

PART 2

4. THE DUTCH EMPIRICAL CASE STUDY

4.1 INTRODUCTION

The Netherlands has the highest level of bicycle use within the industrialized world. More than 27% of all trips are made by bicycle, a figure that has been relatively stable over the last decades (Pucher and Dijkstra, in: Martens, 2007, p. 327).

The bicycle accounts for 27% of all trips made in the Netherlands (Frulanu & de Munck, in: Van Hout Kurt, 2008, p. 14). For distances up to 7,5 km the bicycle is even the most popular means of transportation with a share of 35%. Compared to most other European countries the bicycle use in the Netherlands is far higher (Van Hout Kurt, 2008, p. 14). Medium-sized cities in particular, show high levels of bicycle ridership, with some reporting a bicycle share of trips exceeding 35% (de la Bruheze and Veraart, in: Martens, 2007, p. 327).

In their programs for the parliamentary elections, almost all Dutch political parties add paragraphs in which they vow to enhance facilities for bicycle commuting. The political party GreenLeft even promotes a principle called "Groen Reizen" (green travelling), in which the choice to use bicycles and public transportation plays a key role (Legambiente Report Journal, 2005, p.3).

This is the bike role and importance framed within the Dutch national context.

In the following paragraphs will be given insights about the bicycle statute level more in detail. It will be introduced the Dutch Bicycle Master Plan and the decentralisation and the new targets of the national cycle policy. In addition will be taken into account, in detail, the four research variables at the national level.

4.2 THE DUTCH BICYCLE MASTER PLAN

The Dutch Bicycle Master Plan, that ran between 1990 and 1997, was the first integral and comprehensive strategy for the promotion of bicycle use in the world (Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001, p.14). It showed that national targets and a national strategy for cycling may have a significant influence on local policies. An evaluation study involving 19 local authorities showed that the intensity of planning for the bicycle has increased because of measures taken for the needs of cycle use (known as pull-measures), and by restricting car use (known as push-measures). While small authorities (up to 50,000 inhabitants) are now more fully active than before, regarding cycle traffic needs, medium sized authorities (to 135,000 inhabitants) and large authorities are both trying hard to restrict car use in combination with measures for cyclists (Dutch Ministry of Transport, 1998). In the late 1970's first state funded experimental pilot projects were executed with specially designed urban bicycle routes. In the 1970's and 1980's the national government subsidised regional and local authorities for implementing bicycle facilities. An experimental scheme was implemented based on the concept of urban bicycle route network, accompanied with an extensive research programme on the effects of this approach. The main focus of bicycle oriented policies was road safety (Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001, p.14). These were the first supply side efforts to enhance the national use of bike and to reduce the use of private car.

4.3 DECENTRALISATION AND NEW TARGETS FOR THE NATIONAL CYCLE POLICY

The Dutch national cycle policy has moved into a phase called decentralisation: regional and local government have to make and do the output of bicycle policy, they have a legal obligation to elaborate essential parts of the national transport policy, which includes the promotion of bicycle use and the formulation of a policy for short distance travelling.

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Also the local governments are stimulated to elaborate the following targets: indicate a coherent central policy in order to stimulate bicycle traffic; contribute to the development and implementation of effective measures and stimulate other governments, institutions, public transport companies and other companies to take appropriate steps (Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001, p.p. 15-16-17). The general policy objective is: "Promoting bicycle use while simultaneously increasing bicycle safety and appeal" and it was elaborated into 5 spearheads, mentioning specific targets that are also referred to the categories of the four research variables:

1. The switch from the car to the bicycle, that is the main topic of the research comparison between Utrecht and Milan cities. The target is an increase in the number of kilometres by bicycle of 3.5 billion by the year 2010 in relation to 1986, resulting in a reduction of 8.75% to the desired reduction in growth of car use.
2. The switch from the car to public transport + bicycle. Target: An increase in train transport of 1.5 billion passenger kilometres (15%) in 2010 in relation to 1990, by means of improving the transport chain of public transport and the bicycle (i.e. improving intermodality). The government recognizes the importance of combining cycling with public transport and gives priority to increase cycling from home to the station (now 30%) and also from the station to the destination (now 8%); the government is not stimulating the combination of bicycles on the train.
3. Cyclist safety. Target: 15% reduction in cyclist fatalities compared to 1986 and 50% reduction in 2010. 10% reduction of injured cyclists in 1995 compared to 1986 and 40% reduction in 2010.
4. Bicycle parking facilities and theft reduction. Target: A substantially lower number of bicycle thefts compared to 1990.
5. Communication. Target: in 1995 bicycle policy was an integral part of all traffic and transport plans carried out by the State, the provinces, municipalities and transport regions (Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001, p.3).

Moreover, decentralised efforts towards a better local cycle policy are made by the the Dutch cyclists' association that has a key role in linking practically the demand and supply parts.

The Cycling Balance (FietsBeraad) in the Netherlands is an initiative of the Dutch cyclists' association who wants to award the best cycling city of the year. At the same time they are delivering a status report on the comfort of cycling (by means of a measure bicycle) in that city.

The Dutch Cyclists' Association is doing a lot of national wide press communication on the results of the Cycling Balance and by this approach the screened cities feel the pressure to get cycling policy on a high quality standard. The result of the Cycling Balance is the opinion of the user groups association (BYPAD, 2008, p.29).

4.4 THE LOCAL AUTHORITIES ROLE

Where in the past most of the (financial) means were situated on national level, the local authorities will get more freedom to invest in mobility measures. The framework for this is the National Transport Plan where cycling is one of the themes. Local authorities are pleased with the higher responsibilities they get but they emphasize the fear that reducing the technical and know how support from the national level will have a negative impact on the long term. The safeguarding and quality improvement of the (local) cycling policy is done by the Bicycle Council.

This is an independent expert group funded by the national government which sets out research and pilots and which translates local needs to a national level. The Bicycle Council is established to monitor developments, to identify problems which need to be tackled on a national level and to organise projects to generate solutions for those arising problems. The Dutch Cyclists' Union has a representative in the Bicycle Council. A group like the Bicycle Council in the Netherlands is important for the link between national and local cycling policy.

Environmental organisations in the Netherlands are much more involved in the general debate on mobility and transport policies (e.g. in the debate about the construction of new highways et cetera) and less in specific cycling issues. They are the linkage of the supply to the demand sides.

In the Netherlands, the bicyclist has a legal status that is laid down in the Road Traffic Act (a bicyclist is a “driver/ rider” just like a car driver, motorbike rider and a moped rider). The Road Traffic Act contains traffic regulations that are applicable in the Netherlands, as well as the requirements that are placed on the equipment of the bicycle (brakes, lights, etc.). The responsibility for bicycling is in the majority of municipalities split into development and management. In practice this means that a policy department (in Utrecht this is the City Planning Department) is responsible for the development of the bicycling policy and that a management department (in Utrecht this is the City Management Department) functions as the road maintenance authority. The road maintenance authority is responsible for the design and execution of bicycle provisions and for the maintenance of bicycle provisions (Gemeente Utrecht, 2008, p.16).

4.5 THE DISTANCES AND THE ITINERARY VARIABLES

The National Traffic and Transport Plan (NVVP) states that all levels of government promote and stimulate the use of the bicycle, and develop a policy for short distance travelling (Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001, p.4). The distance of bike's travel is an important variable that can affect travel behavior. In the research this variable is categorised in the first influential position in the travel behavior modal choices. The NVVP approach to increase the length of cycle routes is “to make the infrastructure suitable for cycling” and improve the quality of cycle routes: in 2010 the travelling time for cyclists to economic and crowd pulling centres have been decreased by 20% owing to the construction of short cuts by improved infrastructure (Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001, p.4).

MEAN DISTANCES COVERED BY BICYCLE PER PERSON/DAY/YEAR

COUNTRY	KMS/PERSON/DAY	KMS/PERSON/DAY (PROPORTION OF TOTAL DISTANCE)	KMS/PERSON/YEAR
NETHERLANDS	6,66	2,3 (6%)	1019
ITALY	0,97	0,4 (1%)	168

Table 1: MEAN DISTANCES COVERED BY BICYCLE PER PERSON/DAY/YEAR

Sources: Rietveld & Daniel, Hydén et al, Dekoster & Schollaert, in Van Hout Kurt, 2008 p.17).

The Dutch have the largest figure for bicycle use per inhabitant in Europe: more than 1000 cycle km per inhabitant per year (Wittink, in: Van Hout Kurt, 2008, p.16).

4.6 THE INFRASTRUCTURAL STRATEGIES AND STATUTE VARIABLES

Referring to the urban transports infrastructural strategies and statute plans variable, in the Netherlands, all railway stations offer bicycle parking facilities in 2 categories: secured bicycle parking and free bicycle parking (Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001, p.10).

At larger railway stations (about 80) the secured bicycle parking is provided by means of supervised (i.e. guarded) indoor bicycle parking. This service has to be paid for. Additional services like rental bicycles and repair are available as well. The free bicycle parking at these stations were traditionally uncovered in the open air. The quality of the free provision was deliberately kept low in order not to compete with the supervised parking. At smaller railway stations the secured parking is traditionally offered by means of lockers. The free parking at these stations was traditionally roofed (Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001, p.10).

The national government is financing the bicycle sheds and the Dutch railways are responsible for building and maintaining the infrastructure. The design of the sheds and the lockers is the same in all station and it was chosen on the basis of a design contest. The company 'NS-Fiets' ('Dutch Railways – Bicycle') is responsible for the management of all sheds. The company's mission is to get as much people as possible to and from the railway station by bike.

Moreover, there here has been started the 'OV-Fiets project' (PT-Bike project) which is an automatic bicycle rent system for offering door to door transport with bicycle + train. Renting the bikes goes through chip cards. In all large railway stations (ca. 30) there are the 'Fietspoints' (bicycle-points). These are professional bicycle shops where clients can buy, repair or rent a bike. The 'fietspoint' is an upgrading the bicycle stations with guarded bicycle parking and service which are already a standard in the main Dutch railway stations. A folding bike is the best door to door transport mean in the transport chain bicycle – train – bicycle, but when the amount of folding bikes is increasing heavily it gives capacity problems on the trains Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001, p.p 10- 40).



Fig1: Bicycle locker OV-Fiets



Fig2: Chip-card OV-Fiets



Fig3: Utrecht's central station bikes' parks

Source (Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001 p.p.42-43)

These infrastructural and facilities provisions for bikes are expected to be a relevant variable in the research data comparison between the Dutch and the Italian cases of study.

Every Dutch municipality has specific traffic lights for bicycles and in front of mostly public and private places, (shops, houses, schools, universities, offices, parks, etc.), several bicycle sheds are provided to induce to use the bike. Most cycling in the Netherlands is for practical, utilitarian purposes. Travel to work or school accounts for 32% of bike trips and shopping trips account 22% (Dutch Ministry of Transport, in: Pucher and Buehler, 2007, p.4).

4.7 AN EMPIRICAL EXAMPLE TO STIMULATE THE USE OF THE BIKE THROUGH PARKING FACILITIES

A pilot project, conducted by AGV (1994), focusing on bicycle parking facilities was carried out in the centrally located and densely populated province of Utrecht. The goal of the project was to stimulate bike-and-ride levels through improvements in the quantity and quality of bicycle parking facilities at bus stops along secondary roads. During the first half of 1993, 42 bus stops were equipped with various kinds of parking facilities, ranging from simple stands for two to ten bicycles to larger scale covered facilities for up to thirty bicycles. The majority of the involved bus stops was located in rural areas, while about one fifth was located in or on the edge of a (small) town. Most bus stops were served by regular, half hourly, bus services linking towns and villages to the main urban centers in the region. Bicycle accessibility of most stops was reasonable to good, with many accessible via dedicated bicycle lanes or paths (AGV, in: Martens, 2007, p. 334).

The results of this small-scale survey carried out directly after installing the facilities, show that the impacts of the improvements were limited, at least in the short term. The occupancy rate of the new parking facilities was about 25%, with larger, covered, bicycle parking facilities scoring substantially higher than small, uncovered, bicycle stands. In terms of impacts on travel behavior, the survey suggests that the bicycle parking facilities did result in some changes in behavior. Some of the respondents indicated that they started to use the bike-and-bus combination instead of car, bicycle or public transport for the whole trip, while others indicated that they changed the bus stop they used in favor of the bus stop with the bicycle parking facilities (AGV, in: Martens, 2007, p. 334).

4.8 MODES OF TRANSPORTS CONNECTED TO EACH OTHER (INTERMODALITY) VARIABLE

In the Netherlands, commuting by bicycle is a very common phenomenon, as well as the combined use of the bicycle with means of public transportation, for practical but also ecological reasons.

From the analysis of the modes of transports connected to each other variable, the policy of the Netherlands Railways with regards to bicycle transport on trains has always been ambiguous, hesitating between discouragement and meeting demand, as the Velo Mondial in association with I-ce the Netherlands and OGM Belgium, (2001) reported. As early as the 1970's the Railway Company tried to ban bicycle from the train, but massive public protest resulted in the retraction of this plan. Here it is shown the importance of the Dutch Cyclists' Union (Koninklijke Nederlandsche Wielren Unie), and of the citizens who contributed to a change from the bottom to the upper managerial and policy decisions. Since that time different price-systems have been used. In some periods prices were extremely high to discourage bicycle transport, but as a result of the lobby of the Dutch Cyclists' Union the policy of the railway company is now 'neutral' in this respect (aiming at a balance between capacity and demand). The present situation is that one can take his/her bicycle on the train outside peak hours against a flat rate of about € 5.25 (Velo Mondial in association with I-ce the Netherlands and OGM Belgium, 2001, p.11).

Thanks to this integrated transport strategy, cycling has become a part of the new national transport plan with a view to integrating all transport modes. This seems to be a logical step towards thinking about 'mobility' instead of thinking about 'cycling' or 'public transport' separately. However, local authorities are not happy that the national cycling strategy is now part of a wide transport plan. Cycling is not put to the foreground anymore (Dutch Ministry of Transport 1998).

4.9 TRAVEL MOTIVATIONS AND ATTITUDES

In the Netherlands, the use of bicycles is not restricted solely to school-going children. Certainly, bicycle use among those involved in 'education/study' is the highest (50%), but this only relates to a limited percentage of all journeys (9%). The high overall cycling proportion (26%) is far more due to the fact that the bicycle achieves a more or less comparable share in all travel motives – and particularly in the most important motives in terms of scope, such as commuter travel and shopping (Ministerie van Verkeer en Waterstaat, Fietsberaad, 2009, p.11).

JOURNEYS BY MAIN MEANS OF TRANSPORT AND MOTIVE IN 2007

MEANS OF TRANSPORTS	BICYCLE	WALKING	CAR DRIVER/PASSENGER
TOURING/HIKING	16,00%	59,00%	11,00%
SOCIAL-RECREATIONAL	31,00%	14,00%	50,00%
VISIT	21,00%	14,00%	60,00%
EDUCATION	50,00%	18,00%	18,00%
SHOPPING	28,00%	18,00%	49,00%
SERVICES,PERSONAL CARE	18,00%	18,00%	55,00%
BUSINESS TRIPS	11,00%	3,00%	79,00%
COMMUTER TRAVEL	25,00%	4,00%	62,00%

Table2: JOURNEYS BY MAIN MEANS OF TRANSPORT AND MOTIVE IN 2007

Source: (Mobiliteitsonderzoek AVV in: Ministerie van Verkeer en Waterstaat, Fietsberaad, 2009, p.10)

Traffic problems occur primarily in the rush hours, when workers travel to or from work by car. So it is particularly attractive to encourage cycling for commuter traffic. This certainly applies to companies and establishments which have to cope with a dire shortage of parking spaces.

The bicycle currently remains popular in commuter traffic – the major increase in car use plays out particularly over the longer distances. Most people believe half an hour's travelling time to and from work is acceptable. Cyclists can certainly cover some 7.5 km in this time. This is an interesting figure, because of all those working in the Netherlands, half live within 7.5 km from work. 45% of them already opt for the bicycle – but more is certainly possible. Those who cycle to work no longer actually need to go to the gym – even if you only live 15 minutes away from work (Ministerie van Verkeer en Waterstaat, Fietsberaad, 2009, p.41).

In the Netherlands, many people do not make absolute choices between using the car or the bicycle over shorter distances. The image of 'sometimes the bike and sometimes the car' is dominant. People who do have a choice between using the car or bicycle for their short trips tend to alternate in their respective use (Ministerie van Verkeer en Waterstaat, Fietsberaad, 2009, p.11).

4.10 NATIONAL DATA ON TRANSPORTATION METHODS AND DISTANCES

Despite the increasing distances covered by the Dutch, the bicycle has retained its popularity. The bicycle is used for more than a quarter of all journeys. In fact for distances up to 7.5 km, the bicycle is the most popular means of transport. In 2007, 34% of all trips up to 7.5 km were made by bicycle (Ministerie van Verkeer en Waterstaat, Fietsberaad, 2009, p.11).

DISTANCES	UP TO 7,5 KM	7,5 KM TO 15KM	15KM OR MORE	TOTAL
CAR DRIVER/PASSENGER	36,00%	76,00%	81,00%	48,00%
TRAIN			11,00%	2,00%
BUS/TRAM/METRO	2,00%	6,00%	4,00%	3,00%
WALKING	27,00%	0,00%	0,00%	19,00%
BICYCLE	34,00%	15,00%	2,00%	26,00%

Table3: Journeys according to main transportation means and distance category in 2007

(Source: Mobiliteitsonderzoek [Mobility Study] Nederland 2007, AVV)

Bicycle use very much depends on the distance covered. As 70% of all journeys in the Netherlands are still shorter than 7.5 km, the strong position of the bicycle over short distances (35%) also extends into the total modality split (27% bicycle). At the same time, it is interesting to note that the bicycle is regularly chosen above 7.5 km: 15% of journeys in the category 7.5-15 km (Ministerie van Verkeer en Waterstaat, Fietsberaad, 2009, p.11).

OVERALL CONCLUSIONS

In conclusion, it is important to have a clear national strategy which is the basis for initiative on local level. For this reason, the value of the dutch Masterplan Bike (a clear national strategy) is recognized as a crucial step in the whole cycling policy. Through the Masterplan Bike local authorities were 'forced' to make cycling important, all kinds of actors had the opportunity to invest in cycling (research, infrastructure, campaigns, ...) and a lot of attention went to cycling (Dutch Ministry of Transport 1998).

The distance, together with the bikes infrastructural provisions variables are determinant in the travel behavioral modal choice, as it is showed by the Utrecht empirical example. For this reason these crucial indicators have to be taken into great account by the supply side, in order to encourage and direct people's travel behavioral choices towards the use of the bicycle.

An important connecting role, between the demand and the supply parts, is held by the Dutch cycling association (Fietsersbond).

Bicycles mobility data are very important and will be analysed in the following chapters since they inform about people's actual travel behaviour and the modal split choices.

5 UTRECHT CASE STUDY

5.1 THE CYCLING POLICY AT THE LOCAL LEVEL

How does the national Dutch authority support cycling policies at the local level?

Utrecht has three administrative layers above it: the Utrecht region, the province of Utrecht and the State. The region is the most important discussion partner with respect to the bicycle policy. After all, it is the region that is responsible for the development of the regional (cross local authority border) bicycle network (Gemeente Utrecht, 2008, p.p. 22-23).

Traditionally, the bicycle policy has primarily been the responsibility of municipalities. Municipalities are responsible for the majority of the facilities used by cyclists. This not only involves the road infrastructure, but also bicycle parking facilities at shops and schools. The local cycle path network is also a municipal responsibility. Each municipality has a different approach to cycling. Some municipalities implement an independent bicycle policy, while others integrate bicycle policy in the general traffic and transport policy. There is seldom an independent implementation programme for cycling measures; it generally hitches a ride with other traffic and spatial measures. In implementing bicycle policy it is important that the various departments are aware of each other and that projects are carried out integrally to ensure inclusion of bicycle facilities (Ministerie van Verkeer en Waterstaat, 2009, p.p. 31-33).

Within the local authority organisation, two departments play an important role with respect to bicycle policy: the Traffic Policy department is responsible for the development of the bicycle policy and the road manager is responsible for maintaining the facilities and the physical expansion of the network. In Utrecht, the development of the traffic and transport policy is a responsibility of the City Planning Department with the management and maintenance of the infrastructure being a responsibility of the City Management Department.

Furthermore, there are numerous local authority departments and organisations that are responsible for the execution of parts of the bicycle policy: the Town Planning department is responsible for designing public space (spatial planning), the local authority parking department is responsible for the construction and maintenance of bicycle parking, large urban developments (such as the redesign of the area around the station, the development of new districts, etc.) have their own project organisation. The work of all of these players is guided by the bicycle policy document. Consultation with the traffic policy department happens only on a project basis. The regional administration (Utrecht region) is an important consultation partner for Utrecht with respect to the bicycle policy. Every five years, the regional administration draws up a Regional Bicycle Plan. This Regional Bicycle Plan is harmonised with the local authority Bicycle Plan and vice versa. The regional administration executes a subsidy scheme on behalf of the State. The State used to execute the scheme itself, but to improve the harmonisation of the bicycle plans with the local needs, in the mid nineties it was decided to decentralise (Gemeente Utrecht, 2008, p.23).

Bicycle infrastructure projects can be financed from the subsidy scheme (maximum contribution 50%), but this scheme can also provide finance to projects in the area of bicycle promotion, education, parking, etc. (here the maximum contribution is 70%). The number of projects that can be subsidised annually is limited. The region is also an important partner in the financial area. The local authorities are for a large extent dependent on the region for the financing of infrastructure. There is therefore regular consultation between the local authority of Utrecht and the Utrecht region on the development of bicycle policy.

The province plays only a marginal role in bicycle policy matters. It is only involved with recreational bicycle facilities. However, the province also plays a role as the provincial road manager. There is only consultation with the province on a project. The previous directing role of the State has to a large extent been taken over by the Regions (Gemeente Utrecht, 2008, p.p. 23-24).

The region is also an important partner in the financial area. The local authorities are for a large extent dependent on the region for the financing of infrastructure. There is therefore regular consultation between the local authority of Utrecht and the Utrecht region on the development of bicycle policy. The Province plays only a marginal role in bicycle policy matters. It is only involved with recreational bicycle facilities. However, the province also plays a role as the provincial road manager. There is only consultation with the province on a project. The previous directing role of the State has to a large extent been taken over by the regions (Gemeente Utrecht, 2008, p.6).

5.2 UTRECHT'S SOCIAL ORGANISATIONS INVOLVED IN THE CYCLE POLICY

In Utrecht, various social organisations are actively involved in the bicycle policy. The most important discussion partner for the local authority is the Utrecht branch of the Dutch Cyclists' Union (Nederlandse Fietsersbond). This is a professional organisation that not only promotes the interests of cyclists, but also carries out research and develops and implements initiatives. The Dutch Cyclists' Union has structural consultation meetings with the road manager about the physical condition of the bicycle network (Gemeente Utrecht, 2008, p.23).

Incidental discussions are also held with the Traffic Policy department on the further development of the bicycle policy. For instance, Utrecht's recent (2002) bicycle policy document was drawn up in close cooperation with the Cyclists' Union. They especially made a contribution to the structure of the main bicycle network and in the determination of the bottlenecks in this network. This is a clear example of the importance of linking together both the perspectives of the policy transport makers and the demand side made by cyclists.

Not only infrastructure projects, but also policy documents have a legally arranged consultation procedure. This consultation procedure involves not only those directly involved (residents, companies, shopkeepers) but also social organisations such as the Cyclists' Union, the Dutch traffic safety organisation and senior citizens' organisations. So that the cycle policy strategies are comprehensive of all the public and private point of views (Gemeente Utrecht, 2008, p.11). 36

5.3 OBJECTIVES OF THE CITY CYCLING POLICY

The policy with respect to the bicycle focuses on retaining the high proportion of movements by bicycle in the total number of traffic movements. Because the city will continue to grow until 2015, which will cause the physical distances to increase, if nothing is done the use of the bicycle is expected to decline. This underlines the complex relationships between land use and transportation, the development of compact urban forms and the design of urban communities favour walking and cycling and are seen as particularly effective strategies for reducing car dependency but Utrecht city is going to grow in the future years (Gemeente Utrecht, 2008, p.17).

To achieve the aim of retaining the high proportion of bicycle movements, various instruments are available: a specified main bicycle network, a programme of requirements, and an investment programme. These instruments will be used to improve the quality of the existing provisions and to construct missing links in the network.

The result is that the travelling speed on the network will increase, safety and attractiveness will increase and the detours will be reduced. This should result in an increase in bicycle use, especially for the longer distances (3.5 – 7.5 kilometres), (Gemeente Utrecht, 2008, p.17).

5.4 THE UTRECHT BICYCLE COORDINATOR

A number of cities in the Netherlands, including Utrecht, have appointed a bicycle coordinator. Bicycle coordinators can be appointed for both development and management. Utrecht only has a bicycle coordinator for the development of the bicycle policy. The bicycle coordinator in Utrecht is engaged in the development of the bicycle policy plans, providing advice to the municipal administration, planning and programming bicycle projects, internal discussion (especially with the road maintenance authority and the various municipal project organisations) and external discussion (mainly with interest groups and other areas of government). The bicycle coordinator combines the bicycle coordinator function with providing advice and policy development in all areas of traffic and transport. The function of the bicycle coordinator was created in Utrecht in 1992. The bicycle policy document that appeared that year laid the basis for this function (Gemeente Utrecht, 2008, p.5).

5.5 NATIONAL AND MUNICIPAL MOVEMENTS MODAL SPLIT PERCENTAGE

	Car driver	Car passenger	train	bus/tram	moped	bicycle	walking	other
Utrecht	19,00%	11,00%	5,00%	4,00%	1,00%	33,00%	25,00%	1,00%
Netherlands	31,00%	17,00%	2,00%	3,00%	1,00%	27,00%	17,00%	1,00%

Table 4: The number of movements by main methods of transport (modal split). Source (Gemeente Utrecht, 1998, p.6).

As it is shown in the table 4, in Utrecht city the bike is the most used mean of transport (33%), followed by the walking mode choice (25%) and the private car (19%). The public transports of bus and train are the lowest methods followed by the moped mean of transport. These data help to answer the subquestion related to the distances and modes of transports utilized and to verify in practice how the compact city center of Utrecht influence the modal transport choice.

As literature (Garrard et al., 2006; Goldsmith, 1992), reported, traffic safety concerns have been identified as a major constraint on cycling in countries with low rates of cycling, high rates of car use, and large gender differences in cycling but in Utrecht case commuters' traffic enhance the choice of using the bike to avoid traffic stress, delays and reduce costs. The parking space policy is that in the centre of the city and in the surrounding older districts, both residents and people from outside of the city must pay to park.

5.6 THE LOCAL TRANSPORT SYSTEMS INTERMODALITY

From the central station in Utrecht, railway lines run in six directions. The most important cities in the Netherlands are accessible by train from Utrecht with services running every 15 or 30 minutes. The train plays a role not only in long distance transport to the rest of the Netherlands, but also in the commuter transport within the region. There are 22 stations within a radius of 15 kilometres around Utrecht, with 4 in the city itself. In the next few years, 7 new stations will be opened in and around the city to make a system of frequent train services (“Randstadspoor”) in the region possible. To achieve this some of the railway lines will be extended to four tracks. Utrecht Central station. With 114,000 people arriving and departing every day, this is the busiest station in the Netherlands. All of the regions of the Netherlands can be accessed by train from Utrecht.

The tram connection, which was opened in 1982, transports 27,000 passengers a day (Gemeente Utrecht, 2008, p.8-9).

Local public transport in Utrecht is made up of city and regional bus lines. A network of high-quality bus lanes is being created for the long distance transport in the city. The bus station adjacent to the central station in Utrecht handles 50,000 passengers a day. In the city 90,000 passengers are transported by bus every day. The shopping area in the centre is predominantly pedestrian. The remainder of the centre has little traffic.

It is not possible for through traffic to pass through the centre of the city. The majority of the residential areas have also been arranged so that there is little traffic. Through traffic is routed over the main roads. By taking measures to reduce speed and measures to improve traffic circulation, motorised traffic is kept away from the bicycle lanes and the residential areas (Gemeente Utrecht, 2008, p.8-9).

The public transport policy has two functions: offering a good alternative to the car (the mobility function) and the social function of accessibility (for instance for people without a car).

From the viewpoint of the mobility function, the aim is to increase the use of public transport by offering more rapid lines (using railway connections or bus lines that make use of dedicated infrastructure).

From the viewpoint of the social function the aim is to improve (for instance, re-route or increase the frequency of) the lines that open up the area where people live. Moreover, the aim will be to realise public transport modal intersections (including bicycle routes) and modal intersections between public transport and the car on the outskirts of the city, so that it is possible to transfer from car to public transport (using a transferium) before entering the city (Gemeente Utrecht, 2008, p. 15).

5.7 THE MUNICIPAL BICYCLE INFRASTRUCTURAL PROVISIONS

The programme of requirements is an instrument that allows the realisation of bicycle provisions with a certain quality. The programme of requirements includes regulations that concern dimensions, material use and other design requirements for bicycle routes. An investment programme is linked to the bicycle policy document.

In Utrecht there are provisions for the moving bicycle and provisions for parking bicycles.

There are bicycle paths along the majority of main roads in the city. The bicycle paths are, wherever possible, on both sides of the road. Two-way traffic is allowed on a large number of bicycle paths.

Utrecht perhaps has the largest amount of cycle parking at a railway station of anywhere in the world. There are currently over 1400 parking spaces at the station, soon to be expanded to over 20000. The Municipality of Utrecht (270,000 inhabitants) is working on an integrated network of bicycle parking facilities. Their starting point is that sufficient storage facilities must be present at homes (origin site) and the destination. There has been considerable experimentation in Utrecht with various bicycle parking facilities.

However due to the lack of any administrative structure to this, this led to a great variety of forms and charges.

The Municipality of Utrecht assigned responsibility to the bicycle parking company from 1996. This bicycle parking company can take its own initiatives, produce policy and penetrate the network of municipal services. The advantage of this is that more attention to bicycle parking is fostered within the entire organisation. (Gemeente Utrecht, 2008, p.p. 13-14).

Since 1997 Utrecht has had a funding system in which bicycle parking facilities are partly financed by car parking fees. Up to 2016 this involves an amount of 750,000 annually. This budget is supplemented from other municipal budgets. In particular the costs for administration and enforcement are paid from the parking fees, while investments tend to be funded from other sources. In areas where paid parking is implemented (public funding areas) an inventory is drawn up of the need for parking spaces for both the car and the bicycle. If necessary, a maximum of 2% of the car parking spaces are converted into bicycle parking facilities. In this effort, they want to work together with residents to achieve sufficient space for bicycles. Of the users of bicycle facilities, 62% appear to be extremely satisfied with the quality of the storage facilities. These storage facilities are well utilised (Ministerie van Verkeer en Waterstaat, 2009, p. 66).



Fig 4: the introduction of bicycle provisions in the city. The retention of a tree in a bike path (LedigErf). Source (Gemeente Utrecht, 2008, p.12)



Fig5: the realisation of a bicycle lane (without a Legal status) in an inner city regeneration area, (Herman Gorterstraat) (Gemeente Utrecht, 2008,p.12)

The paths are in principle surfaced with asphalt. In the Netherlands, the surfacing of bicycle routes is normally red. The letters on signposts for bicycle routes are also in red on a white background. Older paths and paths that run over numerous cables and pipes are surfaced with paving stones. Utrecht has a very wide range of bicycle provisions: from substantial infrastructure such as a bicycle tunnel (Europalaan) to a very simple provision such as concrete blocks used to separate the bicycle path from the road (Stationsplein) (Gemeente Utrecht, 2008, p. 13).

The provisions for the moving bicycle are generally:

- bicycle paths
- bicycle lanes
- bicycle suggestion lanes (bicycle lanes without a legal status)
- traffic priority arrangements to the advantage of the cyclist
- parking prohibited for cars on the bicycle lane
- traffic control installations
- bicycle bridges and tunnels
- signposts for bicycle routes.

The number of people possessing a bicycle in the Netherlands is 840 per 1000 inhabitants. Because many have more than one bicycle, the number of bicycles (approximately 20 million) in the Netherlands is higher than the number of inhabitants (16 million), (Gemeente Utrecht, 2008, p. 13).

Bicycle theft is a major problem. Bike's thief can be reduced to a degree by creating well-guarded and unguarded bicycle parking and bicycle clamps.

The provisions for parking bicycles comprise: bicycle clamps and racks on the street, indoor local parking in residential areas, bicycle parking at companies, bicycle parking at companies, guarded bicycle parking in shopping centres, stations, etc.



Fig6: parking provisions at stations consist of guarded bicycle parks (at the central station in Utrecht there are guarded bicycle parks with in total 7,000 places). Fig7: unguarded bike parks outdoors. Source(Gemeente Utrecht, 2008,p.14).

5.8 UTRECHT ACTUAL BICYCLE USE

Utrecht's cycling rate is 33% of all journeys by bike. Far from the highest in the Netherlands, but of course they have plans to increase this. However, quite a lot of people live in Utrecht and the result is that the place already has impressive numbers of cyclists (David Hembrow' blog, 10 may 2010). Despite the growth in car use, the bicycle still fulfils an important function in the pattern of movement in Utrecht. For instance, the bicycle is used for more movements than public transport. These are mainly movements over a limited distance (up to approximately 7.5 km). For such distances the bicycle is an ideal method of transport because of its flexibility. Of the current car journeys, about half are also for short distances. The bicycle can in principle take over a large proportion of these journeys and as a result can make a major contribution to limiting the use of the car. Bicycling and walking as the main method of transport in Utrecht each account for a large percentage of movements, respectively 33% and 25% (the average in the Netherlands is respectively 27% and 17%). These modes of transport are mainly dominant for movements over short distances, but even so a third of the movements up to 7.5 kilometres are made by car; a large number of these movements could also be made on foot or by bicycle. The car is for 30% and public transport for 9% the main method of transport (Gemeente Utrecht, 2008, p.11).

Although the bicycle's share of the total number of movements is 33%, up to a distance of 5 kilometres this is 42%. The bicycle's share reduces considerably above a movement distance of 5 kilometres. The Utrecht's City Council stated in the website that: "Vredenburg is one of the busiest junctions in the city centre. Every day, more than 18,000 cyclists and 2,500 buses pass. The challenge in designing this new junction lay especially in creating clarity and safety for all users. In the new design, cars, buses, cyclists and pedestrians are clearly separated from each other." Note the priority is to separate different modes. If cycling is to be attractive this is essential (David Hembrow Blog, 10 May 2010).



Fig8: the high-quality public transport lane on the "Vleutenseweg". One of the sections of the bus lane network that has already been realised. From left to right the photo shows a parallelroad, a bicycle path, a grass verge, the main road, the bus lane and the central reservation of the road.

Source (Gemeente Utrecht, 2008, p. 9-10).



Fig9: a traffic circulation measure, one-way traffic, the cyclists can ride in both directions (Leidseweg).



Fig10: a road profile with adjacent bicycle paths (Nobelstraat). Source (Gemeente Utrecht, 2008, p.11).

5.9 UTRECHT BICYCLE NETWORK

Most municipalities have a network of principal bicycle routes based on bicycle policy. Such a network is developed through an analysis of the origin areas and the main destinations for cyclists such as offices, schools and the station. A traffic model is sometimes used for this, though generally a manual analysis serves, combined with local expertise. The main routes must meet higher quality requirements, for example always having tarred surfaces, or priority always being given to the main cycling route. Tackling bottlenecks on the main cycling routes is generally also accorded more priority.

The cycling network cannot be considered in isolation from the network for vehicle traffic or – to a lesser degree - the bus network. When main cycling routes coincide with traffic arteries for vehicular traffic, this often has negative consequences for cyclists. The larger number of conflicts leads to more traffic danger, hindrance and delay. In a number of Dutch cities attempts have been made - often successfully - to disentangle the cycling and vehicle networks. Car traffic using the historic radial to the centre has been reduced, for example, in favour of bicycle traffic. Or a railway level crossing for cars and bicycles is replaced by a bicycle underpass (Ministerie van Verkeer en Waterstaat, 2009, p.57).

The policy with respect to the bicycle focuses on retaining the high proportion of movements by bicycle in the total number of traffic movements. Because the city will continue to grow until 2015, which will cause the physical distances to increase, if nothing is done the use of the bicycle is expected to decline. To achieve the aim of retaining the high proportion of bicycle movements, various instruments are available: a specified main bicycle network, a programme of requirements, and an investment programme. These instruments will be used to improve the quality of the existing provisions and to construct missing links in the network (Gemeente Utrecht, 2008, p.21).

Utrecht has set out a main urban bicycle network with a mesh of 400 – 500 metres that connects to the regional bicycle network. This network has somewhat the form of a spider's web, in which the radials are directed at the centre of the city. The main bicycle network consists of routes.

No facilities (bicycle paths, etc.) have yet been allocated to these routes.

Three basic profiles are available for these main bicycle routes: a profile with a physical separation of the bicycle facilities, a profile with a visual separation of the bicycle facilities and a mixed profile. For more information about this subject, refer to the appendix.

The choice of the best basic profile to use is dependent on factors such as the function of the road, the intensity of vehicle traffic and the speed of vehicle traffic.



Fig11: the regional bicycle network. Source (Gemeente Utrecht, 2008, p.22).

Utrecht has a number of obstacles in the form of railway yards, industrial sites and canals. Sometimes long detours must be made to by-pass these obstacles. Within the framework of urban development (for instance with housing on disused railway yards or the construction of new housing districts on the other side of a canal) occasionally a shortened route can be created. However, the majority of these missing links in the main bicycle network cannot be realised as a result of the high costs (there is always an expensive tunnel or bridge needed), (Gemeente Utrecht, 2008, p.24).

Maintenance is extremely important for the operation of the bicycle network. A good and comfortable road surface attracts users. In Utrecht, road maintenance plays an important role on two fronts: during asphaltting activities, as many paths as possible made of paving stones are replaced by asphalted paths. The paving stones are uncomfortable and many are written off and when the paving machine is in operation anyway it is relatively cheap to asphalt the bicycle path at the same time. Furthermore, major overhauls (complete reconstruction of roads) are often the moment when the road can be given a new profile. This is an excellent moment to introduce bicycle tracks (Gemeente Utrecht, 2008, p.22).

The result is that the travelling speed on the network will increase, safety and attractiveness will increase and the detours will be reduced. This should result in an increase in bicycle use, especially for the longer distances (3.5 – 7.5 kilometres), (Gemeente Utrecht, 2008, p.21).

5.10 POLICIES FOR PROMOTING AND INCREASING UTRECHT'S ACTUAL NUMBER OF BIKE USERS

Despite the fact that the Netherlands is traditionally a cycling country and that Utrecht has a high bicycle share in the modal split, Utrecht created bicycle policy documents in 1992 and 2002. An unchanged policy will result in the bicycle share falling, as a result of all sorts of developments.

The Utrecht bicycle policy has two objectives. The first objective is to retain the high bicycle share in the modal split. At the moment, the bicycle has a 33% share in all of the means of transport and even a share of 42% where journeys of less than 5 kilometres are involved. The city will however grow strongly until 2015. The built-up area will nearly double (Gemeente Utrecht, 2008, p.21).

The maximum distance to cycle within the built-up area is currently a maximum of 9 kilometres. In 2015, this will be 14 kilometres. Research has shown that the bicycle share in the modal split above 7.5 kilometres decreases strongly. This means that measures must especially be taken to retain bicycle use in the segment between 5 and 7.5 kilometres. This is another confirm that the distance and the city itinerary, of bicycles lanes, are really affecting the Utrecht travel choices.

The situation is that the distance to travel is not the only aspect that determines the action radius of the cyclist, but aspects such as journey speed, the probability of stopping, waiting times and comfort also play a role (Gemeente Utrecht, 2008, p. 21).

The second objective of the Utrecht bicycle policy is the integration of the bicycle in the whole traffic and transport system. Car, bus, tram, train, bicycle and pedestrian all have their own place in the traffic and transport system. After all, not every car journey can be replaced by a bicycle trip. The task is therefore to find the most optimum balance. A better balance must also be found in relationship to public transport. At the moment, in urban areas the bicycle and public transport are competitors. An increase in bicycle share occurs mainly to the detriment of public transport and vice versa, while when the distances in the urban area increase, these two methods of transport should support and complement each other. Making regional rail transport accessible to bicycles is one of the measures that can be considered (Gemeente Utrecht, 2008, p.p. 21-22).

Utrecht has up to now only developed sectoral policy in the area of traffic and transport. Policy documents in the area of traffic safety, parking, bicycles, road categorisation, public transport and highway structure have been made in the last years.

These documents express to a greater or lesser degree the vision of the Utrecht local authority: reducing the inconvenience of car traffic in the city, while retaining good accessibility. An integral vision that also makes the link with the long-term spatial and economic developments is still missing. This will be rectified in the Local Authority Traffic and Transport Plan that is currently being made (2003).

At the same time, from 2003 there is a monitoring programme (counting and measuring car and bicycle traffic, including intensities, speeds, journey lengths in time, and waiting times at traffic control measures). This monitoring programme will have a policy-supporting role (Gemeente Utrecht, 2008, p. 22).

6. ANALYTICAL DATA OF UTRECHT'S ACTUAL BIKE USERS

MOVEMENTS BY BICYCLE PER PERSON, PER DAY BY MOTIVE

COMMUTING	SHOPPING/ RECREATION	EDUCATION	OTHER	TOTAL BICYCLE	TOTAL OF ALL MODES OF TRANSPORT
0,18	0,43	0,08	0,1	0,79	3,15

Table 5: The average number of movements by bicycle per person per day by motive. Source (Gemeente Utrecht, 2008, p.18).

The origin and destination of the bicyclist have a direct relationship to the motivation. So that the distance variable is linked closely to the variables concerning travel motivations and attitudes. Moreover, the bicycle plays a role not only as the main mode of city transport, but also as a means of getting to and from the station at both ends of the journey when the train is used (Gemeente Utrecht, 2008, p.18).

THE CHOICE OF THE MEANS OF TRANSPORT AND THE STATION ITINERARY

	BICYCLE	WALKING	CAR	BUS/TRAM/METRO	OTHER
TRANSPORT TO STATION FROM ORIGIN	30,00%	24,00%	14,00%	31,00%	1,00%
TRANSPORT FROM STATION TO DESTINATION	8,00%	46,00%	9,00%	32,00%	5,00%

Table 6: The choice of the means of transport to and from the station when the train is used. Source (Geemente Utrecht 1999, p.19).

Within some countries there might be some regions with a significantly higher bicycle share. Even in countries with a very low bicycle share there might be cities with a far higher bicycle use. These cities are also mentioned in the table above. An extensive overview of the bicycle share in some Dutch cities in 1995 (de La Bruhèze and Veraart in: Van Hout Kurt, 2008,p.15).

BICYCLE USE IN DIFFERENT DUTCH CITIES

	ALL JOURNEYS	JOURNEYS< 5KM
ZWOLLE	39,50%	52,30%
GRONINGEN	39,20%	47,50%
AMSTERDAM	27,60%	36,80%
LEIDEN	35,90%	45,90%
ENSCHDEDE	35,60%	44,70%
UTRECHT	32,40%	42,70%

Table7: Bicycle use in different Dutch cities. Source: de La Bruhèze & Veraart in: Van Hout Kurt, 2008 ,p.15).

5.8 OVERALL CONCLUSION

The Utrecht bicycle policy seems to be the most relevant instrument to give priority to and implement the bicycle policy

As it has been previously showed, the public transports, as well as the urban public spaces of Utrecht, are provided by good quality and quantity bike's infrastructures. This infrastructural strategy is necessary to enhance the actual number of Utrecht's two wheelers.

Since 1990 the City of Utrecht has increased its efforts to implement the new Dutch town planning which is oriented towards the "compact city" concept (Ebel, 1996, p.40). The fact that Utrecht city center is compact and that the business and shopping districts are more or less close to each other, are relevant characteristics influencing the distance variable, one of the most threat ones when promoting the use of the bike. But, as result of the growth of Utrecht urban areas, the distances to be covered will become longer which will result in the bicycle losing ground in favour of the car and public transport. Since the cyclist has a limited action radius, generally of 5 kilometres, above this distance, the bicycle share in the modal split is extremely limited. For this reason, it is relevant that the land use and urban planning managers work together with the Dutch Cyclist Union, the Municipality of Utrecht and the transports managers, in order to have a comprehensive look from both the demand needs and the supply practical views.

As David Tomlinson suggests, cars and highways encourages urban sprawl, which requires even more land and more infrastructure than is needed to service compact urban development. Bicycle infrastructure (for instance, two-way 4-metre-wide bicycle paths) have a large capacity and can be created cheaply when compared to the infrastructure required for vehicles (Gemeente Utrecht, 2008, p.20).

Day-to-day living in sprawling development, in turn, demands greater mobility, since sprawl is characterised not only by low urban density, but also by the segregation of land-use activities. When more travel is required to conduct daily, activities, alternatives to driving, such as public transport, cycling, and walking, become less feasible (David Tomlinson, 2003, p. 7). This problem has to be taken under great consideration by the supply side when enhancing the urban bike use.

A serious problem to take into account, when enhancing the use of the bike, is the fact that it's difficult to increase the bicycle share by taking share from the car. An increase in bicycle use is usually at the expense of public transport.

The growing use of the car has a number of unfavourable side effects, such as use of space, the emission of hazardous substances and traffic nuisance, including noise. Moreover, the car forms, as a result of its speed, a threat to traffic safety, mainly for vulnerable traffic participants such as pedestrians and bicyclists. But despite the growth in car use, the bicycle still fulfils an important function in the pattern of movement in Utrecht. For instance, the bicycle is used for more movements than public transport. These are mainly movements over a limited distance (up to approximately 7.5 km). For such distances the bicycle is an ideal method of transport because of its flexibility.

The expected growth in mobility should be able to be accommodated throughout all of the networks for cars, bicycles and public transport. The inconvenience of the motor-traffic (safety, pollution, traffic, time consuming, money and energy spending) must be decrease.

Since many people choose the bike over public transportation or a car for trips over short distances shorter than 5 kilometers in Utrecht city, as the Municipality of Utrecht stated in the City Document (2008), the result is that the bike is the main local mean of transport.

In the Utrecht local policies and data presentation all the four variables have been integrally touched within the city bicycle policy. In the following chapter the Italian policies and Milan data will be introduced and discussed always by taking into account the research variables.

