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Measure Evaluation Results

UTR 3.1 Innovation of the system of parking permits and rates

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Executive Summary

The measure 'Innovation of the system of parking permits and rates' aimed at optimizing the parking management of on-street parking facilities in Utrecht by digitising the existing parking products. The availability of public space for driving but also parking vehicles in Utrecht is limited. With an increase in cars and a more and more prominent lack of space, Utrecht saw the need to use the public space in the most optimal way, parking spaces included. Under this measure, several "hardware" and "software" were developed and implemented to help keep Utrecht accessible and easy to reach. Thereby, the expected objectives were to implement an efficient enforcement system for parking fees to increase 'payment behaviour', to decrease the number of visitors to the parking reception desk and to generate parking data.

Stage 1: Installation of 530 digital parking ticket machines *(2009-2012)* Although a person who wants to park his/her car has to enter the license plate of this car in the parking machine, he/she still needs to place a paper ticket behind the front window of their car.

Stage 2: Communication campaign on digital parking *(February 2009 to May 2009*) The communication campaign that was finalised in 2009 was called "Digitaal parkeren doe je zo", translated 'this is how to use digital parking'. The new parking machines, the digital visitors' passes and the digital parking permit for residents were communicated to visitors, inhabitants and companies in Utrecht, as well as employees at the city administration and the politicians. A clear visual design was developed to support the message. The website www.parkerendoejezo.nl was launched.

Stage 3: Introduction of the digital parking permit and a personal web page *(April 2009-October 2010)* The plastic parking permit is replaced by the digital parking permit. Part of digitisation is the development of personal internet pages related to parking. Since October 2010 parking permit holders got online access to a personal web page to monitor their parking credit and payment status. They can use a secure code to find the digital forms needed to apply for e.g. a permit, see the status and validity of their own permit, order visitor's tickets, find phone numbers or ask online questions.

Stage 4: Introduction of the digital visitor permit *(2009)* This very successful innovative product allows the visitors of residents to park 70 hours per three months for a discounted tariff. In the digital product these 70 hours have not yet been paid, it is 'credit' that can be used by entering a code in the digital parking machine. The machine checks if there are still 'discount hours' available.

Stage 5: Purchase of a scan-car *(November 2010 – December 2010)* A special scan car, equipped with license plate readers, that enforces the digital parking permit was put into operation in December 2010. The car drives through the streets and 'reads' the license plates of parked cars. The scan car recognises the license plates that are in the central digital parking database; cars that have been paid for are registered in this database. Cars that are not in there are checked by enforcement personnel on scooters and on foot.

Stage 6: Removal of the obligation to enter license plate number (*2012)* The city council decided that visitors could not be obligated to enter the license plate of their car when they wanted to park since they had not given their permission for this. For this reason the parking machines were adapted in March 2012.

Stage 7: Introduction of Mobile Parking (*March 2012)* Paying for parking by mobile phone was introduced. The tariffs are the same as paying via the parking machine; Visitors pay by calling, texting, mobile internet or a special smart phone-app when they park their car.

Evaluation approach focused on society and economic indicators. **Impact evaluation** showed that the innovation of the parking system was successful on many levels: The payment behaviour changed as the percentage of short-term parked cars with a ticket increased by 10% between 2010 and 2012 compared to the business-as-usual situation, while the number of enforcement officers decreased from 63 in 2008 to 45 in 2012. Despite the increased tariffs and the decreased number of short-term stay tickets the number of day-, evening- and visitor permit parking tickets sold increased. It cannot be proved that this was purely the effect of the digitising, but the increases are very likely the effect of the improved and more user friendly digitised products. Furthermore in the first few months almost 15% of paid parking by visitors was done by mobile phone parking highlighting the accomplishment of this measure. Since the number of visitors to the parking reception desk decreased by more than 10,000 per year compared to the business-as-usual situation, the personnel costs of the Department of Parking decreased proportionally. Likewise, the introduction of the scan car has been a financial success as the number of enforcement officers decreased.

One of the barriers encountered concerns the data collection. There have been political discussions about the privacy of car parkers which resulted in the political position that users need to give permission to the city before the city can use personal information. Hence the registration of license plates could not be implemented which reduced the effectiveness of the enforcement and accuracy of collected data.

Since 2008, the city of Utrecht is in charge of parking enforcement. This augmentation of the responsibilities of the Parking Department was a relevant **driver** which enabled the successful implementation and ensured a long-term parking management strategy.

The public acceptance and appropriation of the new parking system contributed to the **success** of the measure. This highlights that the communication strategy was profitable for the measure and that the implemented products responded efficiently to the current user needs. For the implementation of similar measures, **recommendations** arising from Utrecht´s experience are: (i) to establish a productive and continuous dialog with local politicians and be aware of the political agenda during the planning process, (ii) to determine and establish an evaluation strategy from the earliest stage of the process and (iii) be aware that technological progresses can occur sometimes in a shorter time than the time required to raise public awareness and achieve political decisions, therefore it is recommended to inform stakeholders continuously on updates and progresses achieved during the process.

The overall result of the evaluation showed that the measure was successful and contributed to improve parking management in the city of Utrecht. Researches on new alternative products will be carried on under the supervision of the Parking Department with the aim to incentive car users to shift towards cleaner cars by offering them favourable parking tariffs. Additionally, another 150 machines will be installed after the CIVITAS MIMOSA period in 2013.

A Introduction

A1 Objectives

The measure objectives are:

High level objectives:

- Improvement of air quality,

Strategic level objectives:

- To implement energy efficient parking policy,

Measure level specific objectives:

- To gain parking data which will allow one to alter the negative effects of (an overload of) cars in the city and future decision making;
- To increase the 'payment behaviour' of people who park their car in Utrecht;
- To make paid parking more user friendly;
- To reduce the costs for the Department of Parking by:
  - simplifying (and thereby intensifying) the enforcement of parking regulations;
  - reducing the number of visitors to the physical parking desk.

A2 Description

Within the city centre of Utrecht and the surrounding areas residents and visitors have to pay to park their car on the streets. Figure A2-1 shows these areas.

Figure A2-1: Map of the areas (red, dark yellow and light yellow) in which people have to pay to park their car on the street.

Residents in these areas can buy a parking permit, visitors can buy a parking ticket for the time he/she wants to park his/her car. To give an idea of the tariffs: in 2012 the cost for a permit in the city centre (the most expensive area) is € 54.30 for three months and a parking ticket for one hour in the centre costs € 4.26. Furthermore residents can buy a so-called visitors-permit. This permit gives a discount of 50% for 70 hours every three months.

The availability of public space for driving but also parking vehicles in Utrecht is limited. With an increase in cars and a more and more prominent lack of space, Utrecht saw the need to use the public space in the most optimal way, parking spaces included. In addition to the need to use the public space in the most optimal way, new technologies opened up a whole new range of possibilities for more efficiency with regard to paid parking, parking permits and enforcement.

In reaction to these developments Utrecht developed a vision for parking with the objective to 'optimize the use of parking infrastructure for cars and bicycles by providing services based on information', a strategy for digital parking (e.g. over 500 new parking machines that allowed for digital parking, digitisation of the permit system, new enforcement methods) and an accompanying communication strategy to inform citizens, visitors and companies in Utrecht (City of Utrecht, 2012).

Within this vision it is firmly established that smart parking strategies can help keep Utrecht accessible and easy to reach. Travelling by individual car can often be combined with travelling by bicycle, public transport or car sharing car. Parking is a part of the mobility chain, but not per definition the end of this chain. Measures can be implemented that discourage the use of private cars and other measures can focus on optimising the use of the private car. The latter is within the realm of the parking department. It can play an important role in implementing information-based services for parking when combining information about traffic, travelling and parking in relation to time and place. Parking information becomes a part of mobility information and parking services are offered from a demand point of view. Parking services become multichannel, multimedia, multilingual and irrespective of time and place.

As a consequence the tasks of the parking department were to shift their focus to a database with parking rights, to digitise parking permits and increase the digitisation of the front-office.

Utrecht decided to innovate the parking system which consisted of a number of “hardware” and “software” implementations. The following innovations were part of this measure:

- Installation of at least 500 new (digital) parking ticket machines during the MIMOSA project period.
- Introduction of a digital parking permit for residents:
  The former plastic permit which had to be attached to the car window was digitised: the license plates of the cars for which residents received a permit, are registered in a central database.
- Introduction of digital 'parking tickets' for visitors:
  The former paper parking tickets were digitised: visitors who wanted to park their car in a paid parking place on the street did not need a parking ticket anymore. By paying through the digital parking machines, it was registered for which car the 'ticket' was paid, based on the license plate of this car.
- Implementation of a web space where parking permit holders could prolong their permit, pay for it, monitor the status, etc.
- Implementation of a broad information campaign on the new system for paid parking "Digitaal parkeren doe je zo", translated ‘this is how you can park digital'.

The advantages of digitising the parking system and registering for which cars fees have been paid in one central database are the following:

- Enforcement becomes easier: enforcement officers on the streets can use equipment (officers that check the cars on foot have a handheld computer and since December 2010 a scan car has been put into operation) to scan the license plates of all the parked cars. This enables them to check whether the license plates of the parked cars are registered in the

central database and therefore immediately verify whether someone paid for parking this car, at that location and time. As enforcement becomes easier it will also become cheaper and more cars can be controlled at the same time.

- The possibilities to commit fraud are reduced. Due to the digitalised parking products it is no longer possible to imitate a parking permit, it is not possible to transfer a permit or a parking ticket to another person.
- It makes it possible to pay for the exact time a car was parked (pay per minute).
- 'Payment behaviour' increases: more people who park their car in a paid area will buy a parking ticket because the probability of being caught increases.
- The number of visitors to the physical parking desk will decrease and thus the costs for personnel will decrease.
- Digitising the parking system will generate a lot of data which will make it possible to apply mobility management measures, like:
  - differentiation of parking tariffs according to the number of used and available parking places;
  - differentiation of parking tariffs according to the time of day;
  - differentiation of parking tariffs according to the type of vehicle;
  - using the real-time data of the available parking places to inform car drivers, or even make these data available through route planners;
- Digitising the parking system makes it possible to introduce Mobile Parking: within this concept a person can buy and pay for a parking ticket by using a mobile phone. Mobile Parking means a reduction in distribution and administrative costs as well as more ease and an increase in social security for the person who parks his car; some people do not feel safe when they have to pay by pin or with cash at a parking machine on the street, especially when it is dark or when there are no other persons on the street.

B Measure Implementation

B1 Innovative aspects

The innovative aspects of the measure are:

- The **use of new technology** – introduction of a new digital parking ticket machine and a new digital parking permit. Utrecht is, together with Amsterdam, a frontrunner in the advanced digitising of parking products in the Netherlands. This encompasses not only the issuing of parking products but also the parking products themselves (such as digital permits and tickets, for example through Mobile parking) and the enforcement (digitally).
- The introduction of a **new conceptual approach** – it is highly innovative to use this new technology to gain insight into the parking habits of all cars in the city (that occupy paid parking spaces) and subsequently use this information in policy decisions.

B2 Research and Technology Development

The following research and technology development activities have taken place:

- Research into technical possibilities for parking ticket machines.
- Development of a new strategy for parking permits, where the former used parking tickets and permits will be replaced by a digital version.
- Research into advanced digitising of application of parking products, the issuing of parking products, and of the parking products themselves (digital permit, digital visitor permit, digital enforcement, mobile-phone parking).
- Research into the possibilities that the new digitalised parking system generates regarding general mobility management in Utrecht. The city of Utrecht started to discuss the possibilities of providing information on the percentages of occupied parking places through navigation systems with suppliers of these systems. This takes time, especially due to the fact that parking garages are reluctant in sharing this information.
- Development of a communication plan for different target groups (such as permit holders or visitors), including a recognisable logo for the campaign (see chapter B4 stage 3).
- Development of a web space where parking permit holders can individually prolong their permit, pay for it, monitor the status, etc.
- Furthermore a so called scan-car has been developed. This technically advanced car is equipped with cameras that are able to read license plates of parked cars both from the rear and from the front. The car drives, scanning, along the streets. If the car computer detects a parked car that is not stored in the database, or in doubt one of the parking officers is notified and will go on an electric scooter to the car and (if applicable) write out a fine. The car is also used for other possibilities, like enforcement of the Low Emission Zone, or to trace people who for example still have to pay taxes. From 2013 onwards the scan car will also be used for measuring how many of the parking spaces are occupied. Until 2012 this was done by people. By using the scan car the estimated saving is about € 60,000 per year.

Picture B2-1: pictures of the scan-car. Left: the side of the scan car with cameras behind the mirrored glass. Middle: camera system inside the car. Right: the computer display showing information on the scanned license plates.

B3 Situation before CIVITAS

Parking was and is regulated through parking permits for residents in combination with parking rates for visitors in the inner city and areas around this inner city.

The city of Utrecht has different parking rates for parking a car on the street, depending on the location. Parking costs are higher in the centre than in the surrounding areas. On the 1st of January 2007, the city of Utrecht considerably raised the rates for on-street parking.

Since the 1st of January 2008 the Parking Department of the City of Utrecht is responsible for parking enforcement (shortly before the start of CIVTAS MIMOSA this responsibility shifted from the local police to the municipality).

The parking permits for residents were distributed in the form of a 'plastic' permit to be attached to the car window. At the end of 2008 a total of 21,348 parking permits were supplied. Residents pay for this on a quarterly basis. Every 3 months the permit had to be renewed.

The parking tickets for visitors were distributed in the form of a 'paper' ticket to be obtained with coins from a parking ticket machine on the street. This ticket needed to be put behind the car window.

The visitors-permit for residents with which visitors of residents received a discount of 50% on the parking tariffs was a kind of chip card. A resident could add cash on this card at the parking machine. A visitor of this resident could use this card to pay his/her parking tariff. A disadvantage of this was that sometimes large amounts of money were added to the card. When the card was broken, the city was responsible, but could not check how much money the card contained. Another disadvantage was that residents could only use cash to add money. Finally there were residents that did not like the fact that they had to pay for their visitors.

Before the digitising, enforcement officers had to walk along the parked cars to check on paper parking tickets and parking permits. They had to read the tickets/permits and check whether the car had the 'right' to park in that parking place. With the digitalised parking products, enforcement can be done by scanning the license plates which makes enforcement cheaper.

Before digitising the city had no real time information about the number of parked cars and the number of free parking places.

B4 Actual implementation of the measure

The measure was implemented in the following stages:

Stage 1: Installation of 530 digital parking ticket machines (2009-2012)

In 2009, 70 machines were installed in the centre of Utrecht. In 2010, 300 machines were placed and in 2011 another 180 machines were installed.

After the CIVITAS MIMOSA period another 150 machines will be installed in 2013.

Although a person who wants to park his/her car has to enter the license plate of this car in the parking machine, he/she still needs to place a paper ticket behind the front window of their car.

Picture B4-1: the digital parking ticket machine

Stage 2: Communication campaign on digital parking *(February 2009 to May 2009*)
The communication campaign that was finalised in 2009 was called "Digitaal parkeren doe je zo", translated 'this is how to use digital parking'. The new parking machines, the digital visitors' passes and the digital parking permit for residents were communicated to visitors, inhabitants and companies in Utrecht, as well as employees at the city administration and the politicians. A clear visual design was developed to support the message. The website www.parkerendoejezo.nl was launched.

The aim of the Utrecht communication strategy related to parking was on the one hand to inform citizens and visitors about the changes, and at the same time to stress the benefits of digital parking. On the other hand, support for their own organisation (internally) was also to be created. This was to be done with one common communication plan. The communication department of the municipality worked closely together with the parking department.

An overview of the most important dates for the digital parking strategy was put together (e.g. the installation dates of new parking machines and date when no paper permits are no longer allowed, digital ones only).

The common communication message was that the introduction of digital parking made the use of parking products in Utrecht easier. The main products to be communicated were the new parking machines (main message: more payment options), the new visitor tickets (main message: no physical ticket necessary anymore) and the new digital permit for inhabitants (main message: no parking permit behind the windscreen anymore). A pitch and logo were decided upon. The logo consists of a Dutch license plate plus a Dutch bank card, which equals a Parking sign (see picture B4-2).

Picture B4-2: The logo for the communication campaign for digital parking

For each of the products mentioned above, a detailed overview of "who, why, what, where and when" regarding the means of communication was made. For example, for the new parking machines the following tools were used (the "when" was left out for this summary):

- ***Target groups:*** Inhabitants, companies and visitors to Utrecht
- ***Purpose:*** Announce changes / inform the target groups
- ***Means & Where***:
  - A press release about first 4 test machines in national and local press.
  - Green street graffiti at 15 strategic "old" parking machines that will be replaced (see picture B4-3).

Picture B4-3: Green street graffiti: the pavement is cleaned by spraying water under high pressure on a template which showed the web page of digital parking. As a result the address of the web page shone through on the 'dirty' pavement. After about five weeks the message gradually fades.

  - A press release about the street graffiti in national and local press.
  - Z-cards at different service points in the city, tourist offices, cinemas, gas stations, and supermarkets (see picture B4-4).

Picture B4-4: Z-card: this is a small poster (A4 size) folded to the size of a credit card, so it is easy to take with you, with information about the changes, where, when and for whom.

- Advertisements in local & regional press.

Picture B4-5: Examples of advertisements in the press.

- A press release about the placement of the new machines in national and local press.
- 40 event billboards along main roads in Utrecht, over four weeks.
- Radio commercials on the regional Radio M, 5 times a day, focus on rush hours.

Stage 3: Introduction of the digital parking permit and a personal web page *(April 2009-October 2010)*
The plastic parking permit is replaced by the digital parking permit. From the 1st of April 2009 residents did not have a visible parking permit in their cars.

Part of digitisation is the development of personal internet pages related to parking. Since October 2010 parking permit holders got online access to a personal web page to monitor their parking credit and payment status. They can use a secure code to find the digital forms needed to apply for e.g. a permit, see the status and validity of their own permit, order visitor's tickets, find phone numbers or ask online questions. They can do this at any time or day of the week. The implementation of this personal 'parking permit page' has taken place and been improved gradually, to make this big technological step as easy as possible for both the customers and the parking department. In 2011 information about the waiting lists for permits was added. For each area there is a maximum number of available permits, based on the number of parking places in this area. In some areas this number is reached. When the city receives a request for a new permit in such an area (in the centre a domestic address can have one permit, in the other areas two permits), this request is placed on a waiting list. The whole inner city centre and parts of the other paid parking areas have a waiting list. The website is popular and well used with about 1,000 unique visitors every month.

Stage 4: Introduction of the digital visitor permit *(2009)*
Instead of the chip card with its many disadvantages (see B3), residents with a parking permit received a personal code for the parking machine which gives their visitors a discount of 50% (maximum 70 hours every three months). This very successful innovative product of paid parking could be introduced thanks to the digitising of the parking system. In the digital product these 70 hours have not yet been paid, it is 'credit' that can be used by entering the personal

code in the digital parking machine. The machine checks if there are still 'discount hours' available. The visitor has to pay the costs himself. The front- and back office were trained to answer questions about digitised parking products.

Stage 5: Purchase of a scan-car *(November 2010 – December 2010)*
A special scan car, equipped with license plate readers, that enforces the digital parking permit was put into operation in December 2010. The car drives through the streets and 'reads' the license plates of parked cars. The scan car recognises the license plates that are in the central digital parking database; cars that have been paid for are registered in this database. Cars that are not in there are checked by enforcement personnel on scooters and on foot. When a parked car has no parking right, the owner receives a so-called after parking-tax assessment (an additional assessment for unpaid parking fees which has to be paid within 30 days - the tariffs in 2012 are € 54.00 plus the parking tariff due for one hour of parking; this tariff covers the costs and does not result in a profit).

Stage 6: Removal of the obligation to enter license plate number (*2012)*
The digital parking machines have many technological options and can offer various (digital) products. Digital short term parking was technically possible, but from a political point of view and for privacy reasons, visitors still needed to be able to park anonymously in the case of short term parking. For this reason in September 2011 it was decided by the city council that visitors could not be obligated to enter the license plate of their car when they wanted to park this car since they had not given their permission for this. For this reason the parking machines were adapted in March 2012.

The parking department therefore developed a variety of attractive products for which visitors entered their license plate number voluntarily. Of course they were informed beforehand what the license plate number would be used for. Mobile phone parking (see stage 5) and digital parking licenses (see stage 5) are examples of these products that have been implemented.

Stage 5: Introduction of Mobile Parking (*March 2012)*
In March 2012 paying for parking by mobile phone was introduced. All phone providers can be part of this. Payment takes place via a separate mobile parking provider. These providers are Parkmobile, Park-line, My Order, Yellowbrick, SMSparking, Sunhill Technologies and Zmazz. The tariffs are the same as paying via the parking machine; the benefit for users is that it is easy to use. Visitors pay by calling, texting, mobile internet or a special smart phone-app when they park their car. Payment takes place after an agreed period, mostly every month or two weeks. Participants need to enter their license plate number for this.

Picture B4-6: Logo of Mobile Parking.

B5 Inter-relationships with other measures

The measure was related to the measure **UTR 1.2** Clean Parking Policy which was stopped during the course of MIMOSA. This measure aimed to implement a new parking tariff system based on the environmental characteristics of the vehicle parked. To be able to implement this

new parking tariff system, it was necessary to implement the parking ticket machines and permit system of this measure (3.1). It was impossible to implement UTR 1.2 without UTR 3.1.

Whereas this measure targets mainly at the “technical” hardware of the parking infrastructure, measure UTR 1.2 was aimed at the specific “software” part of the parking policy i.e. tariff differentiation based on the environmental performance of the parked vehicles. The idea was that the city could decrease the usage of 'dirty' cars by charging 'dirty cars' (cars with high emissions) with a higher parking tariff than clean cars.

To be able to differentiate the parking tariffs in this way, besides the digitisation of the parking system, new national and municipal legislation was needed. Due to the postponement of this required national law it was no longer possible to implement a pilot and measure 1.2 was stopped in 2011. In November 2011 the national government decided not to make it possible to differentiate parking tariffs according to the environmental characteristics of a car (see also measure report UTR 1.2 and the process evaluation results in part D in this report).

C Impact Evaluation Findings

C1 Measurement methodology

C1.1 Impacts and Indicators

This measure aims to gain parking data and thus facilitate the alteration of the negative effects of (an overload of) cars on the city and future decision making, to increase the 'payment behaviour' of people who park their car in Utrecht, to make paid parking more user friendly, and to reduce the costs for the Department of Parking by simplifying (and thereby intensifying) the enforcement of parking regulations and reducing the number of visitors to the physical parking desk.

The verifiable result is that at least 500 new parking ticket machines are placed in Utrecht.

To measure the impacts the indicators which are listed in table C1.1.1 were used.

Table C1.1.1 Table of indicators

No.	POINTER indicator Number	Evaluation area	Impact	Indicator	Source of data	Related objective
1		Transport	Payment behaviour	The percentage of parked cars in paid parking areas for which parking has been paid per month	Department of parking	To increase 'payment behaviour'
2		Society	Acceptance Number of parking permits	The number of parking permits issued per year	Department of parking	To make paid parking more user friendly
3		Society	Acceptance - Number of sold parking tickets	The number of parking tickets per year, differentiated by the different kind of tickets	Department of parking	To make paid parking more user friendly
4		Society	Acceptance - Number of mobile phone parkers	The number of transactions for mobile phone parking per month	Department of parking	To make paid parking more user friendly
5		Society	Acceptance- Number of website visitors	Number of unique visitors to the personal parking website per month	Department of parking	To make paid parking more user friendly
6		Economy	Costs derived from number of visitors	Number of visitors to the parking desk per year	Department of parking	To reduce the costs by reducing the number of visitors to the physical parking desk

Detailed description of the indicator methodologies:

1. **The percentage of parked cars in paid parking areas for which parking has been paid –**
   This percentage indicates the 'payment behaviour' or in other words the 'willingness to pay'. It is calculated as follows: B/(T-V) x 100%
   B: Number of vehicles in parking spaces that have a valid parking ticket
   T: Total number of parked vehicles (incl. vehicles with a parking ticket, an after-tax and a

permit)
V: Number of vehicles in parking spaces that have a valid parking permit

The so-called 'level of payment' is also presented. This level is calculated as follows: (B+N)/(T-V) x 100
N: Number of after-taxes

The 'payment behaviour' tells for what percentage of the parked cars a parking ticket was bought; cars with a parking permit are not taken into account.
The 'payment level' includes the enforcement; this indicator tells what percentage of the parked cars have a valid parking ticket or an after-tax.

This measure has the objective to increase the willingness to pay so for this objective the first calculation is more appropriate.
To be complete the 'level of payment' is reported too because this indicator shows the effectiveness of the enforcement. The scan car was implemented to intensify the enforcement.

Since April 2010 the department of parking has measured the percentage of parked cars in paid parking areas for which fees have been paid per month. The sample size of these measurements is established in such a way that with a reliability of 95% judgements can be given about the numbers with a margin of 3%. Every week a new sample is drawn.
Enforcement officers check the cars in the streets of the sample. They only check and do not enforce the cars during this task.

2. **The number of parking permits per year** – The department of Parking registers the number of provided parking permits. These numbers are reported from the end of 2008 onwards. This number tells us something about the popularity and user-friendliness of the permit. Important to mention is that Utrecht has a waiting list for the permits in many areas, so this indicator does not simply reflect the number of residents that would like to have a permit.

3. **The number of parking tickets per year** – The department of Parking registers the numbers of sold parking tickets differentiated by the different kind of tickets (short-term stay tickets, day tickets, evening tickets, and visitor permit tickets). These numbers have been available since 2006 and tell us something about the user-friendliness of parking cars in a paid area.
The number of tickets sold is influenced by the digitising of the parking products but also by other factors, especially the parking tariffs, which increased significantly during the last few years. The tariffs are reported in appendix 1. The increased tariffs caused a decrease in the number of tickets sold.
On the other hand this measure has improved the evening and day cards (thanks to the digital machine people can now pay by pin and credit card too which is attractive because of the large amounts - the costs of such a parking ticket is easily 28 euros and at the old parking machines people had to pay cash) and the visitor permit tickets (instead of the chip card on which residents could deposit an amount of 70 discounted hours every three months visitors can now enter a special code).
Having access to the reported numbers of day, evening and visitor permit tickets sold before and after the implementation of this measure is very important. This data tells us something about whether the measure contributed to the user friendliness of parking a car in a paid area.
To be able to compare the number of sold 'improved' tickets with the number of short stay parking tickets, the latter were also reported.

4. **The number of transactions for mobile phone parking per month** – Mobile parking was introduced in March 2012. This kind of paid parking could be introduced due to the digitising of the parking system. The number of users (transactions) tells us something about the

acceptance of the digitisation of paid parking. The numbers are registered by the department of parking each month, starting in March 2012.

5. **The number of unique visitors to the personal parking website per month** – this number is registered by the department of parking each month and is an indicator for the user-friendliness of paid parking. Numbers have been available since the implementation of this website in October 2010.
6. **The number of visitors to the parking desk per year** – This number has been registered by the department of parking since 2007 and is reported annually. It is an indicator of the costs for the parking department, the less visitors, the less staff needed.

C1.2 Establishing a baseline

The baseline for this measure is the situation before the digitising of the parking system. This digitising was implemented gradually, starting in 2009. The baseline shows:

Indicator 1. Due to the fact that numbers relating to the percentage of parked cars for which parking has been paid are available since April 2010, and the digitising was already implemented in 2009, we cannot show the baseline for this indicator.
Indicator 2. The number of parking permits at the end of 2008.
Indicator 3. The number of parking tickets in 2006, 2007 and 2008, differentiated by the different types of tickets.
Indicator 4. Before the implementation of Mobile Parking, there were no users of this innovative system. So in the baseline this number is zero.
Indicator 5. Before the implementation of this measure there was no personal website, so the number of unique visitors to the personal parking website in the baseline is zero.
Indicator 6. The number of visitors to the parking desk per year in 2007 and 2008.

C1.3 Building the business-as-usual scenario

Indicator 1. **The percentage of parked cars in paid parking areas for which fees have been paid**:
The B-a-U scenario is difficult to calculate for this indicator because there is no baseline. Numbers are available since April 2010. The assumption is that without the digitising of the parking products the percentage would be the same as the first measured percentages. For this reason to build the B-a-U the average percentage for the months April to June 2010 has been used.

Indicator 2. **The number of parking permits per year**:
The number of parking permits is mainly influenced by the size of the area in which people have to pay to park their car. Due to the fact that this measure is not meant to increase the number of permits and due to the waiting list for parking permits the number of permits without this measure would be the same as the number of parking permits with this measure. This should mean that the B-a-U scenario is the same as the situation with this measure.

Indicator 3. **The number of parking tickets per year (differentiated into short-term stay tickets, day tickets, evening tickets and visitor permit tickets)**:
This number was mainly influenced by the big increase in parking tariffs in 2007 and another – smaller - increase in 2008 (see appendix 1). Due to these increases the number of parking tickets sold shows a negative trend: in 2007 the number of parking tickets sold decreased by 12% compared to 2006; in 2008 the number of parking tickets sold decreased by 10% compared to 2007. The expectation is that after these increases the number of parking tickets sold in 2009 and onwards would be at the same level as in 2008, but another factor that very likely influenced the number of parking tickets sold is the financial crisis. There are no numbers available for the impact of the financial crisis on parking tickets sold.

To build the B-a-U the number of tickets sold in 2008 (differentiated by the different type of tickets) was used. The assumption is that without the digitisation the number for each kind of the parking tickets sold would have stayed at the level of 2008.

Indicator 4. **The number of transactions for mobile phone parking per month**:
There is no B-a-U because without this measure there would have been no mobile phone parking.

Indicator 5. **The number of unique visitors to the personal parking website per month**:
There is no B-a-U because without this measure there would have been no personal parking website.

Indicator 6. **The number of visitors to the parking desk per year**:
If this measure had not been implemented the parking products would not have been innovated. The assumption is that in that case the number of visitors to the parking desk would have increased in line with the increased number of parking permits, which was the effect of the expansion of the paid parking area.
To build the Business-as-Usual scenario we used the relative growth of the number of parking permits and applied this relative growth to the number of parking desk visitors from the baseline (2008) and onwards.

C2 Measure results

The results are presented under sub headings corresponding to the areas used for indicators – economy, energy, environment, society and transport.

C2.1 Economy

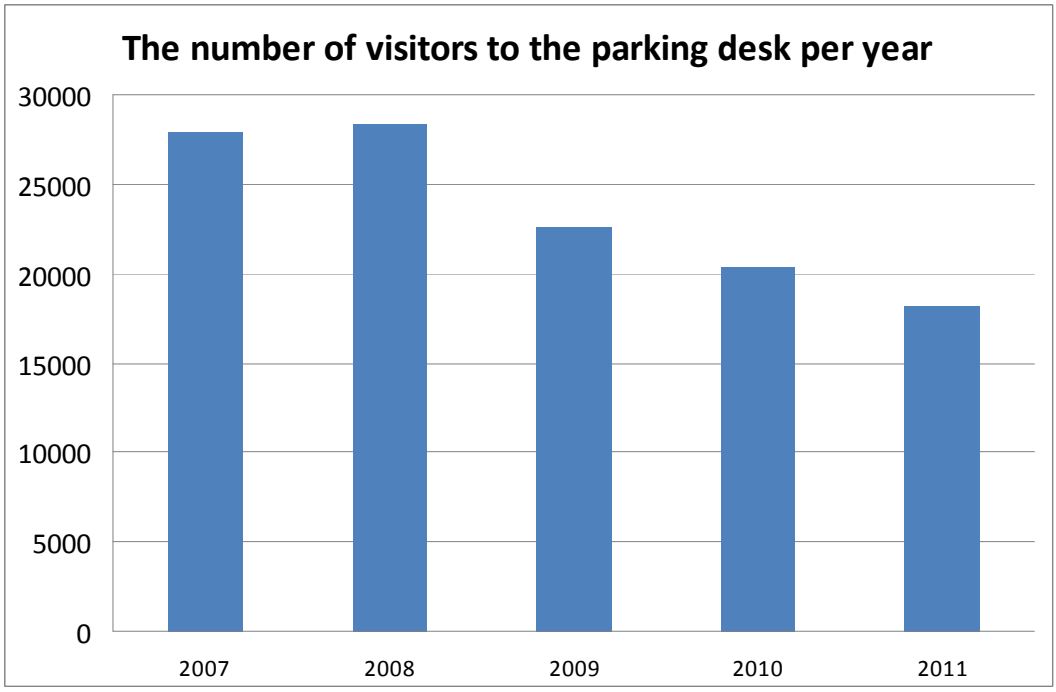
Indicator 6: The number of visitors to the parking desk per year

	Number of parking permits	Relative growth (2008=100%)	Number of visitors to the parking desk	B-a-U	After-Before (2008)	After-B-a-U
2007	Not available	Not available	27998			
2008	21348	100%	28409			
2009	22380	105%	22618	29782		
2010	22680	106%	20345	30182		
2011	23284	109%	18260	30985	-10419	-12725
2012	23918	112%	Not available (yet)	Not available (yet)		

Table C2.1.1: Impact evaluation results indicator 6, the number of visitors to the parking desk.

Table C2.2.1 and graph C2.2.1 show the number of people that visited the parking desk. This number significantly decreased after the digitisation in 2009, in contrast to the increase seen in 2008 compared to 2007. This number is an indicator of the costs for the parking department: the fewer visitors, the less staff needed.

The baseline is the situation before the introduction of the digital permit for residents (2008). The B-a-U was built by using the numbers of parking permits (see indicator 2). This number increased and the relative growth was applied to the number of visitors to the parking desk (see table C2.1.1.)



Graph C2.1.1: The number of visitors to the parking desk per year (department of parking)

The conclusion is that this measure has led to a significant decrease in numbers visiting the parking desk and therefore a decrease in the costs for the parking department. The workload of the parking desk staff decreased considerably and payroll was decreased by 1 fulltime equivalent.

C2.2 Energy

Not applicable.

C2.3 Environment

Not applicable.

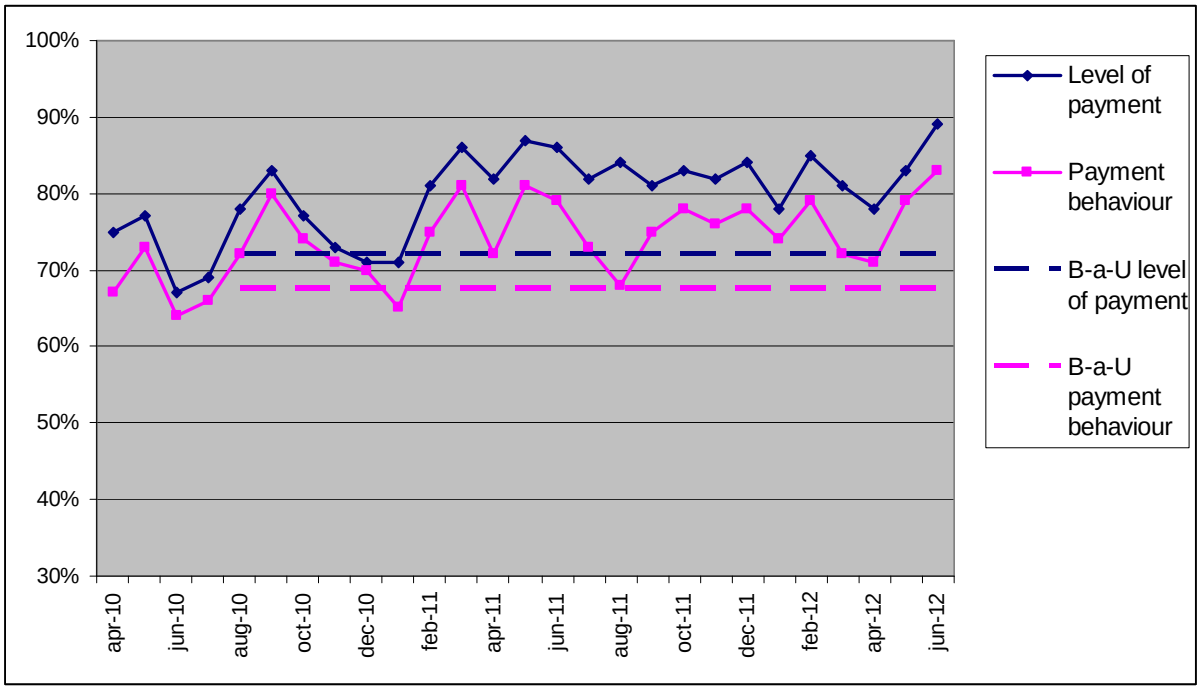
C2.4 Transport

Indicator 1: Payment behaviour.

Indicator	Before	B-a-U	After	Difference: After –Before	Difference: After – B-a-U
Payment behaviour	Average April-June 2010: 73%	73%	Average April – June 2012: 83%	10%	10%
Level of payment	Average April-June 2010: 68%	68%	Average April – June 2012: 78%	10%	10%

Table C2.4.1: Results of indicator 1

The results that present the payment behaviour and the level of payment are presented in graph C2.4.1.



Graph C2.4.1: The level of payment (percentage of short-term parked cars that have a valid parking ticket or after-tax) and the payment behaviour (percentage of short-term parked cars that have a valid parking ticket) per month (department of parking)

The results show that:

- The percentage of short-term parked cars for which a parking ticket was bought, increased.
- The percentage of short-term stay parked cars with a parking ticket or an after tax increased even more: short-term parked cars that had no parking ticket were caught relatively more often.

It can be concluded that this positive development is the effect of the digitisation of the parking products. The scan car generated more efficiency in the enforcement. The enforcement officers now follow the scan car on electrical scooters and are sent directly to the vehicles with a short-term stay parking ticket. Thanks to the scan car they do not need to walk along all the parked vehicles like before. Cars with a parking permit are scanned by the scan car. Besides this the scan car being followed by four scooters is prominently visible which is a reason for people to buy a parking ticket. The number of enforcement officers the city of Utrecht from 2008 to 2012 is reported in Appendix 2. Despite the decreased number of officers, the payment behaviour and level of payment increased.

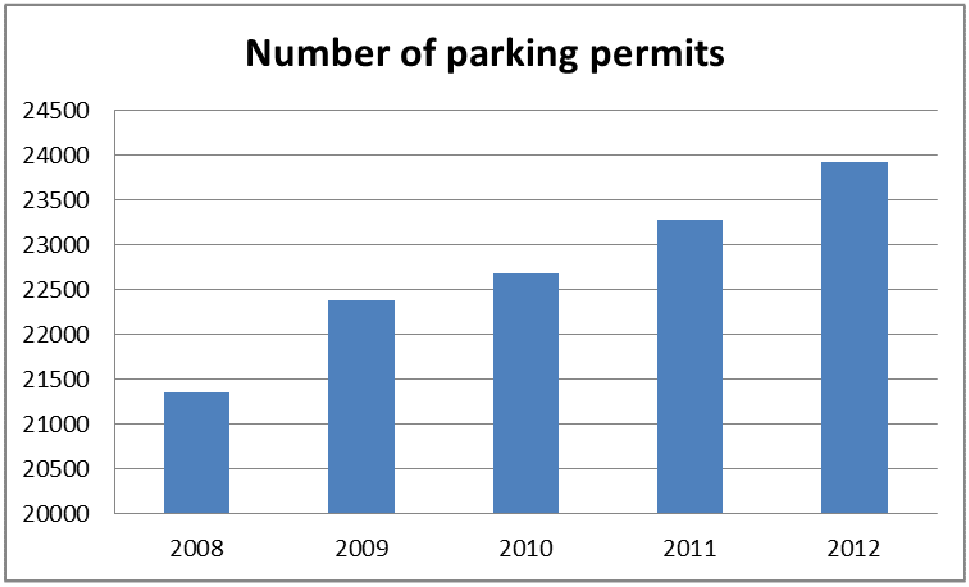
The percentages for each of the three different paid parking areas are reported in table C2.4.2. The level of payment and the payment behaviour increased in all the areas but especially in area 3, which is the outer area. Compared to the other areas the number of short-term parking tickets in area 3 is relatively small and the number of permits high. This means that more cars can be checked by the scan car which increased the efficiency.

	2010			2011		
	Level of payment	**Payment behaviour**	**% after taxes**	**Level of payment**	**Payment behaviour**	**% after taxes**
Area 1	77%	82%	**4%**	81%	86%	**5%**
Area 2	70%	74%	**4%**	72%	79%	**7%**
Area 3	63%	66%	**3%**	71%	80%	**9%**

Table C2.4.2: Results of indicator 1 per area.

C2.5 Society

Indicator 2: The number of parking permits per year.



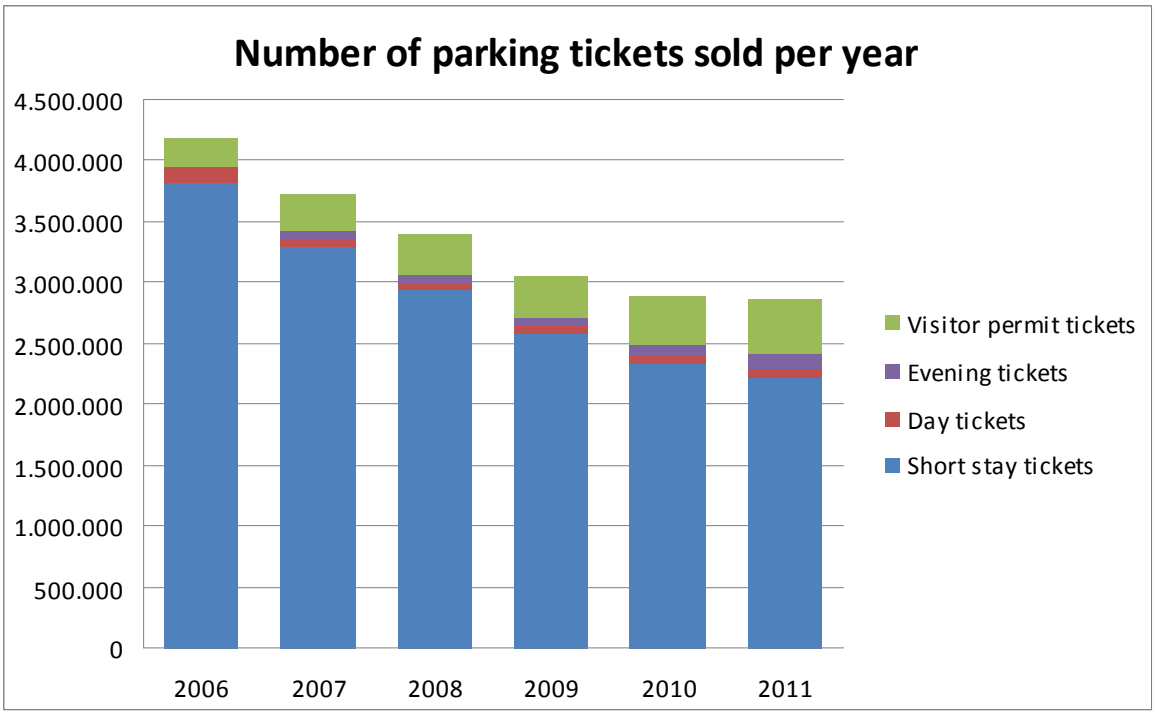
Graph C2.5.2: The number of parking tickets sold per year (department of parking).

The number of parking permits increased. The most important reason for this growth is the fact that the area in which people have to pay to park their car was expanded. The digitisation of the parking permits could have a limited effect on the number of parking permits. Graph C2.5.2 shows that after the implementation of this measure in 2009 the number of parking permits increased.

The conclusion is that, in the period of the implementation of this measure, the number of parking permits increased significantly. It is not possible to tell to what extent this has been the effect of this measure.

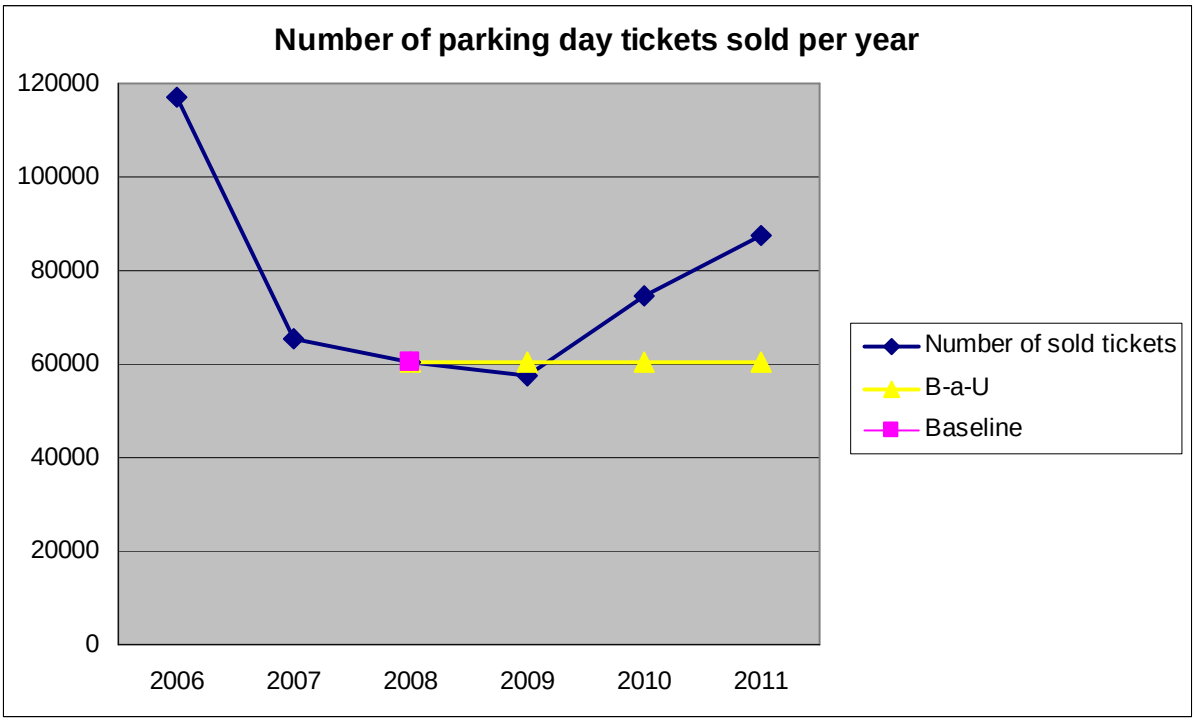
Indicator 3: The number of parking tickets sold

Graph C2.5.2 shows the number of parking tickets sold per year. The total number decreased due to the increased parking tariffs (see appendix 1).

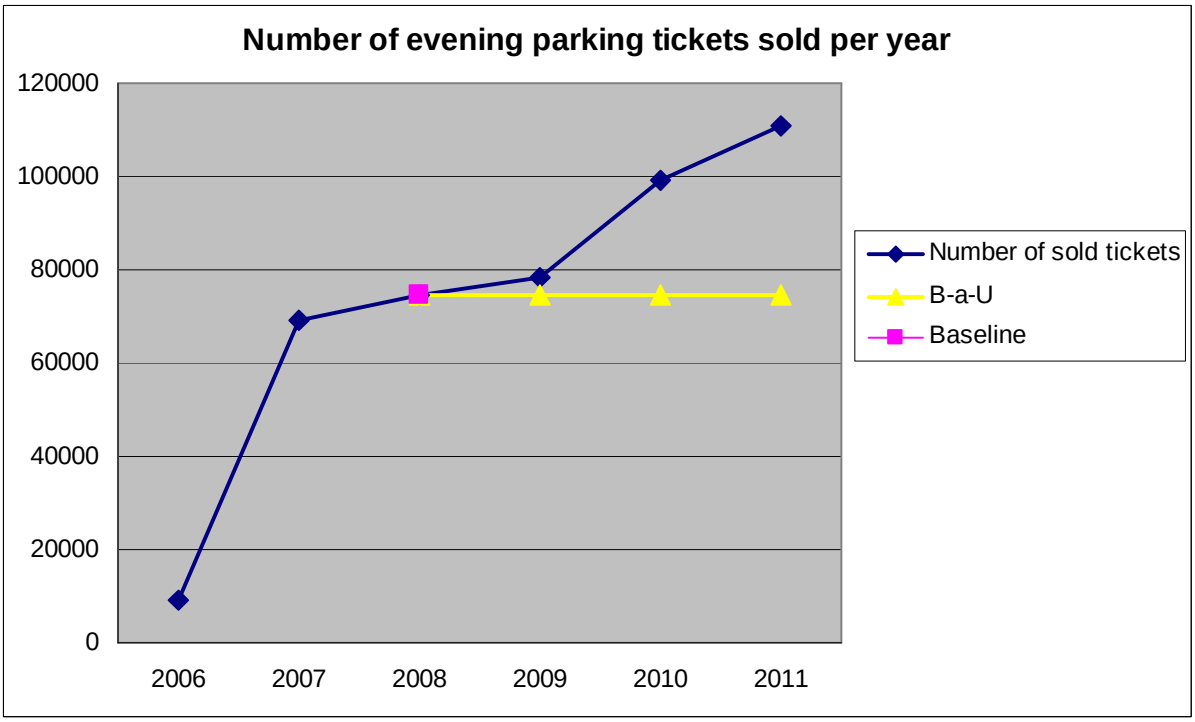


Graph C2.5.3: The number of parking tickets sold per year (department of parking)

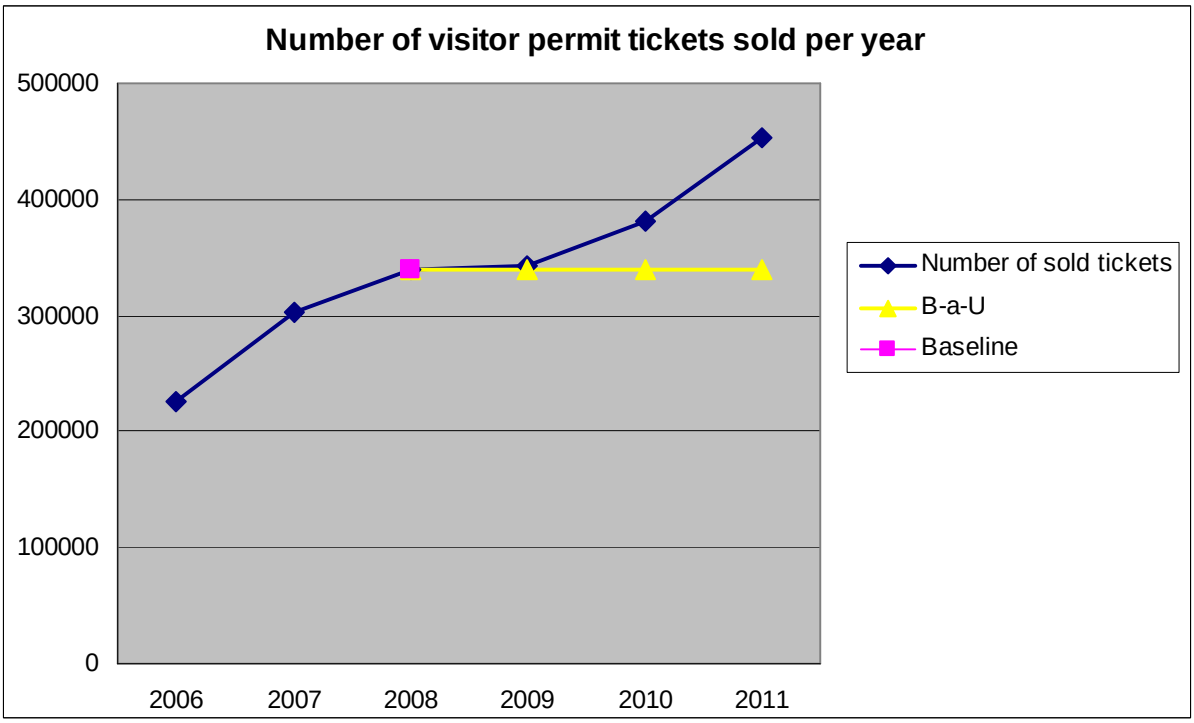
The day and evening tickets and the visitor permits could be improved thanks to the digitising of the parking products. Graphs C2.5.4 to C2.5.6 show the numbers of these tickets sold from 2006 to 2011, including the B-a-U for each of these kinds of tickets.



Graph C2.5.4: The number of day parking tickets sold per year (department of parking)



Graph C2.5.5: The number of evening parking tickets sold per year (department of parking)



Graph C2.5.5: The number of visitor permit parking tickets sold per year (department of parking).

The numbers of these parking tickets sold is an indicator of the user-friendliness of paid parking.

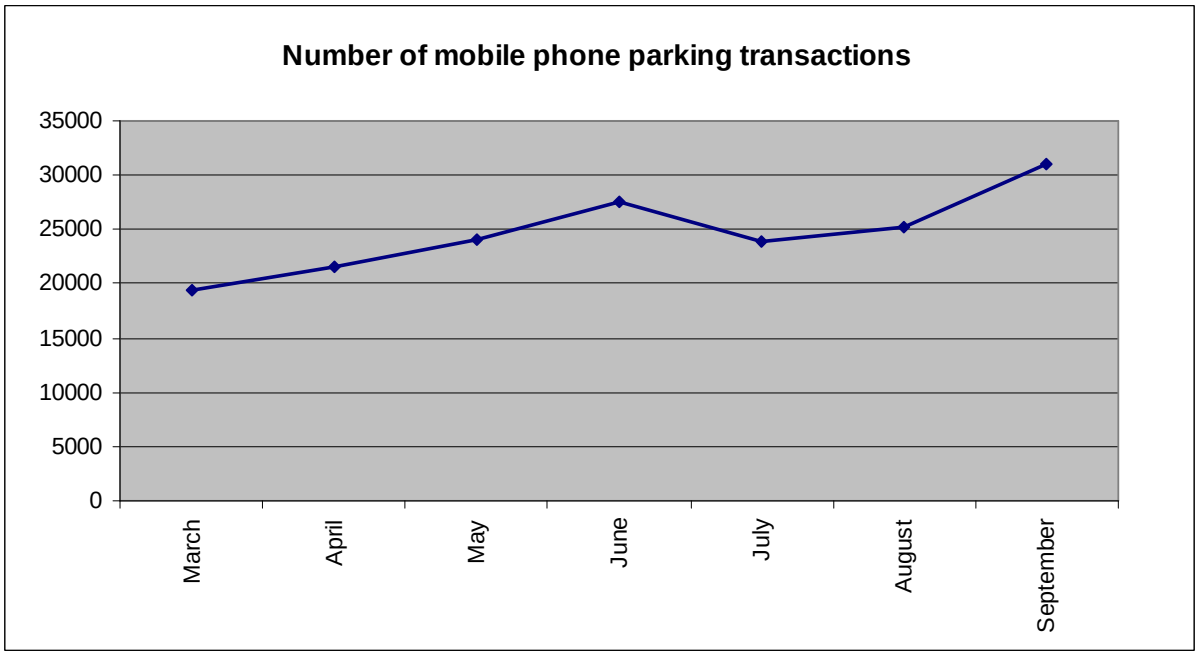
Despite the increased tariffs and despite the decreased number of short-term stay tickets the number of these tickets sold increased. It cannot be proved that this was purely the effect of the digitising, but the increases are very likely the effect of improved and more user friendly products.

The conclusion is that the measure has had a positive effect on the user friendliness of the parking products because numbers of day-, evening- and visitor permit parking tickets sold increased.

Indicator 4: The number of transactions for mobile phone parking per month

In March 2012 mobile phone parking was introduced. Right from the start mobile phone parking has been very popular. A lot of people used this method to pay for parking their car. Already in the first few months almost 15% of paid parking by visitors was done by mobile phone parking. Graph C2.5.6 shows the number of transactions/users. In the first half of the year after the introduction mobile phone parking increased. During the summer months the number was a little lower, due to the holidays.

Mobile phone parking was only possible because of the digitisation.

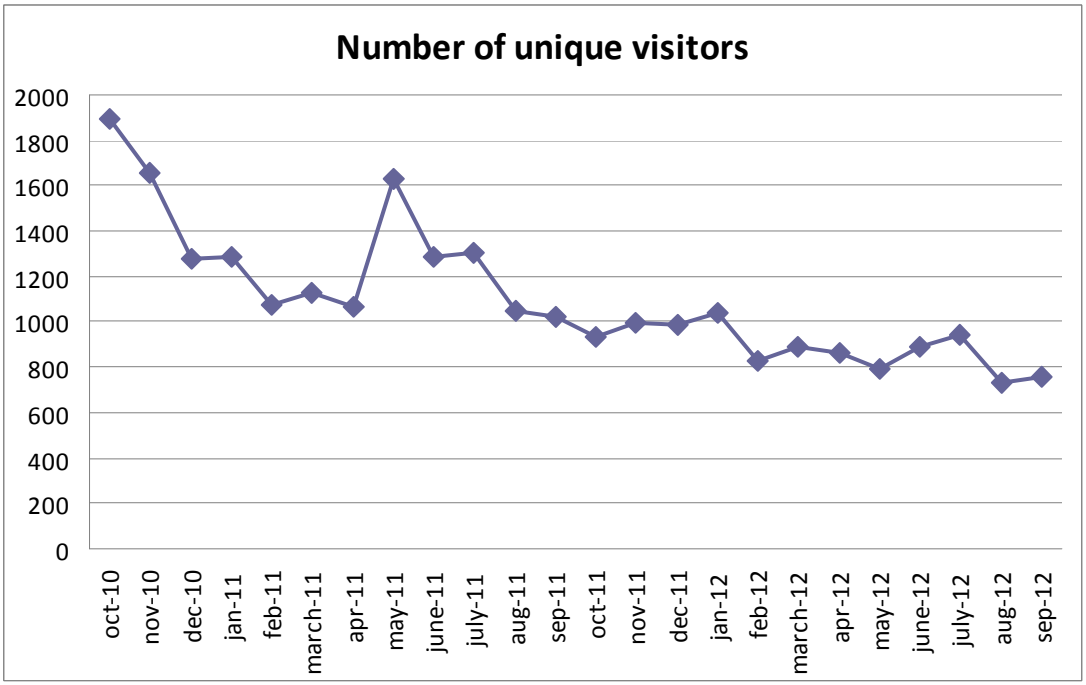


Graph C2.5.6: The number of mobile phone transactions per month (department of parking)

The conclusion is that mobile phone parking is a popular product; the popularity of this product tells us that visitors think it is user friendly; they apparently like to use it.

Indicator 5: The number of unique visitors on the personal website per month

Although the number of visitors decreased, the website is popular and well used.



Graph C2.5.7: The number of unique visitors on the personal website per month (department of parking)

C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
1	At least 500 new parking ticket machines are placed in Utrecht	★★★
2	To increase 'payment behaviour'	★★
3	To make paid parking more user friendly	★★
4	To reduce the costs for the Department of Parking by simplifying (and thereby intensifying) the enforcement of parking regulations and reducing the number of visitors to the physical parking desk	★★

NA = Not Assessed O = Not Achieved ★ = Substantially achieved (at least 50%)
★★ = Achieved in full ★★★ = Exceeded

Although for some indicators it cannot be concluded to what extent, the conclusion is that the targets and objectives of this measure have been reached.

1. 530 digital parking machines were implemented within the CIVITAS MIMOSA period.
2. Payment behaviour increased: the percentage of short-term parked cars with a ticket increased by 10% compared to the baseline and B-a-U.
3. Thanks to the digitising of the parking products paid parking has become more user-friendly. The number of day-, evening- and visitor permit parking tickets, which might have improved thanks to this measure, significantly increased. Also Mobile Phone Parking was implemented within this measure and this is a well-used product which offers more ease and increased social security.
4. This measure has led to a significant decrease in the number of visitors to the parking desk of 10,400 compared to the baseline and 12,700 compared to the B-a-U and therefore a decrease in the costs of the parking department because the payroll of the parking desk was decreased by 1 fulltime equivalent.
   Furthermore the number of enforcement officers decreased from 63 in 2008 to 45 in 2012.

C4 Up-scaling of results

Within the CIVITAS MIMOSA period the digitisation of the parking system was implemented for (almost) the whole paid parking area in Utrecht. Further upscaling of the results within the city is not possible.

C5 Appraisal of evaluation approach

This measure had the following objectives:

- **To gain parking data which would allow the alteration of the negative effects of (an overload of) cars in the city and future decision making**. This was a qualitative objective and it could not be evaluated. Instead, as written in chapter B, some examples for which data can be gathered, are given.
- **To increase the 'payment behaviour' of people who park their car in Utrecht.**
  The payment behaviour, which is the percentage of short-term parked cars for which a parking ticket was bought, has been measured by the parking department since April 2010. Enforcement officers check the cars in the streets of the sample. They only check and do not enforce payment during this task. The sample size for these measurements is established in such a way that with a reliability of 95% judgements can be given about the numbers with a margin of 3%. Every week a new sample is drawn.
- **To make paid parking more user friendly.**
  It is very difficult to measure the user friendliness of paid parking. It is not possible to ask people whether they are satisfied with paying for parking their car. Instead the 'Number of parking permits', 'Number of parking tickets – especially the number of tickets that were improved thanks to this measure', 'Number of transactions for mobile phone parking' and 'Number of visitors to the personal website' were used. These indicators indicate the user friendliness because when people think positively about a product they will tend to use it. At the same time the numbers of permits and tickets sold are considerably influenced by the parking tariffs, but it is not clear to what extent precisely.
  Another indicator for the user-friendliness of the digital parking products could be the number of complaints about these products. It was not possible to report these numbers due to the fact that in the starting years the complaints do not seem to be fully recorded and furthermore the registered complaints are not differentiated by the kind of parking product.
- **To reduce the costs for the Department of Parking by:**
  - simplifying (and thereby intensifying) the enforcement of parking regulations.
    The enforcement has been simplified and intensified which is made clear by the fact that the number of fulltime equivalent enforcement officers (as registered by the department of parking) decreased while payment behaviour (as measured by the department of parking – indicator 1) increased.
  - reducing the number of visitors to the physical parking desk.
    The number of visitors to the parking desk are registered which makes it a good methodology.

C6 Summary of evaluation results

The key results are as follows:

- **Parking data can be gathered** – Thanks to the digital parking machines the city can gather data which allows one to alter the negative effects of (an overload of) cars in the city and future decision making. Due to the removal of the obligation to enter license plate numbers in the parking machines, there is less data than possible.

- **Paid parking has been made more user friendly** – The significantly increased number of improved day-, evening- and visitor permit parking tickets, show that the user friendliness of paid

parking increased since people who think positively about a product will tend to use it. Furthermore mobile phone parking is a popular product; the popularity of this product tells us that visitors think it is user friendly; they apparently like to use it.

- **Payment behaviour -** payment behaviour increased: the percentage of short-term parked cars with a ticket increased by 10% compared to the baseline and B-a-U.

- **The costs of the Department of Parking decreased** – As the number of visitors to the parking desk decreased, the personnel costs of the Department of Parking did too because the staff was decreased by one fulltime equivalent. Furthermore the number of enforcement officers decreased from 63 in 2008 to 45 in 2012.

C7 Future activities relating to the measure

The following activities will be done in the future:

- It will be researched whether and how new parking products can be added to the digital parking machines, like a discount for clean cars, by asking the people to enter their license plate number voluntarily.
- The expectation is to implement a digital business permit in 2014. Until now this permit could not be digitised because this permit cannot be provided for only one license plate. The advantages of this digital business permit is that the businesses do not need to transfer the permit, cannot lose the permit and they can register by who and how often the permit was used. It has not been possible to implement this yet due to the lack of a digital authenticity of businesses. The expectation is that this will be available in 2014.
- It will be researched whether and how the business permits can be differentiated. These permits can be used to park a car 24/7. Thanks to this measure it is possible to provide a permit for a short time like 7 AM to 6 PM. In this way more permits can be provided.

D Process Evaluation Findings

D.1 Deviations from the original plan

The deviations from the original plan comprised:

- **Removal of the obligation to enter license plate numbers** – The political position that users need to give permission to the city before the city can use personal information, resulted in the need for the city to remove the obligation for parkers to enter their license plate numbers in the parking machines. Car parkers have not given this permission, so they can not be obliged to enter their license plate number. Due to this it was not possible to implement differentiation of parking tariffs according to the type of vehicle or other measures that need to have data about the type of vehicle (measure 1.2). Furthermore the people who buy a parking ticket at the parking machines still need to place this paper ticket behind the window. This has the effect that the scan car can not be used for the enforcement of these parking tickets. The scan car can be used for the permits and the mobile parking users. By implementing more products for which people give their license plate voluntarily the advantages of the digitising will increase.
- **Delay in the implementation of the digital business permit** – The business permit can not be linked to one license plate number because of the fact that this permit needs to be used by more than one vehicle. To be able to handle this, a new methodology was figured out in which the involved businesses can change the license plates through the internet. The advantage is that the digital permit does not have to be transferred from one person to another, the permit can not be lost and the businesses can register who used the permit and how often and for how long. Due to the lack of a digital authenticity of businesses the digital business permit could not be implemented yet. The expectation is that this will be available in 2014. The delay was about 1.5 years.

D.2 Barriers and drivers

D.2.1 Barriers

Preparation phase

- **Legal issues** – In case of mobile phone parking, some legal issues had to be overcome (e.g. permission to use the telephone bill for purposes other than to charge for phone-costs). As a result it took more time to implement this. Furthermore the market share increased slowly because people needed to apply themselves to a provider of mobile phone parking before they could use it.
- **Developments take time** – Due to their highly innovative nature it took more time to prepare all the products and talk to the involved parties.
- **Digital business permit needs authentication of the businesses** – This authentication was not available on a national level during the CIVITAS MIMOSA period and due to this the business permit has yet to be digitised. The delay was about 1.5 years.

Implementation phase

- **Start-up problems digital parking machines** – Due to some start-up problems with the digital parking machines the implementation was delayed by six months.

Operation phase

- **Removal of the obligation to enter license plate numbers** – There have been political discussions about the privacy of car parkers which resulted in the political position that users need to give permission to the city before the city can use personal information. Car

parkers have not given this permission, so they can not be obligated to enter their license plate number.

- **Digitised products make the process more complex** – When one part of the system or process fails, the whole chain fails. For example when the phone network does not work, the parking machines and the officers can not work either. So it is very important that the staff understand the whole chain so they can identify the problem quickly. This means more communication and changed skills-competencies. Technical staff need more analytical skills, the front/office staff have to deal with a lot of complaints during short periods with technical problems.

D.2.2 Drivers

Preparation phase

- **The city was responsible for the enforcement** – The fact that the responsibility for parking enforcement shifted from the local police to the Parking Department of the City of Utrecht on January the 1st of 2008, shortly before the start of CIVTAS MIMOSA, sped up these innovations.

Implementation phase

- The technical possibilities of the new system provided many possibilities and features for the parking measures, which increased appreciation for the new system, yet also the possibilities to make the measure a success.
- Mobile Parking created many advantages for parkers, for instance people do not need to walk to the parking machine anymore.
- The digitising of parking permits created new opportunities, like the possibility to make the permits flexible.

D.2.3 Activities

Implementation phase

- The technical possibilities are higher than what is politically or legally feasible at this moment. These “constraints” have to be taken into account. One must ensure that the measure is in line with the legal requirements in relation to the payment options.

Operation phase

- The political position that users need to give permission to the city before the city can use personal information, resulted in the need for the city to remove the obligation for parkers to enter their license plate numbers in the parking machines.

D.3 Participation

D.3.1. Measure Partners

- **Parking enforcement officers –** These officers work for the city of Utrecht. The digitising of the parking system affects enforcement directly since the paper permits have been replaced by digital ones as have some parking tickets due to mobile phone parking. The enforcement changed to using the scan car and handheld computers.

D.3.2 Stakeholders

- Residents who have a parking permit
- Visitors who park their car on the street

- Businesses with a business parking permit.

D.4 Recommendations

D.4.1 Recommendations: measure replication

- Be aware of the fact that modern techniques move forward faster than the political reality and public opinion, and allocate sufficient time and energy to informing these groups.
- In Utrecht the reaction of the public to the new digital parking products has been very positive which had a positive effect on the implementation.
- In Utrecht the introduction of the scan car has been a financial success.

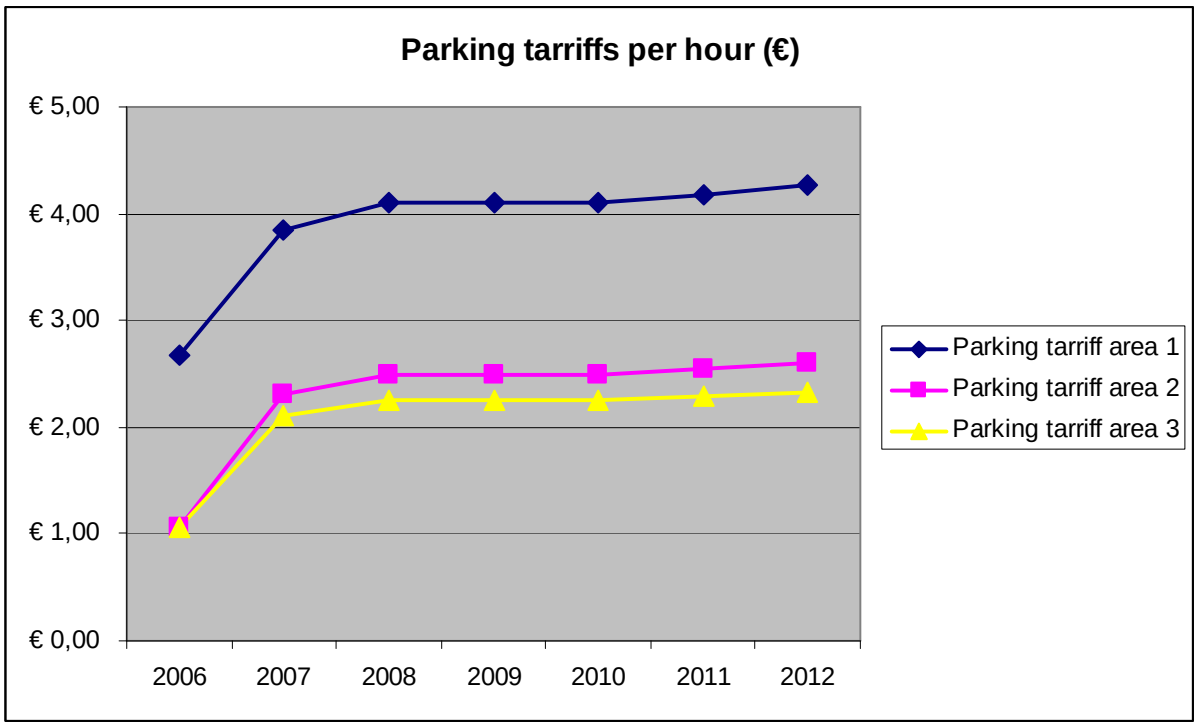
D.4.2 Recommendations: process (related to barrier-, driver- and action fields)

- One should remember to insert a proper evaluation into the plan, from the start.
- Make sure you keep in contact with the local politicians and the political agenda through ongoing consultation.

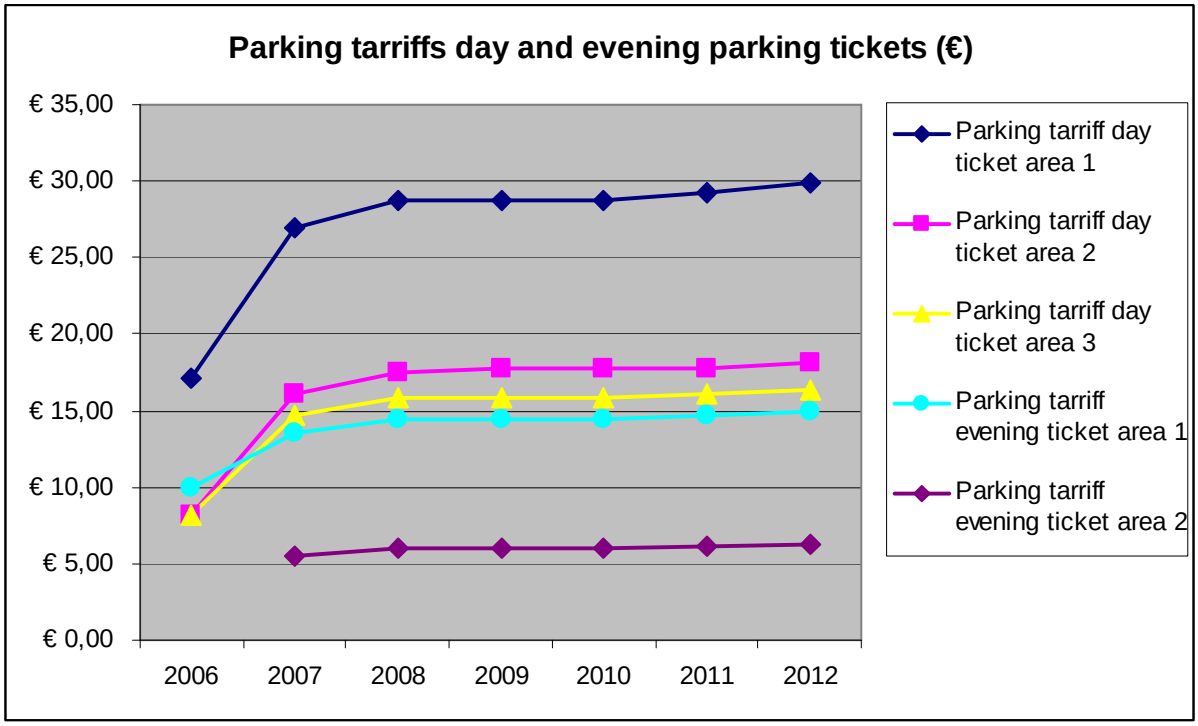
E References

Digitalisering Parkeren en Communicatiestragetie - Afdeling Parkeren, sector Publieke Diensten, city of Utrecht, January 2012

Appendix 1: Parking tariffs 2006-2012



Graph Appendix 1-1: Development of the parking tariffs per hour (short-term parking) per area (the areas are shown in picture Appendix 1-1).



Graph Appendix 1-2: Development of the parking tariffs for day and evening tickets per area (the areas are shown in picture Appendix 1-1).

	Area 1
	Area 2
	Area 3:

Picture Appendix 1-1: Overview of the different paid parking areas

Appendix 2: Number of enforcement officers 2008-2012

The number of enforcement officers in the city of Utrecht from 2008 to 2012 is reported in Appendix 2.

	2008	2009	2010	2011	2012
Enforcement officers (fulltime equivalent)	63	30	40	45	45

Table Appendix 2-1: number of fulltime equivalent enforcement officers in the city of Utrecht (department of parking)