, both before and after introduction of management of parking places.

[10] COST 342/19 - A Rev. 1, p. 69.

Figure 7.1.7: Extent of utilization of parking places in the public street space – 'BEFORE'and'AFTER' introduction of Parking Space Management (period from 9:00 to 11:00 a.m.)

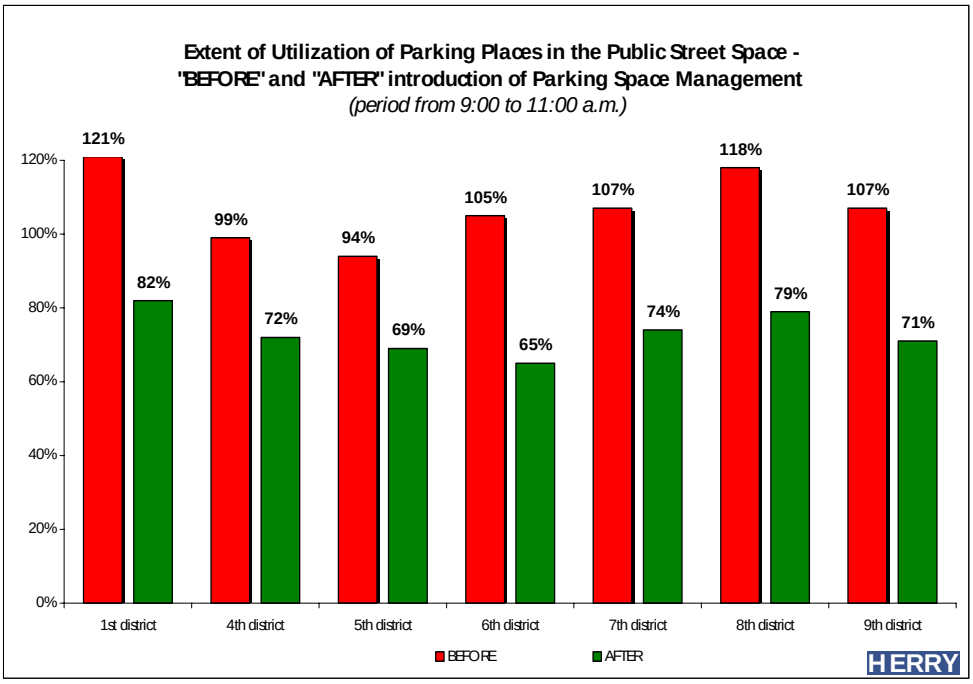
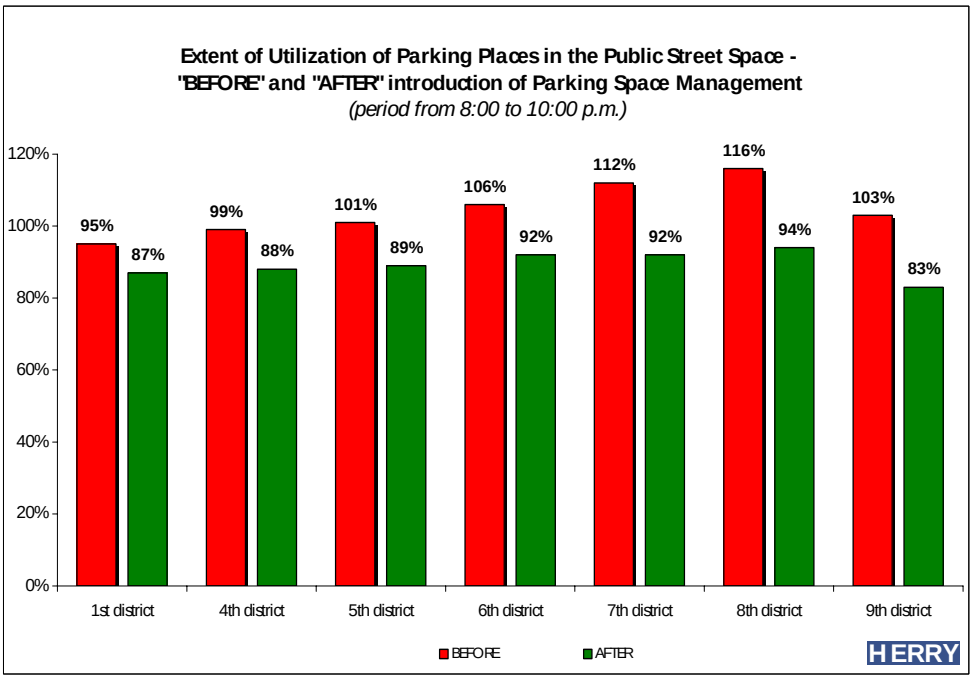


Figure 7.1.8: Extent of utilization of parking places in the public street space – 'BEFORE' and 'AFTER' introduction of Parking Space Management (period from 8:00 to 10:00 p.m.)

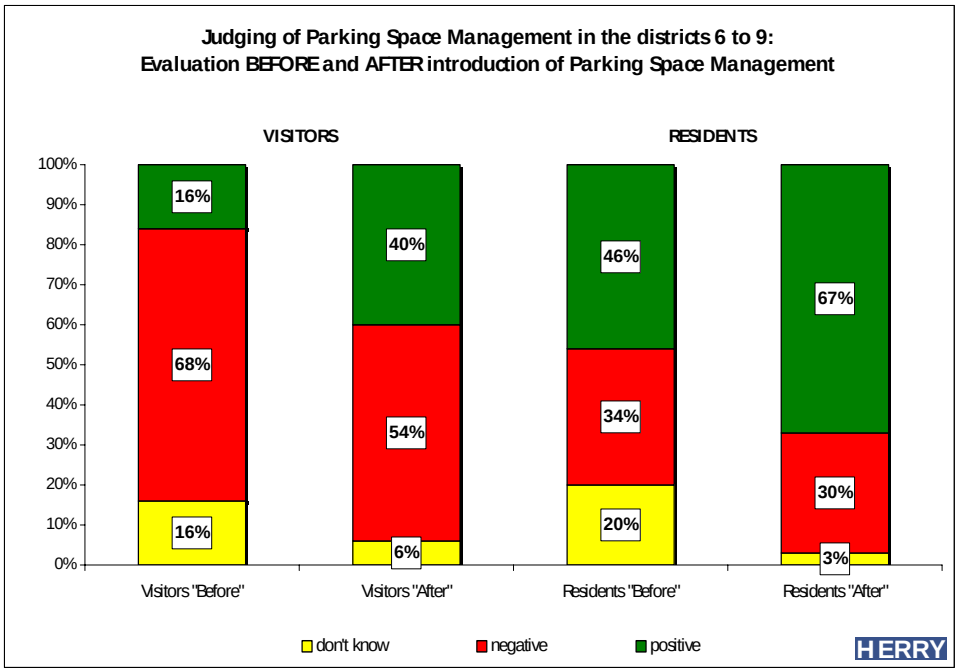


On first inspection it may seem surprising that, in the evening too, the utilization of the parking places has decreased although the duration of management ends at 7:00 p.m. (in the First District) and, respectively, at 8:00 p.m. (in the districts 4 to 9). There are two main reasons for this:

- Before the introduction of the management of parking places many residents used to park their ca r in the public street space, even if they had a private parking place.
- After the introduction of management of parking places more company vehicles have been parked on the firms' own parking places and, on the other hand, there has been considerable evasion to the neighbouring districts.

Of importance is also the exact knowledge of the effects in terms of the volume of traffic in the secondary network of streets [11]. The major part of the search for parking places happens in these streets. It was ascertained in the course of the 'before-after' examinations of the situation in the districts 6 to 9 that the volume of traffic in their network of secondary streets diminished by about 26 % after the introduction of management of parking places.
After the introduction of the system traffic in search of parking places [12] decreased from annually 10 million passenger car kilometres to annually 3.3 million kilometres, that is, to one third. While before the introduction of the management of parking places this kind of traffic accounted for 25 % of the total volume of traffic, it now accounts for only 10 %. It was ascertained in the districts 6 to 9 that the average time it takes to find a parking place has been reduced from about 9 minutes before the introduction of management of parking places to barely 3 minutes now.

Figure 7.1.9: Judging of Parking Space Management in the districts 6 to 9: Evaluation BEFORE and AFTER introduction of Parking Space Management



Due to the introduction of the management of parking places in the districts 6 to 9 the extent of the use of cars [13] when looking for parking places in the public street space of the areas under management has decreased by about 18 %. A comparison with the situation in the First District after the introduction of the system shows that the volume of passenger cars traffic there has been reduced by about 20 %.
Implementing measures of traffic policy it is also necessary to know not only what the effects really are, but also to state the opinion of the persons affected.[14] This shows whether they are satisfied with

[11] COST 342/19 - A Rev. 1, p. 75.
[12] COST 342/19 - A Rev. 1, p. 75.
[13] COST 342/19 - A Rev. 1, p. 75.
[14] COST 342/19 - A Rev. 1, p. 77.

the implemented measures or not. In order to trace this, the persons affected (residents and visitors) were interviewed in the districts 6 to 9 on how they judge the introduction of parking management.

- The residents living in the districts concerned manifested a slight decrease of their negative attitude (from 34 % to 30 %) whereas favourable opinions increased from 46 % to 67 %. The main arguments provided an explanation of the positive appraisal were 'less time needed for looking for a parking place' and 'easier finding it'.
- With the visitors the negative attitude decreased from 68 % to 54 % whereas positive opinions increased from 16 % to 40 %.

The expansion of short-term parking and introduction of parking management have resulted in a continuous increase of income from parking fees.[15] In accordance with the parking meter legislation, these proceeds are earmarked for measures to facilitate inner-city traffic and transport.
Between 1993 and 1998, for example, more than 50 parking garage projects as well as the construction of several park and ride facilities were subsidised in accordance with the legal provisions. Alongside several measures to give preference to public transport, the acquisition of City-Shuttle trains of the Austrian Federal Railways was co-financed as a step toward a modal split between individual and mass transport.
The conclusions from this research are thus:

- Traffic volumes have been reduced by levels reported of up to 30%.
- A shift in mode split has been realised. About 30% of the visitors (including workers and shoppers) who used to park their cars in the streets before the introduction, afterwards come by another means of transport (mainly PT).
- A minority of the visitors who used to park their car afterwards shifted destination.

These findings can be seen as more or less representative.

A statement of the EPA: Parking is part of the solution to the urban traffic problem

The European Parking Association (EPA) represents the parking associations of 18 European countries. Its members manage more than 2.7 million parking spaces in car parks and many millions on-street spaces all over Europe.
Based upon their experience with positive and negative examples concerning parking management strategies the EPA issued a statement for the COST 342 project.

The bottom line of this statement is that parking does not increase the 'urban traffic problem' but that it is part of the solution. Without integrated transport system management and adequate technical facilities to regulate traffic and parking our city centres will suffocate, damaging the overall environment and the economic viability of the city centre.

Parking is not an end in itself, it is always derived from some other need. Therefore parking should be an integral part of any city's policy on mobility and accessibility.
Key issues in maximising the impact of parking policies are:

* Parking policies should be seen as an integral part of cities' overall transport strategies.
* Parking charges do not have a significant effect on local economic activity- motorists would prefer to have a parking space at a high cost than no parking at all. On-street parking should be more expensive, or at least have the same charge, as off-street parking.
* Overall accessibility to a city centre and the quality and range of activities in the city centre are more important for economic vitality.
* Parking policies should encourage off-street parking in preference to on-street parking.
* Good enforcement of parking regulations is essential. The primary objective of this is to ensure proper regulations are complied with; the primary objective should not be to increase municipal revenues.
* High quality parking facilities are essential.
* Different cities will require different policies.

[15] COST 342/19 - A Rev. 1, p. 78.

7.2 Parking supply, -demand and mobility

As said earlier, when studying parking it is important to discriminate between residents, workers and visitors. French research (Ceté Nord Picardie) on the growth over time of demand reveals this clearly.

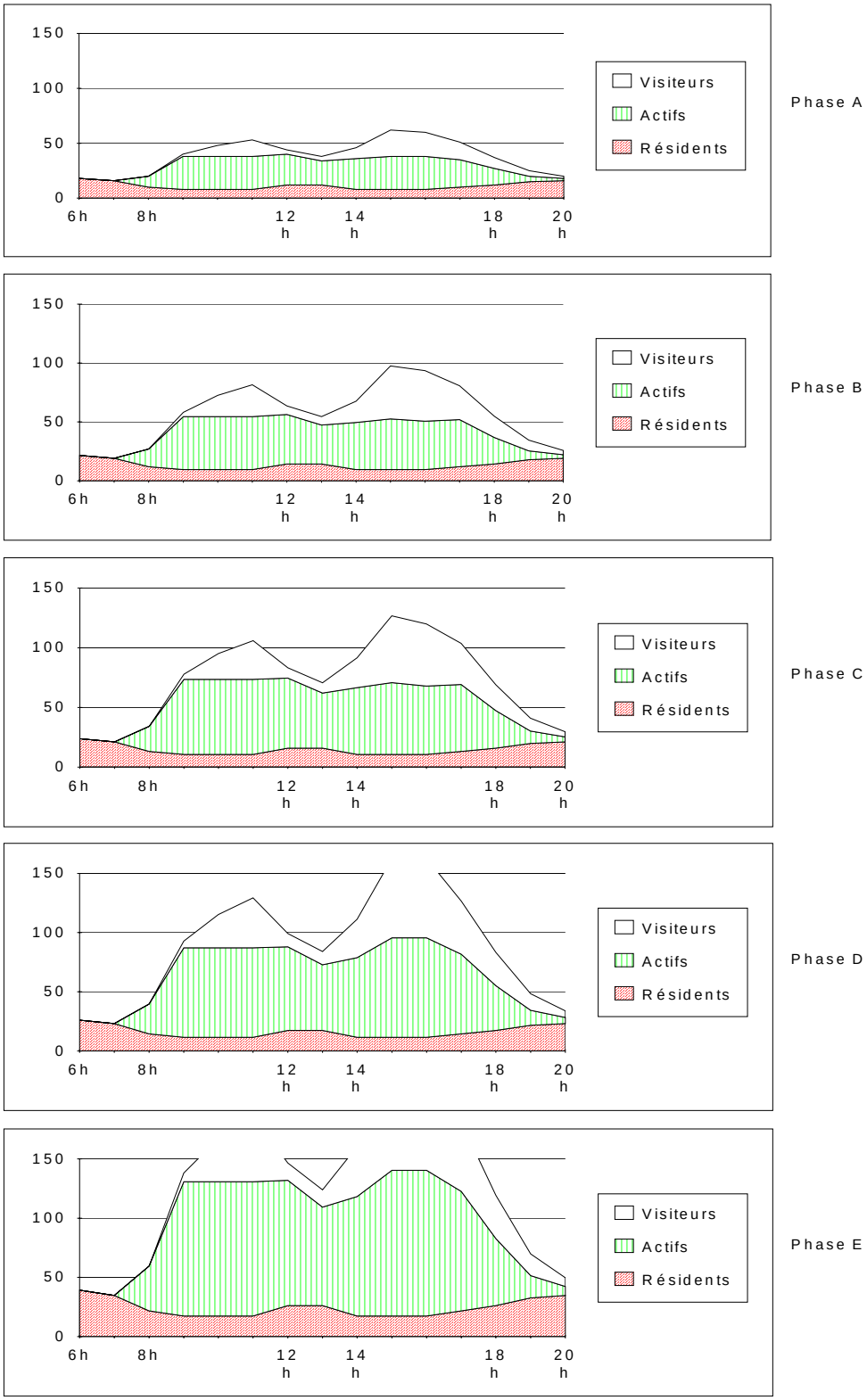


Figure 7.2.1 Growth in parking demand over time.
(phase A low demand, phase E high demand, V= visitors, A=workers, R=residents)
(source: CETE Nord Picardie, Lille, France)

This figure shows clearly two things:

- demand will continue to rise as long as cars can be parked.
- The main driver of the demand is the growth in workers wanting to park.

The graph also shows that if no enforcement is applied illegal parking will grow given the space available.

The picture also explains why restrictive parking measures can be applied to a reasonable level without immediate negative effects.
The workers take the most places and it is the worker for whom alternatives like parking at larger distances or alternative means of transport are the easiest to accept.

THE SWISS CASES; parking as an instrument to manage mobility

Parking policy in Switzerland is changing. In the 1960s and 1970s the main goal of parking policy was to provide a sufficient amount of parking space to meet the rising demand. Environmental damage, congestion and the growing scarcity of open space have led to a rethink in recent years. Starting from the latest findings that the amount of free parking places is a main determinant for road traffic, experts now propose reductions of available parking spaces and improved parking management as appropriate measures in order to slow down traffic growth.
The Swiss cases show some examples how this can work out:
Bern: parking policy as an integral part of the local transport policy
Zürich: parking fees; access contingent in a new development area
Thurgau: introduction of parking fees for all governmental facilities
ski-resorts: considering introduction of parking fees
In terms of mobility some positive effects have been found: in Bern the amount of traffic did not increase, but seems to have stabilized. A slight change in modal choice was found for commuter traffic. In the rural canton of Thurgau however the measures taken had no effects on modal choice. Introduction of paid parking in ski-resorts would lead to diversion of the traffic to other ski-areas with free parking, and subsequently to economic effects. Therefore the costs of parking are incorporated in the fares of the ski-lifts. Users of public transport get a reduction, by buying a ski&rail-ticket.

KÖLN Rathenau-Viertel (D); Resident's mobility-behaviour is not influenced by a change of parking regulations

In the Rathenau-district, directly west of the inner-city of Cologne, parking management and regulation was introduced in 1994. A detailed scheme of parking measures was designed, based upon the principle of separation of paid parking for visitors, and reserved areas for residents parking. During the night, and in some cases also during the evenings residents and also the short-term parking spaces were reserved for residents.
In 1998/1999 this separation between short-time parking and residents parking was changed into a mixed parking-system: all parking-spaces in the area were fitted with parking-meters which allowed a maximum parking time of 4 hrs. Most parking meters were marked with a 'red point', which releases the residents from having to pay a fee.

Surveys show that introducing the paid parking/ residents parking in 1994 led to an increased use of cars by licensed residents because of improved parking possibilities.
The changes in the parking regulations in the Rathenau Viertel did not lead to relevant changes in the demand structure (even though during a transitional period on nearly 50% of the legal parking spaces no regulations were valid). Therefore it can be assumed that the mobility behaviour of residents will not change very much through changed parking regulations.

7.3 Short resume of other findings

In Götheborg (Swe) a clear but small effect on search traffic has been reported.
The same goes for Helsinki and some German towns.

The value of parking

In May 2000 a survey was undertaken in the Helsinki metropolitan area into the effects of parking measures on commuter traffic and shopping trips. A stated preference survey was used, that put questions to respondents about the choice between the car and alternative means of transport (mainly public transport).
The survey shows that car drivers put a great weight on transfers, as a disadvantage of public transport. One transfer is perceived by car drivers as equally important as 14 minutes of actual travelling time (to people travelling with public transport one transfer is equal to 4 to 8 minutes travelling time.)
Walking distance is an important factor. Car drivers in Finland are prepared to pay EUR 0.65 extra if they can park 100 metre closer to their destination. In a similar study in the Netherlands (Zuid-Limburg) similar values were found: when undertaking daily purchases people were prepared to pay up to EUR 0,50 extra to be able to park 100 metre closer to their destination, with recreational shopping this amount is EUR 0,45.
Another subject in the Finnish survey was what effects different kinds of parking measures would have on the share of car traffic in the modal split:
* An increase in parking costs of 30% results in a decrease of car share of 8 to 10%. The effect is somewhat bigger in commuter traffic than in other segments.
* A doubling of parking costs would lead to a decrease of car share of 21%
* If parking costs would always be at least the same as the fares for public transport (many car drivers nowadays can use free or cheap parking facilities at the workplace) car share would decrease by 8%
* If public transport fares would be 30% cheaper car share would only decrease by 2%
* If the walking distance from parking space to destination would be always 400 metre (is now often less) this would lead to a decrease of car share of 9%
* If the walking distance were the same as that of the public transport alternative the car share would even decrease by 13%
* If public transport in-vehicle time were decreased by 15% , the car share would decrease (and public transport share increase) by about 2%
* Less than 20% of car drivers were able to use a direct public transport connection to their destination. If that possibility existed 10% of this group would change to public transport. The overall effect of this would be a decrease of car share by less than 2%.

An important conclusion of this survey is that modal choice will only be influenced to a limited amount by these types of measures. Modal choice and the choosing of a parking location are mainly determined by habit and previous experiences.

Where more parking control also involves the (further) introduction of paid parking another effect will be that commuter (long stay) parking is replaced by visitors (short stay) parking.
These effects are reported for Lyon, Amiens, Lille, Zürich, Bern, Lüneburg, Madrid and other cities.
In fact this is accepted as one of the standard effects of the introduction of better parking control.
The result will be that morning peak-hour traffic will be slightly reduced. That during the day traffic volumes might rise is normally not seen as a problem.

BASEL(CH): company mobility management

The company Novartis is a major employer in the city of Basel. Heavy traffic around the five different company sites in Basel caused by car commuting and travelling between the sites made the company promote the use of bicycles for business and commuter trips. The parking management concept of the company is based on three pillars:

* cut down the supply of parking spaces. The number of parking spaces was reduced and each division of the company was allocated a certain amount of parking space (dependent on distance to be travelled and access to public transport).
* charge parking space: each division has to pay fees for the division's parking spaces to a common driver's pool. The employees however don't have to pay for the use of a parking space.
* offer alternatives: employees who give up a car for commuting and business trips voluntarily are offered a bicycle for free. At the same time the company applies several measures to promote and facilitate the use of bicycles (internal working group, network of bicycle paths at each location and connecting the different sites, special bicycle gates at the entrance, covered bicycle parking, repair service, company-bicycles, promotional activities).

As a result of the integrated parking and cycling policy more than a quarter of journeys to work are now made by bicycle. For its longstanding, systematic and convincing promotion of bicycle use the company was awarded the most cycle-friendly company of Switzerland in 1998.

For Lissabon a clear shift in mode split of workers was reported.
For Lyon goes the same.
For Switzerland (Basel, Zürich, Bern) both effects on search traffic and on mode split have been reported.
For Oxford the effect of bus Park and Ride is said to have attracted over 10% of incoming morning peak hour traffic.
The same results can be found in Berne (CH); Lüneburg, Cologne, Freiburg (Germany)
In fact if one examines all cases presented one finds similar results.
The example in Zürich Nord with a system of maximising the number of daily trips in and out a defined area as a way of influencing the number of car trips by commuters shows the positive effects of this type of measure in the field of controlled parking.

However one must keep in mind:

- all results are found for well defined, specific or specially attractive areas
- reasonable alternatives were available or made available

SWISS SKIING RESORTS; parking policy for leisure traffic

It is estimated that 1/3 of the Swiss population are active skiers and snowboarders. On winter weekends thousands make their way on daytrips to the winter sports resorts, mainly by car (80%). Parking policy may constitute a way to manage the negative side effects: traffic jams, noise and air pollution etc. Skilift operators offer extensive, often free parking facilities.
Customer reactions to a possible introduction of paid parking at -until now- free skiing resorts are mainly negative. With the introduction of a Sfr 40 fee, a majority of drivers would switch to another resort that has still free parking, and 24% would stay home. 29% indicated they would then use public transport. With a fee of Sfr 20 still 55% would change to another resort.
The investment cost for open air car parks in skiing resorts are relatively low. Those costs are at present covered by the income from the skilift tickets. This does not mean that people using public transport to come skiing are also paying for the parking facilities; they can buy a reduced ski'n'rail-ticket which gives them a reduction in using the skilifts. Thus the use of public transport is being stimulated. There is little support for introducing paid parking in skiing resorts. The negative effects on the local economy would probably be striking.

Given all evidence and findings the effects on (car-)mobility of parking policies can be summarised as is shown in the table below.

Table 7. 3.1 Summary of effects on mobility

Type of measure	Target group	Change in number of car-trips	Modal split change towards PT
Reduction long-term parking	Residents	Minor reduction	Hardly 1)
	Workers	Clear reduction	Recognisable
	Visitors	Restricted reduction	Limited
Introduction of residents parking scheme	Residents	No effect	None
	Workers	Clear reduction	Clear
	Visitors	No effect	Limited
Introduction of time-restrictions	Residents	Restricted effect 1)	Hardly 1)
	Workers	Reduction	Clear
	Visitors	Limited reduction	Limited
Introduction of paid parking	Residents	Restricted effect 1)	Hardly 1)
	Workers	Clear reduction	Clear
	Visitors	Limited reduction or even growth 2)	Limited or none at all

Notes:
1. Introduction of time restriction and paid parking is almost always accompanied by residents parking schemes, so residents will not or hardly be effected by these schemes.
2. A proper introduction of paid parking, means in those situation where demand exceeds supply, will turn a usage of 100% and over into a usage of 80 – 90% of the available parking space, meaning spaces are available for the new arriver. The result will be a raise in turnover, which in itself might show as a raise of the number of car-trips.

Remarks:
1. The availability of alternative competing destinations is important for the level of effect on the visitors.
2. The availability of alternative means of transport will effect both the reactions of workers and visitors.
3. Park and Ride is of course one of the ways to compensate for reduction in long-term parking.

(photo: Witteveen + Bos, the Netherlands)

8. EFFECTS ON ECONOMY

Residents and local entrepreneurs are always very involved in parking. Car ownership has increased over the years, and on average every car will be parked somewhere 23 out of 24 hours, occupying on average 3 different parking spaces per day.

Parking opportunities are an important location factor for the local tradesmen. The most important success factors for a shop are however its quality and appeal to the customers. Customers consider accessibility and parking of the city not as a quality, but as a commodity that has to meet certain standards.

Discussions about parking policies – unless this means adding to existing parking supply – are always heavily influenced by the opinions on how this might affect the local economy. Very often resulting in a difficult political debate with unclear results.
The notions and opinions in this debate are very often mixed, fixed and based on partial information if any.

LYON (F): restraining long-term parking to improve economic viability

The Lyon-conurbation has an intermunicipal structure, an urban community comprising 55 communes. One of its responsibilities concerns car-parks. The City of Lyon and the Urban Community are major shareholders in a public-private company, Lyon Parc Auto, which manages these car parks. Each commune in the conurbation is however responsible for its own on-street parking facilities. Consequently it is difficult to implement a coherent parking policy.
In the historic town-centre of Lyon, Presqu'Ile, a reduction of on-street parking took place from 1989 to 1995 as part of the 'Presqu'Ile- plan'. Meanwhile the car park supply increased.
Surveys carried out in May 2000 showed that the on-street parking situation in the town-centre is problematic:

* in all cases the occupancy rate exceeds 90%;
* less than 30% of the users had paid their parking-fee;
* the turnover rate is very low (less then 4 times a day; whereas it should be more than 6 times if parking regulations were sufficiently enforced);
* 15% of the users park in unauthorised spaces;
* 28% of the on-street parking supply is used by residents, 34% by long-term parking (> 3 hrs), 18% by people parking from 1½ - 3 hrs, and only 20% of the space remains available for short-stay parking.

Therefore, paid on-street parking does not meet the first objective for which it was implemented, namely to favour parking facilities for visitors.

Visitors by car are important for the city-centre of Lyon, more than 50% of the total retail-turnovers in the city-centre are coming from visitors by car. The share of the car in the modal-split of visitors of the city-centre tends to decrease slightly, as a result of the policy of the Urban Transport Master Plan to stimulate the use of public transport. This policy appears to be successful, the share of journeys made by public transport increases and turnovers in the city-centre remain stable.

A balanced use of parking facilities requires that on-street parking efficiency will have to be improved to meet customer's needs. An intensified and more efficient enforcement is needed. At present the on-street parking situation goes against one of the main objectives of the urban master plan, namely to dissuade commuters from parking. Long-term parking suffocates the parking opportunities for visitors parking.

Effects of parking measures are a result of the interaction between the socio-economic infrastructure, the visitors of the area, and the parking- (and traffic-) system. The way people react to parking measures is the key-element in generating effects on mobility and the local economy. Comparing

human (spatial) behaviour before and after the parking-measure gives the tools to describe and explain these effects.

Effects of parking measures can be divided in primary, secondary and tertiary effects:

- primary: effects on the parking system (location of parking, changes in use, etc.)
- secondary: effects on the traffic and transport system (modal shift, traffic flows, etc)
- tertiary: effects on the socio-economic system (town planning, land use, economy, etc)

Effects on the local economy are an important part of the tertiary effects.

The decision processes leading to effects of parking measures are very complex, and will be influenced by a great number of external factors. Decisions where to go and how to get there are usually only partly taken on a rational basis. Only under the influence of strong external circumstances (e.g. a parking measure) do people (re-)consider their travelling alternatives on a more rational basis. This may lead to adaptations in travel patterns (time, destination, travel-mode, parking location, et cetera).
The motive for travelling is one of the influencing factors. There is a difference between residential orientated trips, commuter traffic and trips for shopping and leisure. There is –in this order- an increasing freedom in choosing a destination, and a greater degree of possibilities to change travel behaviour (possibly leading to effects on the local economy)

The car driver being confronted with a changed (restricted) parking situation has several possible ways to react upon these changes:

* remain using the car, and accept a greater walking-distance or a higher price.
* change travel-mode and use alternative modes more often,
* choose another destination more often.
* adapt way of life (e.g. buy less in shops and spend more on other activities)

Commuters can choose between:

- remain using the car, and accept a greater walking-distance or a higher price.
- change travel-mode and use alternative modes more often,
- travel less (tele-working)
- find another job

Several studies show that each of these reactions may occur, the impact of each depends on the kind of the measure and its impact.
In a survey in The Hague, aimed at establishing the effects of the closure of a parking-lot, the majority of users of the parking-lot indicated that they look for an alternative parking location in the surrounding area, about 25% expected to do their shopping elsewhere and about 20% would change to using public transport. In Trondheim (Norway) it was found that removing parking spaces had led to considerable changes in shopping destinations.
Another study in The Hague into the effects of removing a long-stay car park mainly used by commuters revealed that the average walking distance of previous users still using the car had increased by 33%. In other respects too the parking situation had deteriorated. 1 in 5 of the previous car-users had shifted to other modes of transport.

The central issue at stake is which reaction a visitor is prepared to take to get to his destination. Parking, car-driving and the use of alternative modes of transport are to be seen as resistance-factors in this matter.

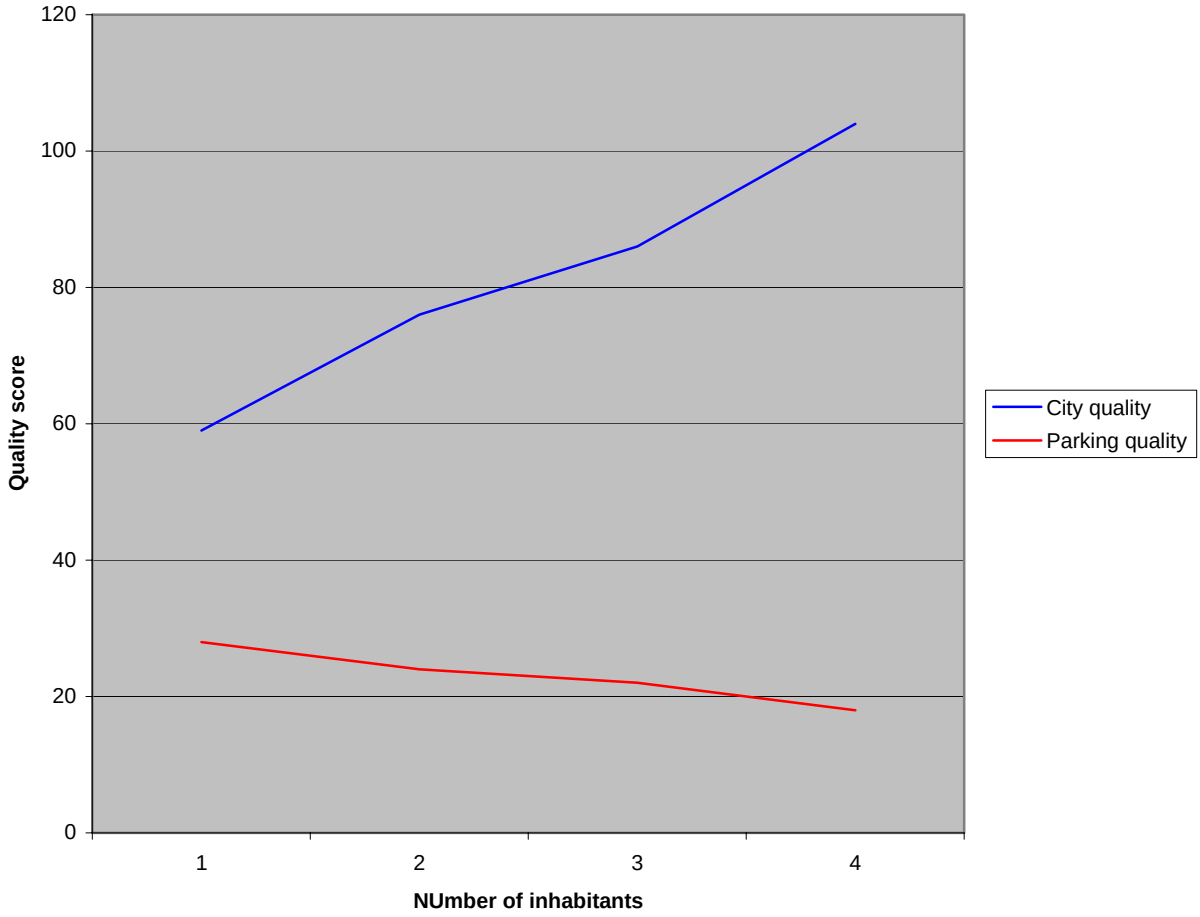


Figure 8.1: The higher the quality of an area (above) the lower the parking quality can be (below)

The research investigated towns varying in size between 17.000 inhabitants (1) AND 230.000 inhabitants (4). The quality scores are indicative.
(source: Althusius, this picture is a schematic reproduction of the real report)

The negative effects of parking measures on the local economy can be compensated by an increased attraction of the inner-city, for instance by an extended shopping area or an improved environment. This can be illustrated (see figure 8.1) by the results of a Dutch study that compared the quality (attraction) of cities, and the quality of parking in these cities. It appeared that the most attractive cities in general could do with a somewhat lower parking quality.

In discussing the relationship between parking measures and their effects on the local economy it is necessary to clearly differentiate between the different measures and the possible effects. The relevant groups of measures are:

- Reduction in the number of parking places in general
- A shift from long term to short term parking
- A reduction in the number of short term parking places
- Introduction of paid parking
- Changes in parking tariffs

Vienna: Effects of the Parking Policy to the Trade and Industry Structure in Vienna
(HERRY Consult 2003)
The aim of the survey was to elaborate the structural changes of trade, retail and industry under a specific focus on effects due to the implementation of parking policy in Vienna the so-called 'Parkraumbewirtschaftung Wien'.
Situation **before** implementation of parking policy ('Parkraumbewirtschaftung'):
- Average parking time 9h (time: 9:00-20:00)
- Car parks mainly used by employees (time: 9:00-20:00)

…leading to the results as follows:
- low turnover => lower customer frequency
- hindrance for supply of trade and retailing due to a lack of available free car parks

Situation **after** implementation of parking policy (Parkraumbewirtschaftung):
Effects on the mobility:
- Improved availability of car parks especially in the morning, but this positive effect decreased over time due to additional motorization within the city districts (residents)
- Average parking time 1h => higher availability of free car parks
- Significant decrease of illegal parking
- Significant decrease of search time for a free car park (from 9 minutes to 3 minutes)
- Additional monetary support public transport and for construction of new garages (revenues are earmarked for transport and social support)

…leading to the results as follows:
- Better availability of free car parks for customers as well as supply of trade, retailing (and industry)
- Higher turnover => higher customer frequency

Effects on the economy:
1. The implementation of the parking policy in Vienna (Parkraumbewirtschaftung Wien) since 1993 did not affect directly the structure of the local economy
   Justification in brief:
   Parking policy in Vienna,
   … does support especially successful companies!
   … does not solve the problems of less successful companies!
   … at locations where it does not work effective, does not harm successful companies!
   … does not harm less successful companies!
2. Parking policy in Vienna presents in relation to the structural changes of trade, retailing and industry during the last decade a minor importance
3. Critical view of retailer on local transport aspects is represented in many cases due to a 'transfer' of other existing problems to transport
4. Evidence on a direct negative correlation of turnover in trade & retailing and the implementation of parking policy in Vienna could not be proven within this study
5. A shift of companies specifically due to parking policy in Vienna (to/from non-parking policy areas) could mainly not be proven within the sample (n=464). Changes were mostly caused due to other reasons like e.g. site specific costs of land.

Note: Specific exceptions on company cars/lorries smoothed the imposed restrictions for trade due to parking policy in Vienna.

General reduction of the numbers of parking places
Some reduction is generally accepted as a positive measure. This measure is usually accompanied by measures aimed at enhancing the area and creating some reduction in traffic. In those cases the advantages of the package of measures outweigh the (small) disadvantages of the parking measure. An example of such a measure can be found in the development in Zurich Nord.

A shift from long-term parking to short term parking.
Introducing time restricted parking reduces the number of commuters parking and benefits the parking of visitors of shops and other businesses.
A typical example of this measure can be found in Oslo. Here on some moment in time in the city-centre time restrictions on parking were lifted on Saturdays, resulting in the most attractive parking places being taken up by workers again instead of the visitors at whom the measure was aimed. A negative effect of a measure intended to facilitate visitors but which failed because it was based on general prejudice and lack of understanding. A few years later the measure is turned around now really facilitating the group at whom the measure was aimed.
The key issue here is which group parkers is targeted.
Long term parkers like workers who have no alternative destination will park elsewhere (if possible) or shift mode. Long stay visitors might be frightened off unless alternatives are created. Short and medium term visitors are in fact facilitated by the measure.

Lisbon: regulation is not disadvantageous to business in the city

Lisbon introduced a strict regulation in 1995 of on-street parking by means of implementing paid parking with a limited parking duration of 3 or 4 hours respectively. This parking regulation was combined with a system of parking permits for residents. The measures led to better traffic circulation, an increase in the number of legal parking spaces (at the cost of a great number of illegal parking spaces) and a better enforceability of the parking system in a great part of the central town.
As a result of the limitation on the permitted parking duration a shift from car use to use of public transport occurred, especially in commuter traffic (an increase of the share of public transport from 27% to 35%). The use of P+R also increased (from 5 to 8%). The share of P+R use in commuter traffic with destinations in the historic inner city even increased from 10% to 17%.
After the parking measures car use nevertheless still has the main share of commuter traffic (57%, was before 68%). With these car drivers a tendency can be distinguished that the choice of a parking location has changed, choosing the alternatives of free parking spaces at a greater walking distance. Some of the people still parking in the city indicate that after the introduction of paid parking they have come more often because now more free parking spaces are available; on the other hand some others indicate that they only come seldom because now they have to pay. On balance the average trip frequency has stayed pretty much the same.
Shopkeepers in the regulated area indicate that the introduction of paid parking has not caused major impacts on their business results. Most likely the decrease of trip frequency with car drivers has mainly occurred with commuters, while customers of trade and industry just benefit from the improved parking situation.

Reduction in the number of short term parking places.
Reduction of the number of parking places results from measures to ban cars from specific areas, mostly shopping streets and historical or otherwise attractive areas.
Starting from the fact that measures to restrict parking are aimed at enhancing the attractiveness of the influenced area, experience teaches us the following about the effects of these restrictive parking measures:

- Initially a decline in gross sales is to be recognised. Provided the right measures fitting the situation are taken this changes after a period of 6 – 9 months back to the initial value and mostly a higher level. The latter mostly being indicated by a growth in gross floor space.
- A shift of the parking demand into the neighbouring areas, mostly follows a reduction in parking places. In those cases it results in the need to introduce residents' parking schemes in case of living areas or other control measures.

Introduction of paid parking and raising parking tariffs
Introduction of paid parking never goes without much debate. Yet experience (Zuid Limburg and Brabant, NL; Oxford, UK; Lisbon, Portugal; Zurich, CH; Madrid, E) has shown that paid parking is one of the most successful means of controlling parking demand.

Fear for the introduction of paid parking (and later raising of tariffs) is mostly based on wrong assumptions about customers behaviour or on assumed behaviour based on the reactions of visitors when asked what they would do if paid parking was to be introduced (Sweden).
This fear is often unfounded. Research (Austria) shows that actual behaviour changes much less than originally expressed. What is much more important to attract visitors and customers is quality and attraction of the destination.

The debate on economic effects of parking control is very often condensed to the sentence: 'No parking no business'. It is used by those opposing parking control and it suggests that business will go down if any restrictive measure in parking is taken. Of course it is nonsense to take restrictive parking policy measures without consideration and on a proper level. The measures discussed are expected to enhance their attractiveness, either by reducing the sheer volume of parked cars, by removing traffic searching for a parking place, or by making places available for visitors and customers. The statement itself is in general not applicable.

There is little evidence to support the hypothesis that the regulation of on street parking adversely effects an area's economic viability.
In the Netherlands a study has shown (figure 8.2) that trade can suffer initially when parking regulations are introduced or parking fees increased but that within 12 months the town's trade recovers to the same level as before any change was introduced.
Studies into the effects of parking measures on the economic functioning of towns in two regions revealed interesting results:

1. If the affected city within the region has no competitor in attraction measures like raising tariffs or restricting parking have hardly any effect on the number of visitors.
2. If the affected city has to compete with comparable attractive cities restrictive parking management measures will have a negative effect on the number of visitors.

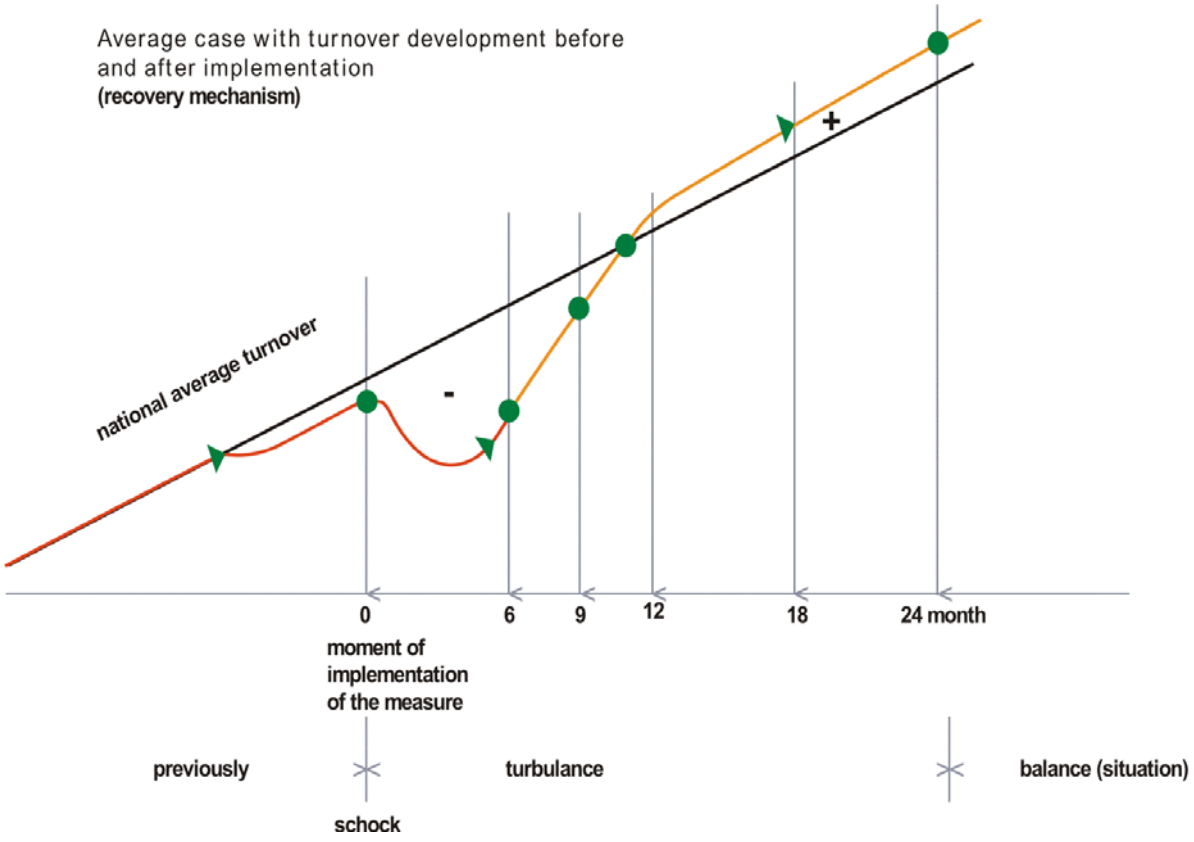


Figure 8.2 *Average economic development around the implementation of measures. (source: CROW publication 159)*

SWEDEN: The value of a parking-space

Cars, and therefore parking, are vital ingredients for the commercial success of a city-centre. On the other hand they are also a threat to the centre as a result of their negative impact on the environment. Considering this it is interesting to know what the value of a parking space is in terms of contribution to the commercial profit of a city centre.
In the Swedish towns of Södertälje, Örebro and Karlskoga a study was undertaken to quantify this economic value of parking spaces. The studies confirm that a customer coming by car spends more during his visit then customers using other modes of transport.
The value of a parking space was calculated based upon the amount of retail-turnover the customer by car generates per parking space per year. This way the value of an average parking space was estimated at about € 35.000 per year. The Swedish studies found that the value of a parking space decreased with increasing walking distances to the centre of commercial activities in the city.
The Swedish study also went into the question of what would happens if car-traffic were to be completely banned from the city-centre. It shows that customers would find other sites to do their shopping, rather then shifting to an alternative mode of transport. The effects on retail-turnovers would be dramatic. Where this differs from findings in other countries regional effects might have to be taken into account.

It is likely that severe regulations or higher parking fees will affect a locality's economic viability and mobility in an area – however, there is no evidence to suggest that this has happened by any significant degree. Available evidence suggest that only extreme measures will work out negatively.

Visitors and customers select their destination based on its quality and its attraction to them. Once this choice is made they will consider the parking situation. The parking situation is not unimportant but it comes very much after quality and attraction.
Cities, shopping centres, attractions etc. compete with each other based on their attraction and their number of customers are based on this attraction. As a consequence the provision of parking places or free parking will have hardly any effect in enhancing the competitiveness of a 'sub-centre' compared to e.g. a historic city- and shopping centre. To some extent though these sub-centres, being more or less comparable in attractiveness, may compete with each other. This should not be exaggerated.
A clear illustration of this was found in the Dutch Research in Zuid Limburg and in Brabant. The research in Zuid Limburg showed that the central city of the area – having a much higher quality then the surrounding towns - perceived hardly any competition from those towns.
The study in Brabant though revealed some competition between the towns involved in the study. This is explained by the fact that those towns all had a comparable quality and are located at relatively short distances from each other.

A thorough study into the relation between economy and parking management measures has also been carried out in Vienna (HERRY Consult, 2003).
The main findings are (see also annex 8) that there is no negative effect on the local economy to be attributed to the marketing policy and the measures based on this policy.

A typical argument in this respect is the value in sales of a parking space. Some research (Sweden, Norway) suggests that the value in gross sales of a parking place adds up to € 30.00,- per annum.
Also research revealed that this value is lower the larger the distance between parking place and destination.

Dutch investigations into this topic show also that this value is lower for smaller places and that it is lower on workdays compared to Saturdays. In table 8.1 some calculations are presented

Table 8.1 Indication of gross sales per stall per year according to city size (the Netherlands, 2002)

City category in inhabitants	Sales per stall for sum of all Saturdays	Sales per stall for sum of all workdays
20.000 – 30.000	€ 20.000,-	€ 45.000,-
30.000 – 50.000	€ 20.000,-	€ 45.000,-
50.000 – 100.000	€ 18.000,-	€ 47.000,-
100.000 – 175.000	€ 18.000,-	€ 49.000,-
> 175.000	€ 16.000,-	€ 44.000,-

Is the consequence of this ex post calculation that if you take away one parking place you reduce annual sales in the area by that amount? No. It tells you that one must be careful in taking measures but no more.

THE NETHERLANDS: economic effects of parking measures

A Dutch study in the COST342 project did review the effects of parking measures in 18 Dutch cities, ranging from small rural towns to large urban centres, on the local economy. The parking measures consisted of (combinations of) restricted car access, introducing or raising parking charges and increasing or decreasing parking volume.
In about half of the cases studied the retailers were sceptical to negative about the parking measures. Looking at the measured effects on the local economy you might say that they were right about their scepticism in the smaller towns. (see fig 6.3.1 in this report)

If we look at the timing of the first follow-up measurements we see for smaller towns that these were held from a few to about nine months after implementation of the parking measures concerned. This is a period where still some turbulence from the measures taken can still be expected, the economic situation will probably not have settled yet. The effects will be judged mainly on the short-term effects, which may be different from the effects in the long run, when the local economy will have found a new equilibrium again.
In contrast, the larger cities did not do their first follow-up measurements until a full year after introduction of the measure, when the area would have recovered from a possible shock of short term effects, and only long-term effects remained. In addition to that the larger cities had city centres with a relatively higher quality which are in a strong position thanks to their uniqueness and are able to withstand large scale parking measures.
Many smaller towns do not have such singularly unique qualities. Some of those are also situated within the catchment-area of the very large cities so both are aiming at the same customers. This explains part of the sensitivity of the smaller towns.
Another observation is that many of the smaller places struggle with a shortage of manpower. It might be concluded that the authorities in the smaller towns in particular were lacking understanding and expertise on the possible effects of the measures, and had problems in communicating with the retail sector. It might well be too that in the smaller towns the problem analysis was not carried out correctly. It was in some of these smaller towns that the measures had to be turned back or at least lessened.

Communication is vital for gaining the co-operation of the retail sector to be able to take adequate and successful parking measures, also in terms of economical impact. The top down approach will meet with resistance if there is not adequate deliberation (e.g. as in Gouda).
In contrast the bottom-up approach has a much greater chance of succeeding, as has been proved in several Dutch municipalities.

Where the Swedish research (for towns with up to about 100.000 inhabitants) suggests that sales will go down if parking places are removed, Swiss and Dutch research is much less explicit in this respect. Higher car dependency for Sweden compared to the other two countries might be an explanation. A higher occupancy of the parking places in the Swedish towns also can be explanatory.

In table 8.2 (below) we summarise the economic effects of parking measures as reported or perceived on a global level. Specific evidence is hard to find yet the material presented lead to convincing findings.

Also we stress that conclusions more reflect the directions into which effects points. Also we must realise that local conditions are important for the level of the effects. In some cases findings for cities of similar size may be contradictory because of their different conditions.

The remarks in the table below are inevitably a bit general. Specific comments can only be given on a case-by-case basis. Yet we are convinced that there is no basis for the general expression 'No parking no business'. In fact the opposite is more true. A well developed, introduced and enforced strict parking policy will:

- prevent long term parkers occupying places better suited for visitors;
- raise the turn-over of parking places and thus raising accessibility
- prevent long-term parked cars needlessly spoil the attractiveness of an area.

Table 8.2 Overview of the general economic effects of different parking measures

Type of measure	Target group	Effect
Reduction long-term parking	Residents	Enhancement of residential quality (property values)
	Workers	No (hardly) shifts in workplace perceived
	Visitors	Might reduce the number of visitors unless occupied by other measures
Introduction of residents parking scheme	Residents	Enhancement of residential quality (property values)
	Workers	No (hardly) shifts in workplace perceived
	Visitors	Might reduce the number of visitors unless occupied by other measures
Introduction of time-restrictions	Residents	None if accompanied by residents parking scheme
	Workers	No (hardly) shifts in workplace perceived
	Visitors	More place for visitors
Introduction of paid parking	Residents	None if accompanied by residents parking scheme
	Workers	No (hardly) shifts in workplace perceived
	Visitors	More place for visitors
First half hour Free parking	Workers	No (hardly) shifts in workplace perceived
	Visitors	Creates more traffic without adding visitors
Creating Park & Ride	Workers	Enhances accessibility
	Visitors	Attracts in principle visitors and enhances accessibility

(photo: Witteveen + Bos, the Netherlands)

Annex 1 Members of the Management Committee of COST Action 342 'Parking policy and the effects on mobility and the local economy'

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Mr. Peter Rienäcker, Vice president EPA

Annex 2: Technical annex to the Memorandum of Understanding

COST-proposal 342: 'Parking policy measures and their effects on mobility and the economy'.

Background

Growing car-ownership and usage are hampering the accessibility of towns and cities. As well the city-centres as well as the economic area's (industrial sites, office blocks etc.). This accessibility can – to a certain extend - be remedied by the supply of road capacity. Other measures, like the reduction of car-use will eventually be inevitable. Parking policy is recognised as a potential important tool in this respect.

Parking policy measures can be aimed at and do have effect on three different levels:

1. The parking system (where, how long, which tariff etc.)
2. The traffic system (traffic flow, modal split, frequency of visits etc.)
3. The transport system (destiny of trips, trip-frequency, location of activities, etc.)

It can not be stressed enough that a good parking policy is an important tool in maintaining and enhancing the 'urban quality' of our towns and cities. It also plays an important role in the success of íntermodal passenger transport systems.

The problem of accessibility is certainly recognised on the national level. Parking policies have to be implemented by local authorities.

Independent from any view on mobility it is very important for the local authority to define a good 'parking management policy'. Only when the parking situation is properly organised it will make sense to develop a parking policy aimed at influencing mobility.

At the local level the perceived disadvantages of reduced parking very often outweigh the estimated effects of an enhanced accessibility. The main explanation for this situation is a lack of knowledge on the effects of parking policy measures. Because of this measures often are taken too little and too late. At the same time much experience and some research results concerning parking policies and their effects on car-mobility and the economy exists. The problem is that the information on these experience and research is scattered throughout Europe (and America and Japan).

Based on some initial research it can be concluded that combining existing knowledge in a structured and concise way will result in an impressive insight into the effects of parking policy-measures. Both in terms of measures and effects relationships as as case studies to be presented as examples.

Since – as stated – much information is available, the result of a co-ordinated inventory and analysis can almost immediately be turned into 'guidelines for best practice on parking policy'.

At the same time a good inventory of existing research will create a firm basis for additional research. Research that might be needed to refine the 'guidelines' sought for.

A European approach has the advantage of a much larger body of knowledge to draw upon. The greater variety in types of measures and conditions under which they were applied provide a much better basis to develop specific guidelines compared to a national effort only.

A potential interesting sideline could be the comparison with the American situation. Generally spoken the concept of restricted parking is more or less accepted throughout Europe. In North America a restrictive parking policy is very rare. In this respect European knowledge and experience is certainly ahead. On the other hand it may be expected that in the field of 'parking management' North American input is certainly worthwhile.

Since the greater part of the work consists of drawing up an inventory of existing knowledge and research a COST-Action provides (in this phase) a proper framework. The COST network gives easy access to information needed and provides a backbone for the information dissemination. When the result of the action indeed indicate the need and possibilities for further research, then the European research Program (e.g. 5th framework) will provide the proper possibilities for that research.

Objectives and benefits

The main objective of the action is (to produce a guideline in order) to increase the available knowledge on best practices in parking management and in parking policies and their effect on mobility and the economy.
This guideline must contain as well measure-effect information, as examples of case studies, relevant to this subject.
Another important objective of this action is the dissemination of the knowledge gathered through the organisation of international and national workshops, technical visits, participation in congresses etc.
It is expected that as a result of this action this guideline can be used throughout Europe and even other countries and in towns and cities of different sizes and in different situations.

The benefits of such a guideline are the following:

- Day tot day experiences on parking management will become easily available and can easily be exchanged between countries (participants).
- parking policies and their pros and cons are in principle treated the same way everywhere;
- parking policy gets a solid (as solid as possible) scientific foundation;
- much less time is wasted in the development of parking policy measures
- wrong measures are prevented as much as possible;
- Existing knowledge is easily exchanged between the involved (COST) countries and parties.

The overall results of the action will be:

- A report describing standard parking management measures and the standard procedures for the description and analysis of parking policy measures.
- The reports on the national inventories. The number of these reports will depend on the number of participating countries in the inventory-phase.
- A Guideline of best practices on parking management and of best practices on parking policy.

The final versions of the different reports will have to be decided upon during the first phase of the Action.

Scientific programme

1. The formulation of standard approaches for parking management

Relevant aspects are

- the numbers of on street places and off street-places in relation to the supervision needed;
- organising of supervision;
- effectiveness of payment systems;
- organisation of residents license-schemes;
- treatment of complaints etc;
- effectiveness of innovatory parking control devices;
- Effectiveness of wheelclamping and vehicle removal practices etc.

2. The formulation of standard procedures for the description and analysis of parking policies and their effects in relation to the situation concerned.

The basic hypothesis under the analysis is the assumption that the same measures will have the same effects on the same groups under the same conditions.
To confirm this assumption but more to learn from others, all experiences and research will have to be presented in the same structured and consistent way. In this first step these standards have to be defined.
This matter has to be discussed thoroughly in the structuring phase of the project. Different approaches are possible:

- Parkers can be defined according to trip-motives (home, work, social trips etc.).
- Parking can be approached on a geographical basis (CBD; residential area's; new developments etc.)
- Conditions can be defined according national parameters, like car-ownership and GNP and local parameters, like city-size, number of inhabitants etc.

- Actual parking demand in terms of short end long-term parking, but also on- or off-street parking, park and ride (P+R) etc.

Also the possible measures and the effects have to be described in a more or less standardised way in order to be able to compare them.

Through a careful analysis of the measures brought together the following results may be expected:
- a more precise description of a measure and its effects in general;
- a prediction of potential effects of a measure for a given situation;
- An overview of potential measures given an expected change for an existing situation.

3. The setting up of national inventories – according to the above-mentioned framework – of parking policy measures and their effects.
Given de results of step 1 and 2, each participating country can draw up an inventory of measures taken. It is suggested to take into account measures taken in the past 10 to 15 years. This in order to reflect as much as possible the change over time in parking policy measures and their effects.
Each national report must be divided in 2 parts:
- part 1, containing the actual inventory;
- part 2, containing the analysis of the measures using the approach agreed upon.

It must be stressed that it is not needed to create new reports if existing reports are available and sufficient. In that case an additional explanatory note may be sufficient.

4. Carrying out a structured analysis of the drawn up measures.
A thorough analysis of all measures gathered using the same approach.
It is expected that this analysis will lead to:
- a better understanding of efficient and effective parking management;
- a better understanding of the effects parking policy-measures;
- a more precise prediction of potential effects of measures;
- a better insight in the potential measures for a wider range of different situations.

The results of the overall analysis may possibly lead to some refining of the reports on the national inventories of measures.

5. Carrying out additional research.
It is anticipated that some research is needed in addition tot the inventory-work.
This research will, among others, aim at the following subjects:
- public acceptance;
- the level of parking fees and its effects etc.

To support the research-work relations will be sought with other (European) research projects like SESAME; TRANSPRICE; ROMANSE; EUROTOLL; LERTS, but also with the work of groups like UITP; EPA; European Council of car free cities etc.
These contacts will also be fruitful with respect to the knowledge dissemination.

Organisation and time-table

The workprocess itself is a rather simple process. It is expected to run as follows:
- Preparatory work and Setting up the standardised approach for definitions and analysis
  Duration approximately 9 month
- carrying out national inventories
  Duration approximately 6 month
- Analysis of national inventories
  Duration approximately 3 month
- Initial overall analysis

Duration approximately *3 month*

- Additional research
  Duration approximately *3 month*
- Final overall analysis
  Duration approximately *3 month*
- Production of the guideline
  Duration approximately *6 month*
- Knowledge dissemination
  Duration approximately *25 month*

The planned working period is 36 months.
A preparatory phase of about nine month is foreseen. It is assumed that at the end of this period also the standardised approach for the definitions, the inventory and the analysis will be agreed upon.
The estimated research period of three months is based upon the assumption that the preparatory work can be done during the period of the initial analysis.
A period of 25 months within the action-period is foreseen for knowledge dissemination.
This period will start at the end of the setting up of the standardised approach and will run during the rest of the planning period.
In order to control thoroughly the contents of the work different working groups will be formed to monitor the main aspects of the work going on.
At the start of the project a working group will create to deal with the work on structuring and standardisation.
A management committee (MC) will supervise the workprocess will have to approve the results of each phase of the work.
This MC will during the first phase of the project have to decide on the setting up of further working groups
The timetable of the workprocess itself is presented in table 1.

Table 1: timetable of the work-process.

Activities	Periods of 3 months											
	1	2	3	4	5	6	7	8	9	10	11	12
Start & Structuring												
National inventories												
National analysis												
Initial COST-analysis												
Additional Research												
Final COST-analysis												
Production guideline												
Knowl. dissemination												

Knowledge dissemination
The following activities are envisaged:

- An international workshop to discuss and finalise the results of the standardisation and structuring process.
- A second international workshop during the phase of the final analysis. In this workshop the analysis can be discussed and refined.
- Distribution through the national participants of the general report. This report consists of the COST-analysis, together with national inventories. Under this item national workshops are envisaged in which other members of the COST-committee participate as external (to the respective country) participate.
- Production (if possible) of national translations (eventually summarised) of the general report.

- An international symposium to present the guideline.
- Production of articles in (among others):
  - Routes/Roads, the monthly PIARC bulletin.
  - Highways, the monthly IRF magazine.
  - Parking trend, magazine of the European parking Association (EPA)
  - Parking Today, a magazine aimed at all type of parking officials in North America
  - Articles in national magazines on the results of the action.
- A presentation of the state of the art on the Action at the World Parking Congress, June 1999 in Banff, Canada.
- A presentation at the biannual Congress of the EPA in 1999, 2001 and 2003
- A presentation at the IRF-world-congress in 2001 in Paris
- A presentation at the BPA-congress in the UK
- A presentation at the PTRC summer annual meeting.
- A presentation at the Parcopolis conference.
- A presentation at the PIARC world congress in 2003
- A presentation at the UITP world congress in Madrid in 2003

Electronic dissemination through CORDIS and other possibilities (to be decided upon).
Further dissemination through the proper EC-channels.

Economic dimension
The following COST countries have actively participated in the preparation of the Action or otherwise indicated their interest: Austria; Czech Republic; Denmark; Finland; France, Germany, Netherlands; Norway; Portugal, Spain, Sweden, Switzerland and the United Kingdom.
Also Canada has expressed its willingness to participate in the Action.

On the basis of the national estimates provided by representatives of these countries and taking into account the coordination costs to be covered by the COST budget of the European Commission, the overall costs of the activities to be carried out under the Action has been estimated, in 1999 prices, at roughly: Euro 9.000.000

A rough estimation of *the workload involved*, including co-ordination, overhead and knowledge dissemination is 8 men-year.

The estimate is valid under the assumption that all the countries mentioned above but no other countries will participate in the action. Any departure from this will change the total cost accordingly.

Annex 3 Framework for inventory

Parking Policy and the Effects on Mobility and the Economy, COST 342

Outline of the framework for inventory and analysis
- updated version of document COST 342/10 -

(based on the final discussion at the 2nd Meeting of the Management Committee, Amsterdam, April 11th, 2000)

Methodical Approach

Parking is often seen as an important aspect of the accessibility of a city.
In the same perspective parking is seen as an important part of the attractiveness of a town or city.

Attractiveness yet can also be explained by other elements like:
- historic / touristic appeal,
- size of shopping area, variety of the offers,
- number of visitors (clients, tourists, special events, ...),
- number of workers or
- number of inhabitants.

The question here is whether the attractiveness of a city is dependent or independent of the parking situation.
We expect that there is a relation between the two yet difficult to define. At this stage it may be the best to describe the parking situation before and after measures have been taken.
Parking measures may be divided in five types of measures:
- the location of parking places (car-free city centres or Park and Ride facilities outside city-centres),
- volume related measures,
- parking management and regulation,
- price related measures and
- measures dealing with control and enforcement (fiscalising and decriminalisation).

Effects of measures can be recognised at three levels:
- within the parking system (parking time and choice of parking place),
- within the transport system (mainly mobility effects like mode split, destination choice, numbers of trips and traffic performance) and
- within the socio-economic system (social, economic and environmental effects).

The scheme below describes roughly, the distribution of measures to be found over the different levels of the system.

	Effect		
Measures	Parking System	Transport System	Socio-economic System
Location			
Volume			
Management			
Price			
Enforcement			

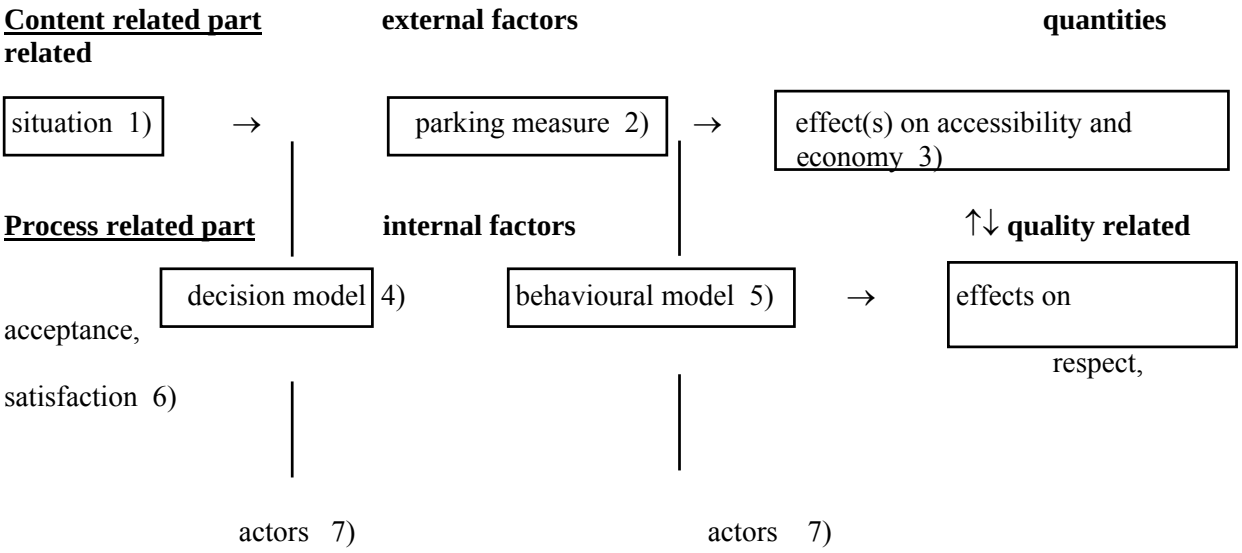
The first thing to be answered here is:
- how to describe the attractiveness of the city,
- how to describe measures and
- how to describe the effects (in relation to the system-level?)?

Apart from the straight forward approach we have to bear in mind that measures taken are part of a policy cycle.

Policy-cycle:

problem
↓ actors
solution — First stage
↓ ← actors
effects/problems
↓ ← actors
solution — Second stage, refining of the measure
↓ ← actors
effects/problems
↓ etc., etc.

The cycle knows a part aimed at content and one aimed at the process



1. We look at cities and towns in relation to their (economic) service area.
   Indicators: National and local policy
   city-type
   Attractiveness
   Starting point for measures
2. Measures can be described as defined earlier.
   In looking at measures also the target groups have to be taken into account (workers, visitors, residents)
3. We are looking for quantifiable (as much as possible) effects. E.g.: occupancy-rate, turn-over; gross revenue; traffic-levels; numbers of visitors; changes in sales; changes in numbers of businesses and shops etc.
4. The type of actors involved may have a significant effect on the measures taken.
5. The reaction to measures taken may differ depending on who is involved: visitors can adapt their behaviour easily, residents only slowly and the worker stand in between.
6. Not only the immediate measurable effects are of importance, also whether the measure is accepted and respected.
7. e.g. municipalities, retail traders, users

National Inventory

The national inventories should have the following structure in 5 tasks:

1 National Overview - Legislation, General Framework
2 Selection of Interesting Cases
3 Case Inventory and Analysis
4 Overview of National Research Activities
5 National Synthesis

TASK 1 NATIONAL OVERVIEW - LEGISLATION, GENERAL FRAMEWORK

1-1 NATIONAL INSTITUTIONAL CONTEXT

Brief presentation of administration and different levels of institutions implied in land use and activities linked with town planning and transportation.

Who decides for what in the field of planning and implementing

- Land use
- Town planning
- Urban transport
  - Public transport (investment, management, operating…)
  - Road Network
  - Parking matters should be detailed in 1-3

➢ National and Regional POLICIES FRAMEWORK

Presentation of National policies which influence Urban Land Use and Transport (e.g. Policies on Air quality, Energy, Transport : Laws, Regulations, Acts, Recommendations, …)

i.e. Name, Date, aims and means of each policy

➢ National PARKING CONTEXT

Characterising Figures

inhabitants
number of licensed cars
car-ownership
average modal split
annual mileage by mode
average journey lengths by mode
traffic performance by mode

Who decides for what in the field of planning and implementing?

on-street parking
off-street parking
parking standards
parking management and regulation
disabled parking
control and enforcement
etc.

General feelings on parking matters from authorities, drivers, population, lobbies… should be addressed.

TASK 2 **SELECTION OF INTERESTING CASES** (mainly towns but also particular topics or research projects etc…)

For each country, the national coordinator is responsible for the inventory and selection of interesting cases. The selection should include small, medium-sized and large towns. In each country may we propose that five to ten cases or towns should be addressed.
The aim, means and results are the main criterions to select a case.

TASK 3 **CASE INVENTORY AND ANALYSIS**

This task is almost the core of the project. We don't aim at exhaustivity. We need to learn from each other all knowledge which is currently disseminated in various countries.
The list of the indicators given in annex is mainly indicative. The more data available, the better. But we think that an interesting case or city must be presented, even if a lot of general and precise information is missing.

FOR EACH CASE, we propose to use the following frame for the presentations :
3-1 Local Context
3-2 Situation (whole town)
3-3 Description of the area(s) in which measures are taken and of the effected area
3-4 Measures implemented
3-5 Results
3-6 Contacts - References - Bibliography

TASK 4 OVERVIEW OF NATIONAL **RESEARCH ACTIVITIES**

Past and current research activities in parking issues related with mobility and local economy.
Funding, Programs, Topics and Actors (Institutions, Universities…) concerned.

TASK 5 **NATIONAL SYNTHESIS**

Summary for each country. A paper from the national coordinator presenting his feelings about:
- Most important points (for success and failure) in the national context.
- Information explaining what was considered as more interesting while choosing the cases selected for his country (criterions used for the selection, list of cases and what can be learnt from them).
- Remaining questions for National and European Research.
-

ANNEX
Task 3 Case Inventory and Analysis

Please answer the following items as far as possible! But remember, **3-4** and **3-5** are the most important issues. The other points (as precise as possible nevertheless) will be helpful for a better understanding of the case situation.
3-1 Local Context
- geographical scope / regional function (conurbation, out-standing town, ...)
- political background (decision making process, plans (e.g. Transportation Master Plan), environment related activities, main actors, 'vision on transport')
- topographic situation

3-2 local Situation (whole town)

- map of the town
- maps for different means of transport
- inhabitants (classification by age (< 18, 18 - 65, > 65), employment, first / second residence), population density (inhabitants / acre)
- 'workday population' (inhabitants, which don't leave the town plus employees coming from outside in the town)
- employees, differentiated to branches
- number of cars or car-ownership (cars / 1.000 inhabitants; cars / household)
- Transport system (all means of transport)
- Parking system (including P+R, parking guidance, no. of disabled parking spaces)
- Modal split (peak-hours (employees))

3-3 Description of the area(s) in which measures are taken and of the effected areas

- map of the area
- historic value
- inhabitants (classification by age (< 18, 18 - 65, > 65), employment, first / second residence), population density (inhabitants / acre)
- 'workday population'
- households (differentiated by size), density of households (households / acre)
- car-ownership
- income
- number of visitors (altogether, division over the week) / origin (locally, regionally) / duration of stay / frequency of visits / kinds of visits (motive, convenience, shopping) / spending per mode of transport / kind and amount of spending
- number of workplaces / branch-composition / changes in settlement patterns
- number and size (gross area) of shops (subdivided in different types of shops) / rents per m² / turn-overs / number and size of empty shops / branch-composition / investments / character of shopping-area (qualitative) / numbers of restaurants / culture / weekly market / changes in settlement patterns
- other functional aspects
- transport system (all means of transport)

  supply

  road network
  - map
  - qualitative description of the main aspects

  public transport
  - map
  - qualitative description of the main aspects
  - means of transport
  - number of lines
  - length of network
  - frequencies
  - number of stops
  - transportation speed
  - time of operation
  - (If possible differentiated by peak-hour / off-peak and workday / Saturday / Sunday)

  bicycle
  - map
  - qualitative description of the main aspects
  - length / density of network, classified by different types
  - parking facilities: on-street / off-street and public / private

  pedestrians
  - length / surface of pedestrian zones
  - qualitative description of the main aspects

demand
number of trips / traffic performance; total
differentiated by means of transport
differentiated by trip purposes
home-related
work-related
other needs
differentiated by different groups of travellers
all trips
inhabitants
employees
all trips which have their origin or destination in the area
other categories as available

- parking system (including bicycle)
  supply
  number of parking spaces
  total
  off-street
  inhabitants
  employees
  customers / visitors
  others
  (if possible additional subdivided by operator (municipality, private))
  on-street
  free parking
  time-restricted parking (which regulations?)
  priced parking
  regulations for specific users (delivery services, inhabitants, disabled)
  enforcement (type of e., frequency, personal / km (km²))
  park and ride
  number of park-and-ride-facilities
  number of parking spaces
  regulations
  qualitative description of the system
  parking guidance / information system (qualitative description)
  demand
  number of trips / turnover
  duration of parking
  legal / illegal parking
  classified by all above mentioned types of parking spaces
  control systems
  on-street
  off-street
  park and ride
  costs
  investment
  operating costs
  revenue from fees and enforcement

3-4 Measures implemented

- What was the problem? Specific context, early questions, ...
- What were the (technical, political) objectives, targets, ...?
- What was done? Actions in the parking policy field and accompanying measures (e.g. public transport).
- Effects on traffic plans and other political actions?

- Categorising of Parking measures:
  - location of parking places
  - volume related measures (differentiated for the different types of parking regulations)
  - parking management and regulation
  - price related measures
  - control and enforcement
  - communication, information
  - others

3-5 Results - Effects on MOBILITY, on ENVIRONMENT and on LOCAL ECONOMY

Answers should be as complete and precise as the actual case allows on (e.g.) the following points.

Change (if any) in: Parking demand; Turnover; Parking-time; Shift in occupancy of places; Modal split; Number of car trips; Traffic performance; Gross sales of shops; Environmental effects;
General discussion (qualitative): Process information; Reasons for success / failure; Recommendations issued from this experience; What next?;Opinion of the inhabitants, retail organisation, others (development of this opinions)

3-6 Contacts - References - Bibliography

- Details (name, institution, address, phone, fax e-mail, …) for people/institutions to be contacted for more information
- Details of publications, presentations etc. for the case (references, language, internet site, ...)

Annex 4: Overview of national/regional parking policies

Title of the document	Reference number	Date
Austria	COST 342/19 – A Rev. 2	29/06/01
Belgium (Parking policy in the Brussels-Capital Region)	COST 342/19 – B	13/06/01
Czech Republic	COST 342/19 - CZ Rev.2	15/03/01
Finland	COST 342/19 - FIN Rev. 2	15/03/01
France	COST 342/19 – F	20/10/00
Hungary	COST 342/19 – H	15/08/00
Italy	COST 342/19 – I	04/08/00
Latvia	COST 342/19 - LV Rev.1	29/11/00
The Netherlands	COST 342/19 - NL	25/08/00
Portugal	COST 342/19 – P	28/02/01
Spain	COST 342/19 – E	10/10/00
Sweden	COST 342/19 – S	19/03/01
Switzerland	COST 342/19 - CH	24/10/00
United Kingdom	COST 342/19 - UK	17/08/00
Canadian Parking Association	COST 342/19- CPA	05/03/01
USA (IPI/ NPA/ ITE)	National overview	

Annex 5: Overview of detailed case studies

Title of the Document	Reference Number	Date
Austria	(COST 342/18 – A)	27/12/00
Belgium	COST 342/18 – B Rev. 1	13/06/01
Czech Republic	COST 342/18 - CZ Rev. 1	15/06/01
Finland	COST 342/18 - FIN Rev. 2	15/03/01
France	COST 342/18 – F Rev.1	18/05/01
Germany	COST 342/18 – D Rev. 1	../11/00
Hungary	COST 342/18 – H	15/08/00
Italy	COST 342/18 – I Rev.1	01/03/01
Latvia	COST 342/18 - LV Rev.1	29/06/00
The Netherlands	COST 342/18 - NL Rev.1	22/01/01
Portugal	COST 342/18 - P Rev.1	28/02/01
Spain	COST 342/18 – E Rev 1	8/03/01
Sweden	COST 342/18 – S Rev. 1	03/09/01
Switzerland	COST 342/18 - CH Rev. 2	30/05/01
United Kingdom	COST 342/18 - UK Rev. 1	15/02/01
European Parking Association	COST 342/18 - EPA	28/02/01
Canadian Parking Association	COST 342/18 - CPA	05/03/01
USA (IPI/ NPA/ ITE)	Regional P+R evaluation	2001

Annex 6: Thematic overview of national case studies

Country	cases	theme
Austria	Graz	parking policy
	Linz	parking policy
	Wiener Neustadt	parking policy, changes in behaviour and opinion
	Wien	parking policy, changes in behaviour and attitude
Belgium	Mons	parking policy
	Charleroi	automated on-/off-street parking systems
	Brussels	public-private cooperation in parking
	Kortrijk	dual tariff/ information
Czech Republic	Olomouc	parking regulation
	Kromeríz	parking regulation
	Liberec	paid parking
Finland	Helsinki	parking policy, P+R, effects on economy
	Espoo	parking policy
	Kerava	parking policy
	Tampere	parking policy
	Kuopio	parking in residential areas
	Vaasa	parking policy
	Oulu	parking policy
France	Lyon	parking policy
	Dyon	enforcement
	Grenoble	parking policy
	Nantes	enforcement
	Strassbourg	P+R
Germany	Köln Rathenau Viertel	paid parking
	Lüneburg	extension of parking regulations
	München	parking regulations and enforcement
	Aken	paid parking, enforcement
	Oberhausen	parking guidance
Hungary	Budapest CBD	car-free areas/ paid parking
	Budapest Castle Hill area	managing visitors/ paid parking
	Budapest Köbanya-Kispest	P+R
	Pécs	car-free areas/ paid parking
	Sopron	car-free areas/ paid parking
Italy	Siena	
	Brescia	
	Genova	topics:
	Napoli	information
	Palermo	enforcement
	Perugia	on-street/ off street supply
	Torino	parking management
	Bologna	innovative control device
	Firenze	private residential parking
	Milano	private non-residential parking
	Padova	park and ride
	Parma	
	Trieste	
	Roma	
Latvia	Riga	parking policy
	medium size towns	no parking problems, therefore no measures

Country	cases	theme
the Netherlands	Arnhem Bergen op Zoom Breda Culemborg Dokkum Enschede Groningen Harderwijk Heemskerk 's-Hertogenbosch Leeuwarden Leiden Middelburg Nijmegen Purmerend Tilburg Utrecht Venray	parking capacity car-free paid parking car-free/ parking capacity paid parking/ parking capacity car-free car-free/ parking capacity paid parking car-free car-free/ parking capacity paid parking paid parking/ car-free car-free/ paid parking/ parking capacity paid parking/ parking capacity paid parking paid parking paid parking paid parking/ car-free
Portugal	Lisbon	parking time limitations
Spain	Madrid Barcelone Zaragoza Seville San Sebastián	topics for each city: mobilty and transport system information on-street/ off street supply paid parking enforcement parking management parking information system (only for Madrid) private residential parking (only for Madrid) private non-residential parking (only for Madrid) park and ride (WG report and Madrid case)
Sweden	general Göteborg	parking as income generator for commercial activities in a city center parking information system parking capacity
Switzerland	Bern Zürich Zürich North development area kanton Thurgau general	Parking policy parking fee policy Access Contingent Model parking policy parking policy for leisure traffic
UK	Guildford, Oxford, Winchester & York	Special Parking Areas and Park & Ride
EPA	Barcelona Parking in the city Rome London Oslo a German city Herford Germany Apeldoorn Saarbrücken	The Mobility Pact Sustainable Mobility parking policy On street regulations and enforcement free parking on Saturdays and Sundays free parking on Saturdays parking fee reduction negative effects of reduced parking fees results of parking fee increase in municipal car parks Mobility card

Country	cases	theme
EPA	medium sized Dutch city 3 Spanish cities general	effects of parking behaviour as result of changes in parking fee policy parking capacity and effects on economy creating new off-street parking facilities in the city-centre
CPA	Vancouver, BC Calgary, Alb Edmonton, Alb Saskatoon, Sask Winnipeg, Man Kitchener, Ont North Bay, Ont Ottawa, Ont Toronto, Ont Windsor, Ont Montreal, Q Quebec City, Q Saint John, Nw Brunsw	general information on the parking supply in these cities
USA	Park-and-Ride	P+R

Annex 7: Case studies grouped according contents of the different chapters

Country	cases	public parking	private parking	P+R	communication/ acceptance	effects on mobility	effects on economy
Austria	Graz	x					
	Linz	x				x	
	Wiener Neustadt	x			x	x	
	Wien	x			x		
Belgium	Mons	x		x			
	Charleroi	x	x		x		
	Brussels	x			x		
	Kortrijk	x		x			
Czech Republic	Olomouc	x					
	Kromeríz	x					
	Liberec	x		x			
Finland	Helsinki	x		x			x
	Espoo	x		x	x		
	Kerava	x					
	Tampere	x			x		
	Kuopio	x					
	Vaasa	x	x				
	Oulu	x					
France	Lyon	x					x
	Dyon	x			x		
	Grenoble	x					
	Nantes	x			x		
	Strassbourg			x			
Germany	Köln Rathenau Viertel	x				x	
	Lüneburg	x				x	
	München	x					x
	Aken	x				x	
	Oberhausen	x				x	
Hungary	Budapest CBD	x					
	Budapest Castle Hill area	x					
	Budapest Köbanya-Kispest			x			
	Pécs	x					
	Sopron	x					

Country	cases	public parking	private parking	P+R	communication/ acceptance	effects on mobility	effects on economy
Italy	Siena	**x**					
	Brescia	**x**					
	Genova	**x**					
	Napoli	**x**					
	Palermo	**x**					
	Perugia	**x**					
	Torino	**x**					
	Bologna	**x**					
	Firenze	**x**					
	Milano	**x**					
	Padova	**x**					
	Parma	**x**					
	Trieste	**x**					
	Roma	**x**					
Latvia	Riga	**x**	**x**				
	medium size towns	**x**					
the Netherlands	Arnhem					**x**	**x**
	Bergen op Zoom					**x**	**x**
	Breda					**x**	**x**
	Culemborg					**x**	**x**
	Dokkum					**x**	**x**
	Enschede					**x**	**x**
	Groningen					**x**	**x**
	Harderwijk					**x**	**x**
	Heemskerk					**x**	**x**
	‘s-Hertogenbosch					**x**	**x**
	Leeuwarden					**x**	**x**
	Leiden					**x**	**x**
	Middelburg					**x**	**x**
	Nijmegen					**x**	**x**
	Purmerend					**x**	**x**
	Tilburg					**x**	**x**
	Utrecht					**x**	**x**
	Venray					**x**	**x**
Portugal	Lisbon	**x**				**x**	
Spain	Madrid	**X**	**X**	**x**		**X**	
	Barcelone	**X**	**X**			**X**	
	Zaragoza	**X**					
	Seville	**X**					
	San Sebastián	**X**					

Country	cases	public parking	private parking	P+R	communication/ acceptance	effects on mobility	effects on economy
Sweden	general						x
	Göteborg	x			x	x	
Switzerland	Bern	x	x		x	x	
	Zürich				x		
	Zürich North	x	x			x	
	kanton Thurgau		x			x	
	skiing areas		x				x
UK	Guildford	x		X	X		X
	Oxford	X		X	X		X
	Winchester	X					
	York	x		x	x		x
EPA	Barcelona				x		
	Parking in the city	x					
	Rome	x					
	London	x				x	x
	Oslo						x
	a German city						x
	Herford						x
	Germany						x
	Apeldoorn					x	x
	Saarbrücken				x		
	medium sized Dutch city						x
	3 Spanish cities	x					
CPA	Vancouver, BC	x					
	Calgary, Alb	x					
	Edmonton, Alb	x					
	Saskatoon, Sask	x					
	Winnipeg, Man	x					
	Kitchener, Ont	x					
	North Bay, Ont	x					
	Ottawa, Ont	x					
	Toronto, Ont	x					
	Windsor, Ont	x					
	Montreal, Q	x					
	Quebec City, Q	x					
	Saint John, Nw Brunsw	x					
USA	Park-and-Ride			x			

Annex 8: Conclusions on economic effects and mobility effects of the Vienna Parking Management study carried out by HERRY Consult

Herry, M., Schoebel, H. et al.: Effects of the Parking Policy to the Trade and Industry Structure in Vienna, commissioned jointly by the Vienna Chamber of Commerce and the City of Vienna, Vienna 2003.

EXECUTIVE SUMMARY

Background

Parking Policy in Vienna – Steps of Implementation

Milestones of the implementation of parking management in Vienna (Die Parkraumbewirtschaftung in Wien)	
1959	First zone established for short term parking in the inner city district (1. Bezirk)
1974	Parking fees for short term parking zones
July 1993	Pilot project - Implementation of exhaustive parking management in the inner city district (1. Bezirk)
August 1995	Implementation of exhaustive parking management in the districts 6, 7, 8, 9 (exhaustive)
June 1997	Implementation of exhaustive parking management in the districts 4 and 5 (exhaustive)
March 1999	Implementation of exhaustive parking management in district 2 (almost exhaustive) and district 20 (exhaustive)
November 1999	Implementation of exhaustive parking management in district 3 (almost exhaustive)

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Development of Parking Fees in Vienna		
Year	**EUR/h**	**Change in Percent**
1974	0,29	
1980	0,58	+100 %
1986	0,87	+50 %
since 01.01.2002	0,80	- 8 %

HERRY 2003

Parking Fees in Vienna	
Duration	**Fee (€) since 01.01.2002**
1/2 h	0,40
1 h	0,80
1 1/2 h	1,20
10 minutes	free of charge

Situation before implementation of parking policy (Parkraumbewirtschaftung)

- Average parking time 9h (time: 9:00-20:00)
- Car parks mainly used by employees (time: 9:00-20:00)

…leading to the results as follows:

- ↳ low turnover => lower customer frequency
- ↳ hindrance for supply of trade and retailing due to a lack of available free car parks

Situation after implementation of parking policy (Parkraumbewirtschaftung) - Effects on the mobility

- improved availability of car parks especially in the morning, but this positive effect decreased over time due to additional motorization within the city districts (residents)
- Average parking time 1h => higher availability of free car parks
- Significant decrease of illegal parking
- Significant decrease of search time for a free car park (from 9 minutes to 3 minutes)
- Additional monetary support public transport and for construction of new garages (revenues are earmarked for transport and social support)

…leading to the results as follows:

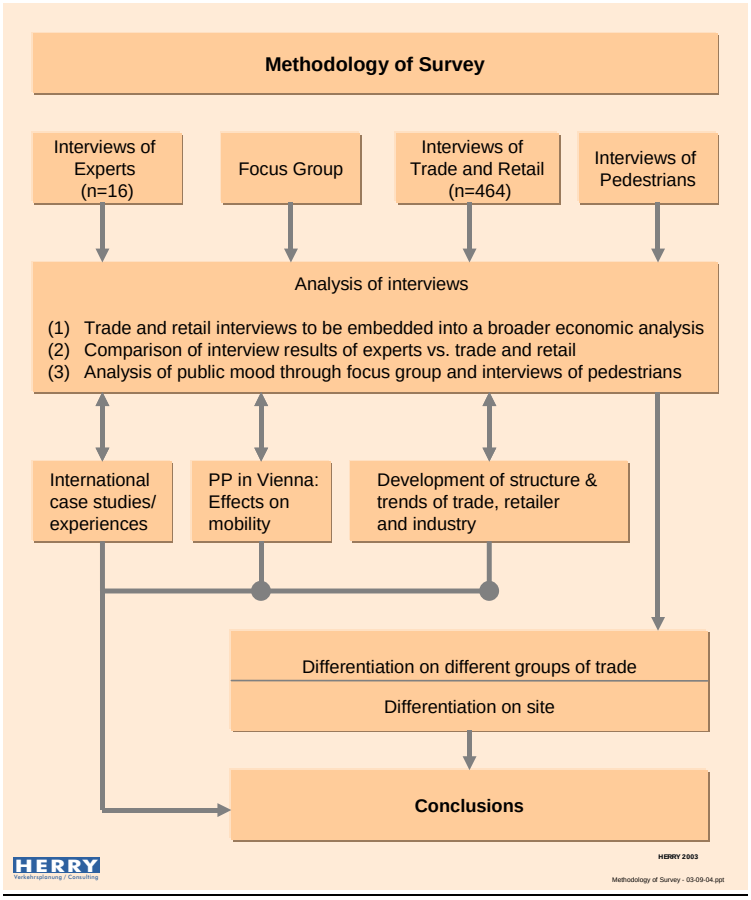
- ↳ Better availability of free car parks for customers as well as supply of trade, retailing (and industry)
- ↳ higher turnover => higher customer frequency

Aim of the Survey

The aim of this survey is to elaborate the structural changes of trade, retail and industry under a specific focus on effects due to the implementation of parking policy in Vienna (Parkraumbewirtschaftung Wien)

Methodology of the Survey

An integrated method has been chosen to put the results of the interviews of the survey in a broader context.



Main Conclusions

1. **The implementation of the parking policy in Vienna (Parkraumbewirtschaftung Wien) since 1993 did not affect <u>directly</u> the structure of the local economy**

   Justification in brief: parking policy in Vienna,

   … does support especially successful companies!
   … does not solve the problems of less successful companies!
   … at locations where it does not work effective, does not harm successful companies!
   … does not harm less successful companies!

2. **Parking policy in Vienna presents in relation to the structural changes of trade, retailing and industry during the last decade a minor importance**

3. **Critical view of retailer on local transport aspects is represented in many cases due to a 'transfer' of other existing problems to transport**

4. **Evidence on a direct negative correlation of turnover in trade & retailing and the implementation of parking policy in Vienna could not be proven within this study**

5. **A shift of companies specifically due to parking policy in Vienna (to/from non-parking policy areas) could mainly not be proven within the sample (n=464). Changes were mostly caused due to other reasons like e.g. site specific costs of land.**
   Note: Specific exceptions on company cars/lorries smoothed the imposed restrictions for trade due to parking policy in Vienna.

Compilation of Effects on Mobility and the Local Economy in Brief

Criterion 'Structure of Local Economy'	**Causally correlation to parking policy in Vienna**	**Remarks**
Shift of company	**no**	Other location indicators are more decisive
Change of company **size**	**no**	Superimposed due to structural economic change under the impact of international trends in economy effecting traders/branches or retailers differently
Change of product supply and services offered by different traders/branches or retailers	**no**	Superimposed due to structural economic change under the impact of international trends in economy effecting traders/branches or retailers differently
Hampering set-up for supply traders/branches or retailers (loading zones etc.)	**no**	The criteria for less storage costs of goods (high costs of floor space in the city centre) induces higher transport frequency due to smaller shipments leading to more traffic.
Hampering set-up for own car pool for traders/branches	**yes**	Additional costs to provide the company owned car pool for on street parking
Criterion „Mobility'	**Causaly correlation to parking policy in Vienna**	**Remarks**
Improved availability of car parks	**yes**	Higher turnover per car park as a result, which offers the possibility for an increase of costumer frequency
Decrease of search time for an available free car park	**yes**	Decrease of search time due to an increased availability of free car parks

HERRY 2003

Annex 9: List of other consulted reports

La voiture à sa juste place, Bernard Latronico, Parcopolis, Paris mars 1997

Deux nouveaux métiers du stationnement

- agent Encaisseur à Dijon,
- agent dÁccueil à Nantes, CERTU, Lyon, novembre 1999

Une politique de Stationnement Pourquoi ? Comment ?, CERTU, Lyon, novembre 1999

Park & Ride in Great Britain 2003, TAS, London, june 2003

Park and Ride in Scotland, TRL and Strathclyde Passenger Transport, The Scottish Office Central Research Unit, Edinburgh 1999

The Quality of on-street parking, CROW record 12, Ede, September 2003

Mobiel betalen voor parkeren, eerste functionele specificaties, brochure nr 3 uit de reeks Van parkeerbeheer naar mobiliteitsmanagement, CROW, Ede, februari 2003.

Park-and-Ride: Canada's Most Cost Effective TDM Strategy; John Morall and Dam Bolger, Calgary June 1996

Kwaliteit en Bereikbaarheid van stadscentra, Robert Althuisius, Universiteit van Groningen, januari 1998

Parking in the town centre: some lessons learned after observing various cases in the Nord-Pas de Calais and Picardie Region (France), paper based on a presentation to the ATEC congress: 'Le stationnement en centre ville: Quelles realités?, Bernard Patrice, Paris Octobre 1994

Parking policy for the Inner City of Helsinki, paper to Transportforum 2002, Olli-Pekka Poutanen, City of Helsinki, januauari 2002

Annex 10:
Excerpt of the Dutch guideline on 'The Quality of on street parking'

Table of contents

Summary
On-street parking is defined as parking and stalling motor vehicles at ground level, along and in the street or in a parking area. Wanting to implement effective parking policy, municipal authorities often face the question of how they should go about drafting qualitatively solid parking policy. This publication offers guidelines, facilitating the development, implementation, organisation, management and assessment of an effective on-street parking policy.
This publication is comprised of three sections: policy development, policy implementation and organisation, management and assessment.

Section one – policy development – distinguishes the following three points. First, the procedural steps leading to policy development are addressed. For this, a checklist and an outline of the policy process are presented and explained in detail. Next, the legal foundation of parking regulation is brought into the spotlight, with a focus on parking bye-laws and the bye-laws governing parking tax.

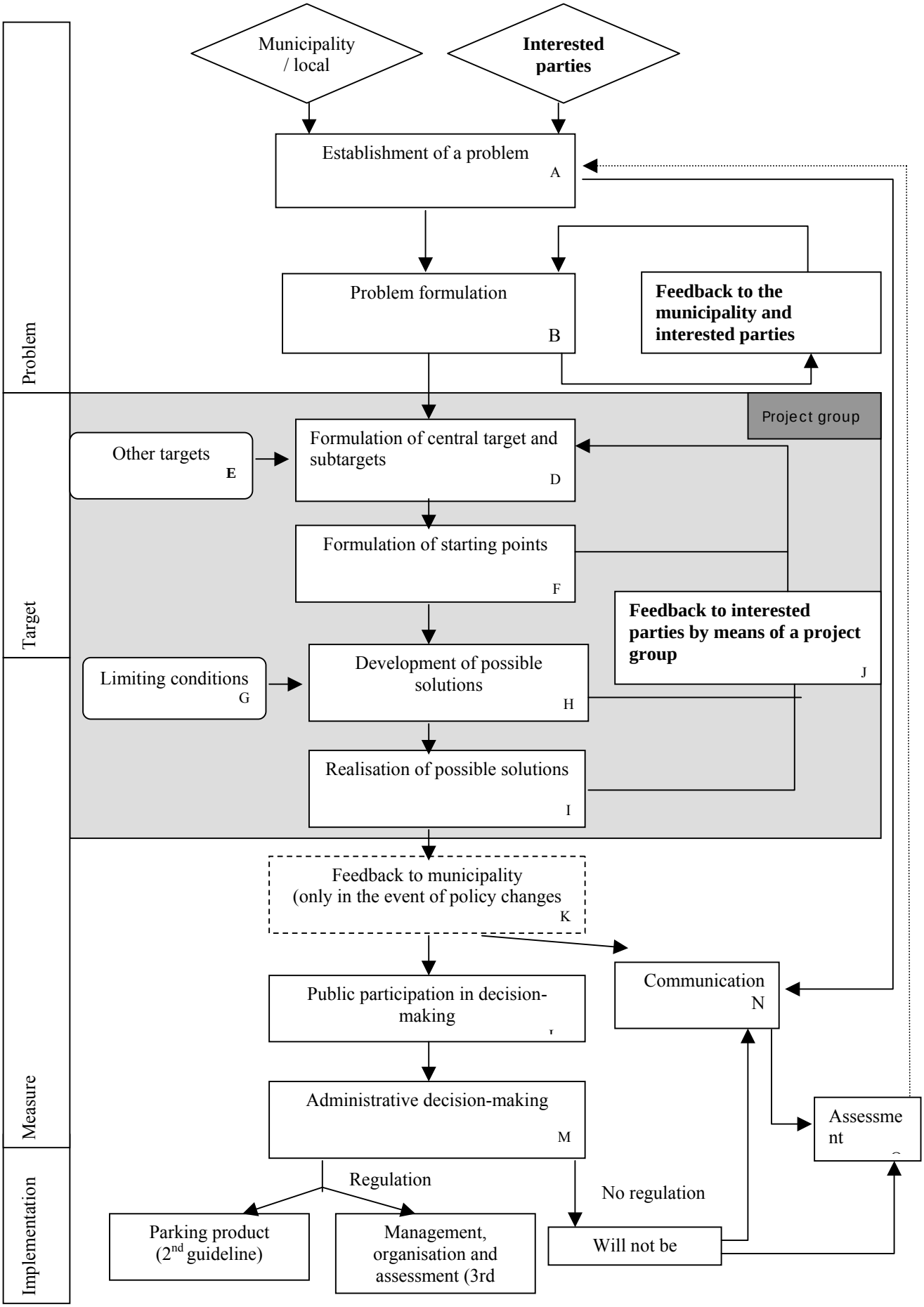
Finally, the various possible policy themes are discussed: parking facilities balance, fees and parking duration, taxation, permit policy, target group policy, parking for the disabled, parking referral system, motorcycle parking, loading and unloading and large vehicle parking. The publication indicates how to formulate policy for each of these points.

The focus of the second section (Chapter 5) is policy implementation. In order to comment on the quality of parking and parking policy, a number of quality requirements must be defined, for which this chapter includes a checklist. In addition, criteria are discussed to measure the pre-determined categories for the various quality aspects.

The last section of this publication explains the management tasks (maintenance of parking equipment and signposting, security, operation and management) and examines the possibility of outsourcing the various activities more closely. The reasons to outsource are addressed and criteria are presented, on the basis of which the municipal authority can determine whether outsourcing is feasible.

Obviously, each parking policy document should dedicate time to monitoring and assessment. The goal of a parking assessment is to determine afterwards the extent to which the proposed objectives were achieved. If necessary, policy adjustments can be made or supplementary measures taken. The last chapter of this publication (Chapter 8) discusses monitoring and assessment.

Figure 2. Policy process outline



5 Quality requirements and guidelines for the parking product

5.1 Introduction

To understand parking and parking policy, a number of quality aspects should be defined to make these terms usable and useful. Parking policy may be reviewed on the basis of these aspects, by considering to what extent the targets have been met and whether there are any bottlenecks. Moreover, quality aspects help interested parties formulate their requirements and needs with regard to parking policy. Seven quality aspects have been defined: safety, uniformity, clarity, user-friendliness, visibility, recognisability and accessibility.
The checklist can help determine whether all quality requirements of a subcategory have been met.

Figure 19. Quality requirements checklist

	Answer	Desired answer	Ref. no.
Is the fees system clear?	Yes/no	Yes	1
Is the enforcement of parking regulations unambiguous?	Yes/no	Yes	2
Is the enforcement of parking regulations clear?	Yes/no	Yes	2
Are the administrative procedures clear?	Yes/no	Yes	3
Are the administrative procedures user-friendly?	Yes/no	Yes	3
Is there uniformity in signs and subsigns?	Yes/no	Yes	4
Are the signs and subsigns clear?	Yes/no	Yes	4
Are the signs and subsigns visible?	Yes/no	Yes	4
Is the parking referral system unambiguous?	Yes/no	Yes	5
Is the parking referral system clear?	Yes/no	Yes	5
Is the parking referral system visible?	Yes/no	Yes	5
Is there uniformity in pedestrian signing?	Yes/no	Yes	6
Is signing for pedestrians clear?	Yes/no	Yes	6
Is signing for pedestrians visible?	Yes/no	Yes	6
Is signing for pedestrians recognisable?	Yes/no	Yes	6
Is there uniformity in parking equipment?	Yes/no	Yes	7
Is the parking equipment clear?	Yes/no	Yes	7
Is the parking equipment user-friendly?	Yes/no	Yes	7
Is the parking equipment visible?	Yes/no	Yes	7
Is the parking equipment recognisable?	Yes/no	Yes	7
Is the parking equipment accessible?	Yes/no	Yes	7
Are the parking bays safe?	Yes/no	Yes	8
Are the parking bays recognisable?	Yes/no	Yes	8
Are the parking bays user-friendly?	Yes/no	Yes	8
Are the parking areas safe?	Yes/no	Yes	9
Are the parking areas recognisable?	Yes/no	Yes	9
Are the parking areas user-friendly?	Yes/no	Yes	9
Are the disabled persons parking places safe?	Yes/no	Yes	10
Are the disabled persons parking places recognisable?	Yes/no	Yes	10
Are the disabled persons parking places accessible?	Yes/no	Yes	10
Are the disabled persons parking places user-friendly?	Yes/no	Yes	10
Are the motorcycle parking places safe?	Yes/no	Yes	11
Are the motorcycle parking places recognisable?	Yes/no	Yes	11
Are the motorcycle parking places accessible?	Yes/no	Yes	11
Are the motorcycle parking places user-friendly?	Yes/no	Yes	11

6 Management

6.1 Introduction

It is necessary to specify various management tasks to enable an adequate parking policy implementation. Figure 20 is a checklist providing an overview of these various tasks which will be explained in the text below.

Figure 20. Management checklist

	Answer	Desired answer	Ref. no.
Is maintenance and repair of the parking equipment provided for?	Yes/no	Yes	1
Is surveillance of closed parking facilities provided?	Yes/no	Yes	2
If so: Were parking attendants appointed?	Yes/no	Yes	2
Is the operation of parking facilities a separate item in the municipal accounts and budget?	Yes/no	Yes	3
Does the operating account structure meet requirements?	Yes/no	Yes	4
Are the coin collection containers emptied on a regular basis?	Yes/no	Yes	5
Do the parking ticket machines register the amounts of the various sorts of coins that are used?	Yes/no	Yes	5
Have measures been taken to enable electronic payment of parking fees?	Yes/no	Yes	5
Is there a specific location to apply for permits and to issue them? Have employees been appointed to this location?	Yes/no	Yes	6
Are there enough staff and means to deal with notices of objection?	Yes/no	Yes	6
Are there enough staff and means to set up and maintain an administration of parking permits and the collection of parking fees?	Yes/no	Yes	7
Are collection procedures with regard to enforcement complied with?	Yes/no	Yes	8
Are collection procedures completed within the set period of time?	Yes/no	Yes	9
Are there any problems in connection with parking fines imposed on foreign parkers?	Yes/no	not applicable	10
If so: Have measures been taken to prevent these problems?	Yes/no	Yes	10
Is there a clear reporting procedure?	Yes/no	Yes	11
Is reporting of parking problems centralised and are reports entered into a central system?	Yes/no	Yes	12
Is there feedback to the reporting person?	Yes/no	Yes	13
Is the report registration open for inspection?	Yes/no	Yes	14
If so Are personal data left out?		Yes	14
Is management reviewed on the basis of the parking policy?	Yes/no	Yes	15
Have the competent authorities issued working instructions for traffic wardens? Is there a uniform reporting policy?	Yes/no	Yes	16
Is the enforcement strategy as little predictable as possible?	Yes/no	Yes	17
Is the enforcement strategy in line with the local situation?	Yes/no	Yes	18
Was an assessment of parking behaviour made to measure the extent to which enforcement targets are being met?	Yes/no	Yes	19
Is it known how parkers assess the chance of 'being caught'? (does this play a role in monitoring?)	Yes/no	Yes	19

Annex 11 Requirements for the introduction of mobile phone payment for parking as used in the Netherlands

General

1. General requirements
- accessible for everybody
- provide additional service for the customer
- 100% reliability to be achieved
- the communication system must have less then 3% failures
- acceptable priced
- respect privacy of customer

2. Requirements from the local authority
- replace or enlarge existing systems
- minimise vandalism and fraud
- comparable or better supervision must be possible
- provide on-line information to make immediate reaction in parking policies possible
- enhance information supply

3. Requirements in use
- simple and easy payment (less then 5 actions needed to pay)
- include voice-response service
- include internet connection possibility
- support internet based license distribution and control
- indicate end of parking-time
- Both pre-paid as other Cell-phones must be applicable
- Provide customer-information to customer
- Needed calling-time less then half a minute
- Entrance costs under 15 EURO.

Organisational

4. Requirements from operators point of view
- must fit in existing management system
- operator must get real-time management-information per area or street

5. Requirements seen from the enforcement
- Easy to use control units
- One unit applicable for all payment-systems available
- Payment control on a certain distance must be possible
- Simple indication on payment on the control device
- Entrance and exit of the users easy available for the enforcement officer
- Provide data on the production of the enforcement officers

6. Requirements from the telecom-provider
- system must be telecom-provider independent
- the parking-system provider must take care of all contacts with the telecom-provider.

7. Requirements to the parking system provider
- the provider must manage and maintain the database
- questions on the system must be services by the system-provider.

Legislative

8. Parking ordnance
- Systems must support all local parking ordinances

9. Fiscalisation (Decriminalisation)
- the parking provider must be able to collect (the fiscal) parking fees
- the parking provider must have a liability insurance
- monthly the number of non-payers must be reported to the local authority operator.

10 Enforcement
- the provider should organise a back-office
- the operator must have real-time admittance to the database of the provider on parkers
- the database must be set up according specifications from the operator
- information asked for by the operator must be presented within 3 days
- the provider must present at least monthly information on non-payment per street per person
- if needed it must be possible to bypass the system to service individual parkers;
- privacy-legislation must be taken into account

Policy-related

11. General parking policy
- the system must be easily adaptable to changes in policy
- System maintenance must be done in the hours of low use of the system
- 24-hours payment for parking must be supported

12. Tariffs
- the system must be able to negotiate all local systems of payment
- the cost for phoning must be recognised and accepted by the user, separate from the cost of parking
- real-time control of the parking tariffs must be supported

13. Licences etc.
- the system must the local licence-policy
- the system must service the local visitors licensing system

14. Residents-parking
- the system must support resident-parking schemes and parking schemes for other target-groups

15. Connection with off-street parking
- in the long run the system must provide added value for off-street parking

16. Payment systems
- Payment to the local operator must be done at least monthly
- All collected money must be passed on to the local operator

Financial

17. Invoice-risk
- The provider must take the invoice-risk

18. Accounting
- Yearly accounting is mandatory
- All financial information must be open to the local operator

19. Contract-agreements
- liability between local operator and provider must be clearly specified
- Place and time of control and maintenance of the system must be pre-specified
- Guarantee, tariffs and billing must be specified in the contract
- Agreements must be made on publicity, circumstances beyond one's control and privacy-legislation

Communication

20. Responsibility for the functioning of the system
- The provider is fully responsible and must provide a helpdesk with enough capacity for peak-demand

21. Responsibility on enforcement and fines
- The local authority must inform the provider on these matters

22. Communication and promotion
- The provider must promote the system

23. Signposting
- tariff-zones must be clearly depicted
- Zone-codes must be recognisable from the vehicle
- Signposting must uniformly explain the possibility to pay by mobile-phone
- Local authority is responsible for the location of Signposting
- The Parker must show uniformly and clearly his way of paying for parking

Standardisation and future developments

24. Transferability
- The customer must be allowed to use the system independent from location, parking provider or telecom provider
- Signposting should be uniform (at least national but preferable international)
- There must be one national communication-protocol
- A maximum must be placed nationally on the fee to be charged by the provider to the local authority

25. Competition
- A monopolistic situation and thus dependence must be prevented

26. Future
- Systems must be able to cater for future-enlargement like guidance or place-reservation
- Systems must be adaptable to other forms of payment for mobility (road-charging)
- In future parking wardens may act as parking-hosts, because they will be (eventually) provided with real time information on the parking situation.