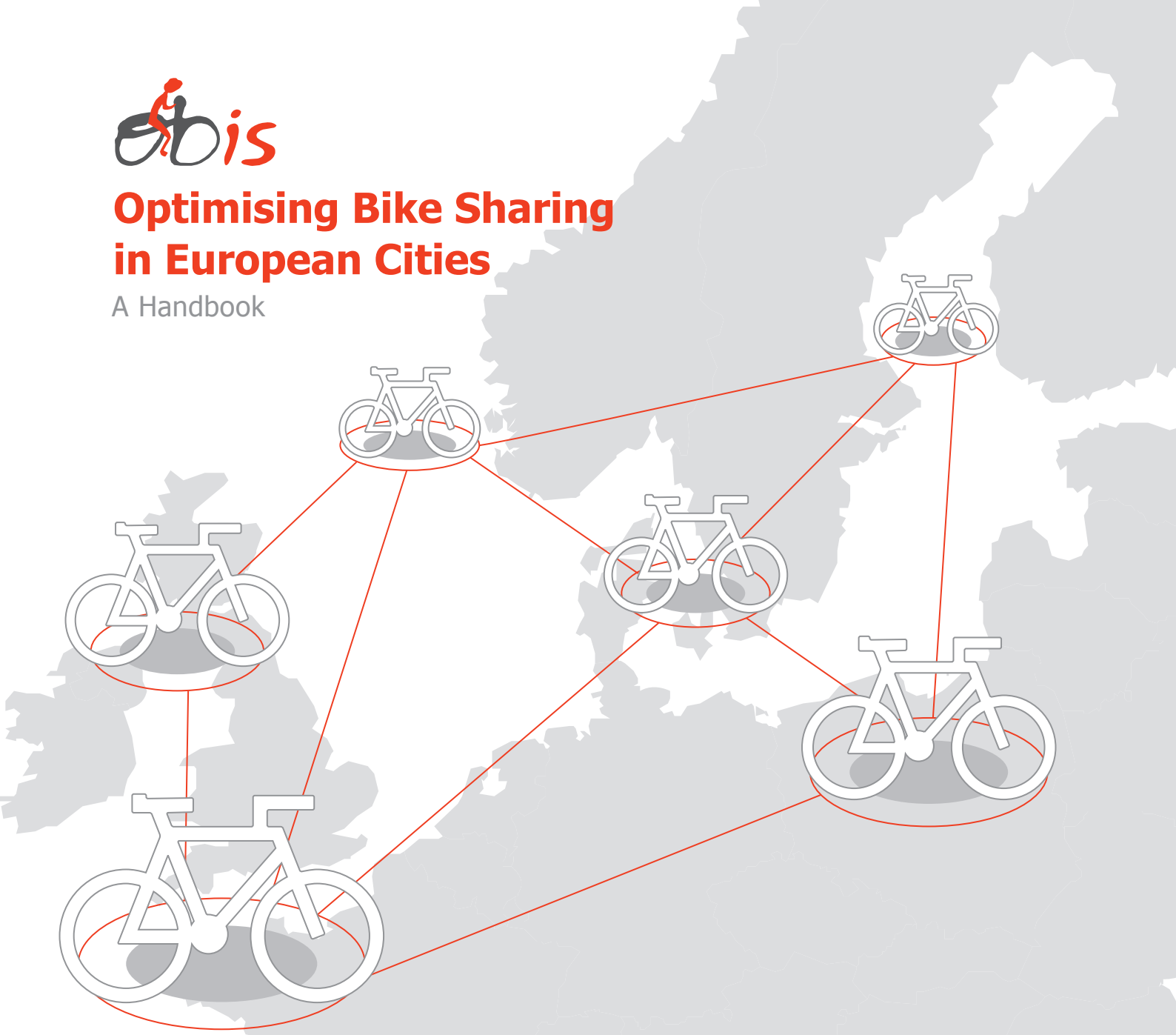
Optimising Bike Sharing in European Cities

A Handbook



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Supported by INTELLIGENT ENERGY EUROPE

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This handbook is based on the findings of the OBIS project.

OBIS, June 2011

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Acknowledgements:

The OBIS partners would like to thank the following former members of the consortium:

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Joanna Dworak
Benoît Beroud
Tony Russell
Dave Holladay
Andrea Leverano
Nicoletta Morrone

Furthermore OBIS thanks all the cities, associations, organisations, operators and researchers who have been involved, for their invaluable support, information, material and pictures which have made this handbook possible.

OBIS was funded under the Intelligent Energy Europe programme (IEE).

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Abbreviations

App	(Smartphone) application
BBSR	Bundesinstitut für Bau-, Stadt- und Raumforschung (Federal Institute for Research on Building, Urban Affairs and Spatial Development, Germany)
BSS	Bike Sharing Scheme
BVG	Berliner Verkehrsbetriebe (Transportation Company, Berlin, Germany)
BY	Creative Commons 2.0, attribution
BYPAD	Bicycle Policy Audit
ČD	České Dráhy (Czech Railways)
CfM	Cities for Mobility network
EACI	Executive Agency for Competitiveness & Innovation
EU	European Union
IDAE	Instituto para la Diversificacion y Ahorro de la Energía (Institute for Diversification and Saving of Energy, Spain)
NA	not available
NC	Creative Commons 2.0, noncommercial
ND	Creative Commons 2.0, no derivative works
NFC	Near Field Communication
OBIS	Optimising Bike Sharing in European Cities
PPP	Public Private Partnership
PPS	Purchasing Power Standards
PT	Public Transport
RFID	Radio-Frequency Identification
SCB	Stockholm City Bikes
TfL	Transport for London
TUW	Technische Universität Wien (Vienna Technical University)
UK	United Kingdom
USB	Universal Serial Bus
WLAN	Wireless Local Area Network
WP	Work Package (of the OBIS Project)

1. Introduction

BIKE SHARING SCHEME (BSS) [baɪk .ʃeə.rɪŋ skiːm] A SELF-SERVICE, SHORT-TERM, ONE-WAY-CAPABLE BIKE RENTAL OFFER IN PUBLIC SPACES, FOR SEVERAL TARGET GROUPS, WITH NETWORK CHARACTERISTICS.[1]

In recent years, numerous and diverse BSSs have been implemented in European cities. Starting with free, low-tech offers by a few enthusiasts, the schemes went through a two-fold development: high-tech systems with thousands of bikes and major funding requirements; and smaller, less expensive systems with lower usage rates. However, bike sharing is a recent development and little information regarding the suitability of different BSS models is available.

Many of the experiences of bike sharing in different European countries can be generalized and transferred to other countries, to help implement and optimise other BSSs.

Differences in the system, financial model, price policy etc. between existing BSSs are analysed (*Chapter 3 OBIS – European Bike Sharing Schemes on Trial*). Presenting the results according to the size of the city provides a good overview and guidance for cities with similar conditions. A list of success factors briefly covers all the main relevant aspects of BSSs.

Guidelines extracted from the theoretical and practical work within OBIS show which steps have to be taken, how to convince stakeholders and how to define a successful BSS while considering the particular features of the respective city or region (*Chapter 4 Guide and Recommendations*).

A presentation of ten different countries analysed by OBIS shows the status quo of European bike sharing (*Chapter 5 OBIS Country Studies*).

[1] As there is no common definition for a BSS, this is a working definition from the "OBIS dictionary".

1.1 The OBIS Project in Brief

OBIS (Optimising Bike Sharing in European Cities) was developed as a result of the 'Big Bang' in bike sharing – namely the start of Vélib' in Paris and Bicing in Barcelona in 2007. With the help of European funding from the Executive Agency for Competitiveness and Innovation (EACI) within the Intelligent Energy Europe Programme, the project gave 15 partners from nine countries the opportunity to assess BSSs all over Europe. OBIS started in September 2008 and ended three years later in August 2011.

The aim of the consortium was to: share knowledge; collect relevant information about more than 50 schemes; carry out innovative demonstration activities within the participating countries; and first and foremost, compile and publish the results of this intensive work to share it with all relevant stakeholders in the field. Thus the OBIS consortium hopes to provide decision makers, municipalities, practitioners, operators and cycling enthusiasts with a useful handbook to encourage the implementing and optimising of BSSs all over Europe and worldwide.

1.2 How to Use this Handbook

The OBIS Handbook provides interesting insights into the world of bike sharing for a wide group of stakeholders. To help readers easily find the most relevant information, we recommend the following chapters.

Readers interested in policy recommendations should start with *Chapter 2 Policy Recommendations*. Details can then be found in *Chapter 4.1 Planning*.

Readers with a general interest in BSSs should start with *Chapter 3 OBIS – European Bike Sharing Schemes on Trial* and continue with *Chapter 4 Guide and Recommendations*.

Readers who have BSS experience and want to know how to optimise schemes should read *Chapter 4 Guide and Recommendations* first, focussing on *Chapter 4.3 Optimisation*.

Readers who want to become familiar with the European BSS market should start with *Chapter 5 OBIS Country Studies* and read the OBIS results in *Chapter 3 OBIS – European Bike Sharing Schemes on Trial*.

Readers who are keen to know every detail and additional background information can find the documents which are the basis of this handbook on the accompanying CDRom or on *www.obisproject.com*. For each of the following WPs, a fact-sheet including practical implications and a full report are available:

> WP 2: *'Analysis of Existing Bike Sharing Schemes and Market Potential'* is the basis for Chapters 3.1, 3.4, 3.5.
> WP 3: *'Identification of Key Attributes'* is the basis for Chapters 3.3 and 3.6.
> WP 4: *'Test of Optimised Bike Sharing Concepts'* is the basis for Chapter 4.3.

2. Policy Recommendations

Even though bike sharing is a relatively new phenomenon, it is already becoming an important means of urban transport in many cities all over the world.

Direct benefits	Indirect benefits
Increase cycling modal share	Make cycling more visible
Additional mobility option	Encourage cycling infrastructure development
Congestion avoidance	Health benefits
Manage (public) transport demand	Liveable streets
Increase attractiveness for tourist	Savings with reduction of car infrastructure
Advertising opportunities	Positive city image
Health benefits	Improve cycling safety
Employment opportunities	Reduce CO_2-emissions

Table 1: Benefits of BSS

The reasons for implementing a BSS and the benefits are diverse and differ according to the perspective of the stakeholder.

The following findings give a general framework for the improvement of existing and upcoming BSSs.

2.1 National Level

1. Bike sharing initiatives need national support

With the increase in systems on the market, knowledge about BSSs grows in places where the systems have been implemented, but this knowledge is not automatically transferred to cities without a BSS. Therefore it is essential to share experiences and knowledge. Cities and municipalities can learn from each other. Therefore, national discussion and information forums with the support of national transport and urban development ministries should be created.

2. Develop funding instruments

Grants can help in implementing BSSs. They can help to cover high infrastructure investments or part of the running costs, especially in smaller cities. However, a critical view of the costs and outcomes of the BSS is necessary. Therefore, grant funded schemes should be monitored and evaluated.

3. Include bike sharing in (national) transport strategies

BSSs are not the panacea for urban and regional transport problems. To unlock their full potential, they must be embedded in a comprehensive cycling and transport strategy. Cycling infrastructure, bike sharing, communication campaigns, PT strategies, and planning for roads and parking should all go hand in hand.

2.2 Municipal Level

1. Define general aims and objectives of the scheme for your town

In principle, what are your reasons for setting up the scheme? What and who is it for? BSSs exist for many different purposes in different contexts and have various direct and indirect benefits (Table 1), depending on local mobility policies, so before you start it is important to define: the immediate problems you hope to solve and the long-term or indirect benefits you hope to achieve.

2. Set up a bike sharing task force

The first step on the way towards implementing a BSS is to pool skills within the municipality. A bike sharing 'task force' should incorporate both practical and administrative skills. Practitioners and experts in the field of bike sharing (that are not involved with an operator) also help to discuss the opportunities and limits of a BSS for the city/region.

3. Set up a 'round table'

All stakeholders involved in the process should participate from an early stage. People involved in a 'round table' should come from the decision making, planning, legal, budgeting, communication and operations departments. Externals such as consultants, students, practitioners from other BSSs can help to explore local opportunities and give an unbiased, external point of view.

4. Involve operators

Make use of the know-how of the operators. They know about technical developments that are about to become available. They know how the operational aspects work. Operators' know-how is useful for tenders and feasibility studies. However, the view of an unbiased expert is necessary to assess operators' information.

5. Analyse requirements and define indicators of success

A professional feasibility study analysing other systems, cataloguing local conditions, drafting different scenarios and analysing future operational figures, should be the foundation for a later decision.

6. Look for funding options

Analyse federal or regional funding to get support for infrastructure or operation. Involving third parties such as local companies or hotels can strengthen the financial foundation, but should never be the only source of funding.

7. Set a milestone for a decision: yes or no

Once all the figures have been collected and relevant stakeholders' opinions heard, there should be a clear and unanimous 'yes' or 'no'. The more relevant stakeholders are convinced about the BSS at this stage, the less time and energy will get lost during planning and implementation.

8. Buy smart

The combination of bike sharing and advertising, as well as buying 'off the shelf systems'[2] might appear easy at first glance. However, the option of buying single components can be feasible and should be considered. In any case, every municipality should define individual requirements for its BSS.

9. Get it right the first time

Small pilot systems, e.g. with a low density of stations, tend to fail. The BSS becomes more attractive, the denser the scheme, the better the daily availability, and the larger the operating range is. Therefore the dimensions should be well chosen from the start. However, pilot schemes do have benefits. They are cheap; they can test the technology and establish people's attitudes towards BSSs based on their actual experience of using a scheme. Pilots should be directed to a dedicated test group.

10. Make your scheme unique

Results from different European cities show that good individual design of a BSS contributes to success. Design elements include the bike itself (colour, city logo), the stations, the terminals and communication materials. However, there is no need to design a scheme from scratch. Existing schemes usually offer a good technical and operational basis with opportunities to adapt.

11. Be aware: knowledge is power

Good knowledge of system performance and costs is the key to success. Therefore, in the initial call for tenders to potential operators, municipalities should include monitoring, reporting and sharing of data with the operator before the contract is signed.

12. Allow yourself to be honest about costs and benefits

After the first operation-period, the figures should be analysed in depth. If they vary from expectations in a negative way, thinking about spending the money in a more productive way should be considered. In the worst case this might mean that the BSS budget is better spent on other cycling measures. Nevertheless, experience shows that most systems do have the potential to work properly.

[2] Complete scheme including infrastructure, bikes, management system (software, hardware), staff etc. from one supplier.

2.3 Arguments You'll Have to Deal With

When discussing bike sharing, several arguments or constraints come up regularly. The most common ones are listed below.

The city already has a high cycling modal share; people have their own bikes.

Bike sharing is an additional option for intermodal transport. Even though people use their own bikes, bike sharing can be used as a flexible means of transport for short trips and before or after PT rides, without the need for maintenance, or risk of theft or vandalism.

BSSs are expensive.

There is room for improvement in terms of costs, but bike sharing is still relatively inexpensive compared to other infrastructure and transport measures (such as car infrastructure and PT). As the market for BSS equipment matures, the costs will also decrease. When evaluating the costs and outcomes of a BSS, positive external effects of the scheme must be considered and compared with other measures competing for the same financial resources.

The city is too small and does not have enough funding options.

Even in small cities with up to 100,000 inhabitants, BSSs can be a useful addition to existing means of transport. PT is often not as well developed as in larger cities. BSSs can therefore be a complement or a substitute for PT. Funding can be obtained with the help of local sponsors, labour market initiatives and social organisations.

A BSS will compete with local bike rental companies.

There are measures to prevent this scenario. The most common options are progressive charges, that increase the longer you use the bikes, or to exclude tourists from the local BSS by only allowing residents to register (as for example in Barcelona). Another option is to involve local bike rental companies in the operation of the BSS.

The city does not even have proper cycling infrastructure. The BSS a) will compete for funding and b) nobody will use the BSS due to the lack of infrastructure.

BSSs should always be combined with other cycling measures. A cycling strategy should therefore comprise infrastructure (such as cycle paths, safe cycle parking stands), choices on infrastructure use, (like bike access to one-way streets, car-parking policy), support for initiatives that encourage cycling (led by user-groups, schools or employers) and communication measures that encourage cycling and other sustainable mobility options. Nevertheless, a BSS can serve as an initial boost for cycling as a daily transport option (like it has in Paris, Lyon, Barcelona and London) which creates a demand for additional cycling infrastructure investments requiring decisions on provision and spending.

Cycling is dangerous; a BSS will increase the number of accidents

The safety of cycling very much depends on the quality of cycling infrastructure and the level of cycling in a city. Car drivers are much more aware of cyclists when they see more cyclists on the streets. Typical experiences (such as Stockholm and Berlin) are that very high increases in cycling have not been coupled with higher accident rates, even in absolute numbers. Thus, a BSS can contribute to making cycling safer. Additionally, safety aspects of cycling should always be measured in 'accidents per cycle trip' and not in 'number of accidents'. Finally, studies show that the health benefits of cycling largely outweigh the risks. Nevertheless, accident risks should be taken seriously and measures be taken to minimise them through, for example, information campaigns targeting cyclists, but in particular also motorists.

All the trips will be one-way; there will be a distribution problem

Redistribution is needed in all BSSs and the experience of existing schemes is useful in this respect. Thus it is important to analyse traffic flows before and after implementation and after that to optimise station planning, not only in terms of mobility needs, but also in terms of the redistribution capacity of the system. Smart algorithms for redistribution planning help optimise redistribution by assigning priorities to the respective stations. Not every empty station needs to be filled (e.g. when it is not usually used during the night).

Additionally the use of zero-emission vehicles helps

reduce the negative impact that redistribution has on the climate.

Bike sharing will compete about street space, parking, pavements etc.

Bikes help make localities accessible with the potential to reduce congestion and promote health. It is therefore in the interest of the citizens that they are provided with the necessary means to start cycling. For groups with special needs, disabled, elderly, children etc.; and the transport sector (e.g. within retail deliveries), special arrangements like dedicated parking and time slots, are always possible.

3. OBIS – European Bike Sharing Schemes on Trial

3.1 Bike Sharing in Europe

While in 2001 only a few BSSs were running in Europe, by 2011 about 400 schemes were in existence in the OBIS countries alone. The main trigger for this was the launch of two big schemes in 2007: Bicing in Barcelona and Vélib' in Paris. While Northern, Central and Southern Europe are well covered by BSSs, they are not yet widespread in the Eastern European countries.

BSSs are most popular in Southern European countries that do not have a cycling tradition. Central and Northern European countries also provide many schemes but usage is lower there. The OBIS countries can be subdivided according to cycling experience in the following manner:

> 'Established cyclists': The use of BSSs was moderate in countries with good cycling infrastructure and comparably high cycling modal share such as Austria, Germany or Sweden.

> 'Cycling newcomers': BSSs have become very popular in countries like France, Italy or Spain, despite the fact that there was no previous cycling culture related to commuting and everyday journeys. The United Kingdom, with its relatively low cycling modal share, opened the large-scale scheme, Barclays Cycle Hire, in London recently but cannot yet look back on broad BSS experience.

> 'New European Union (EU) partners': Very few BSSs are currently operating in Eastern European countries. In OBIS, the Czech Republic and Poland are learning from the experience gained in other places. Therefore, the feedback from other more established BSS cities and nations is crucial for municipalities implementing new BSSs in the Czech Republic and Poland.

It is of special interest to examine which experiences can be transferred to other cities, and how they can learn from the findings of the OBIS project.

The following *Chapter 3* sums up the relevant findings based on research carried out in the OBIS countries.

The ten *Country Studies* can be found at the end of this handbook in *Chapter 5*.[3]

3.2 The OBIS Sample

The OBIS consortium has carried out the broadest analysis of BSSs so far. 51 schemes in 48 cities located in 10 European countries were included in the qualitative and quantitative analysis (Table 2). Most figures were collected on the basis of 2008 and 2009.[4]

Country	Number of BSS studied
Austria	4
Belgium	2
Czech Republic	1
France	8
Germany	7
Italy	11
Poland	1
Spain	7
Sweden	4
United Kingdom	6

Table 2: BSSs Studied per Country

The aim of this analysis was to assess which influencing factors affect the configuration and the outcomes of such schemes.

[3] Unless stated otherwise, facts and figures in the country studies are taken from WP 2 of the OBIS project: Castro Fernández, A. et al. (2009a), Castro Fernández, A. et al. (2009b).

[4] See Castro Fernández, A. et al. (2009a) for details.

3.3 Influencing Factors on Bike Sharing Schemes

The OBIS analysis revealed three categories of influencing factors on the outcomes of BSSs that can be divided into 'endogenous' and 'exogenous' factors (Figure 1):

> Endogenous factors are 'policy sensitive design factors' that can be adjusted depending on the exogenously given context. Endogenous factors are divided into institutional design factors and physical design factors.

> Exogenous factors are factors specific to the city and not easily changed.

The main influencing factors of each category can be found in Table 3.

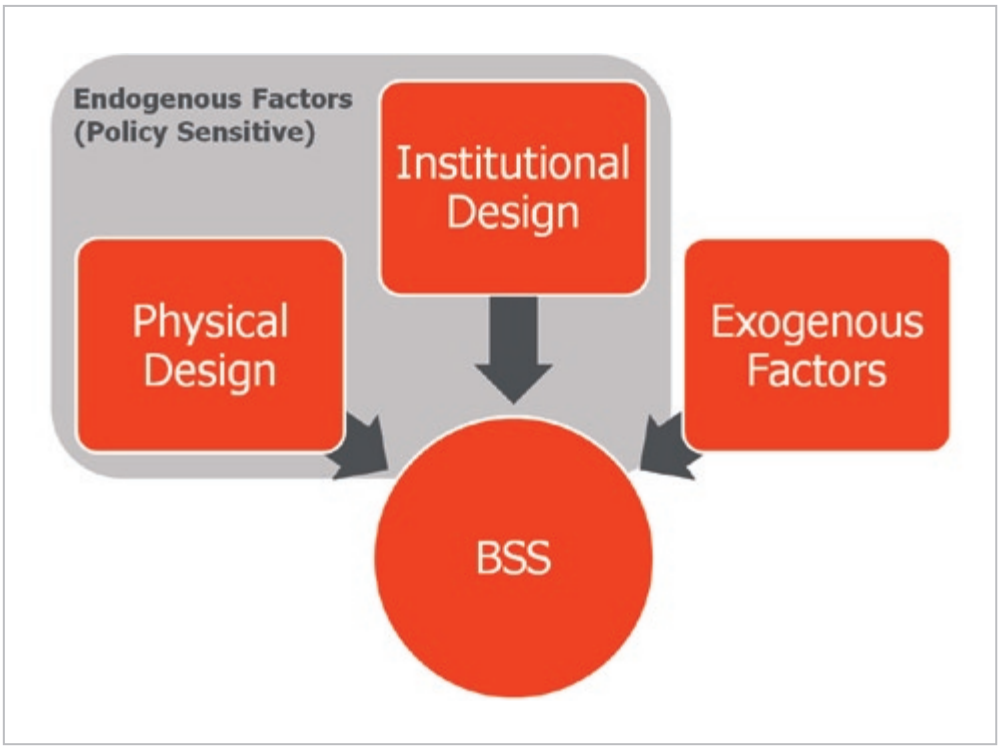

Figure 1: BSS Influencing Factors

Endogenous factors	Exogenous factors
Physical design	City size *(Chapter 3.5.1)*
Hardware & Technology *(Chapter 3.4.1.1)*	Climate *(Chapter 3.5.2)*
Service design *(Chapter 3.4.1.2)*	Mobility behaviour *(Chapter 3.5.3)*
Institutional design	Population density
Type of operator *(Chapter 3.4.2.1)*	Demographic factors
Contracts and ownership *(Chapter 3.4.2.2)*	Economic factors
Financing sources *(Chapter 3.4.2.3)*	Geographic factors and topology (hilliness)
Employment opportunities	Existing infrastructure
	Financial situation
	Political situation

Table 3: BSS Influencing Factors

Figure 2: BSS Configuration Modules

3.4 Endogenous Factors (Policy Sensitive)

Not all BSSs are the same. They consist of different features and characteristics that can (and should) be adapted depending on the exogenously given context. The physical and institutional design factors of BSSs can be grouped into the following categories: hardware, technology and service design; and operators, contracts & financing (Figure 2).

3.4.1 Physical Design

3.4.1.1 Hardware & Technology

Access Technologies

The access technologies of BSSs are diverse and depend on the size of the system, available financing and the technology used. Most schemes in the OBIS sample offer card-based access (Figure 3).

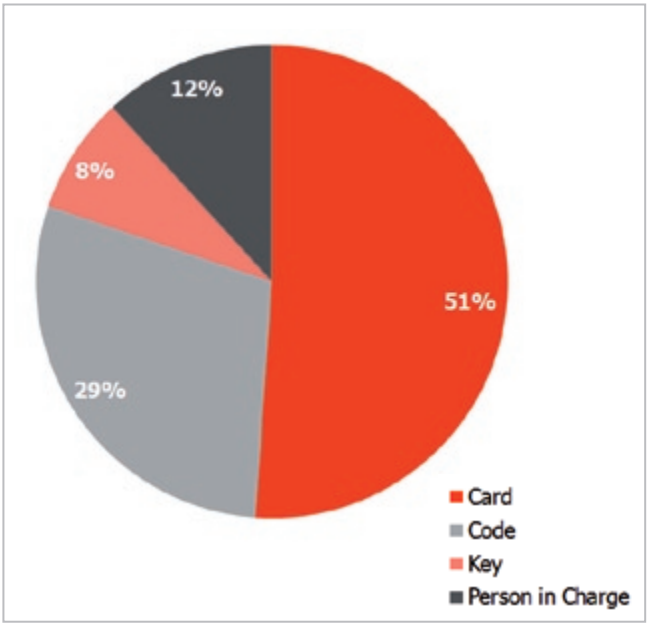

Figure 3: Access Technology in OBIS Sample (N=51)

Cards: the most common means of access is a (smart)-card (Figure 4, Figure 5).

Figure 4: Bicing Scheme Card (Photo: Tim Birkholz, choice)

Figure 5: Stockholm City Bikes Scheme Card
(Photo: Tim Birkholz, choice)

The bike can either be rented at a terminal or at the bike itself if the bike provides a card reader. Different types of cards can be used, such as magnet cards, chip cards, credit cards or RFID cards.

RFID (radio-frequency identification): contactless communication gives the operator the opportunity to provide any physical form of means of access. RFID tags can be glued to ID Cards and mobile phones or mounted into key ring pendants

(Figure 6). The rental process is similar to a card-based one, but removes the need for card reading slots which often become defective.

Figure 6: Barclays Cycle Hire Key Ring Pendant (Photo: TfL)

Code-based rental: the user calls a number or sends an SMS with the required data to a central number and gets an access code or any other access information onto their handset. The access code is inserted into an electronic or mechanical device at the lock (Figure 7) or the docking point.

Figure 7: Call a Bike Code Lock (Alberto Castro Fernandez, TUW)

Key: some schemes, especially in Italy (Figure 8, Figure 9), work with keys. The users receive the key for a bike from a device or kiosk where they have to identify themselves before the rental.

Figure 8: Italian Key Scheme in Teramo, Bike Docking Point (Photo: Centroinbici)

Figure 9: Italian Key Scheme in Teramo, Key Mechanism (Photo: Centroinbici)

Person in charge: some small scale systems do not have any rental technology at all. The bike or the access to it is provided by a local person in charge.

Bikes

The bikes in BSSs differ in design and quality. Nevertheless they share the following general characteristics:

Robust parts: to minimise vandalism damage and to facilitate maintenance, bike sharing operators use robust parts that are easy to replace. Examples are: gear hubs, drum brakes and plastic mudguards. Many operators develop custom bike parts (Figure 10) to reduce incidences of theft.

Figure 10: Vélib' Handle Bar (Photo: Carlo Mellis, choice)

Unique design: to avoid theft and to make the bikes more visible in public spaces, operators use a unique design (Figure 11, Figure 12, Figure 13), which differs from regular private bikes. The bikes within one scheme are usually the same colour and have the same frames and are recognisable even when stolen and repainted.

Figure 11: Clear Channel Bikes Bicing (Photo: Janett Büttner, choice)

Figure 12: Clear Channel Bikes Velo à la carte in Rennes (Photo: Ronan Mulet, Clear Channel)

Figure 13: Homeport in Prague (Photo: Jaroslav Martinek)

One size for all: BSSs almost always offer only one type of bike. Adjustable seat posts make them suitable for most users. However some user groups such as people with children, the elderly or disabled, very small or very large users might not be able to use the bikes comfortably.

The bikes also differ in certain characteristics. Those differences are due to the different types of operation, financing and service design (*see 4.2.2.2 Physical Design*).

Advertising space: operators financing the scheme with advertising on the bikes, design the bikes accordingly. Frame and parts provide visible spaces for advertisements (Figure 14). Those spaces might influence the usability of the bike. However, even without the need for third-party advertising, bikes sometimes provide space to advertise the scheme itself.

Figure 14: LEIHRADL-nextbike Advertisements (Photo: nextbike)

Bike locks: Bikes in schemes with high-tech physical stations are usually locked electronically or mechanically to the docking stations. Only few of them provide bike locks. BSSs without physical stations offer bike locks to fasten the bikes securely during and between the rentals (Figure 15).

Figure 15: Call a Bike Lock (Photo: Alberto Castro Fernandez, TUW)

Stations

Stations are a feature of most BSSs. They differ mainly in the technology involved. BSSs without stations are not very common, but examples do exist (Figure 16).

Low-tech stations: the bike is locked to the docking point mechanically either with a lock on the docking point or a lock on the bike itself (Figure 17, Figure 18). Information columns give static information on the station, the rental process and the surrounding stations.

Figure 16: Flexible Scheme nextbike (Photo: nextbike)

High-tech stations with docking points: the most common type of bike sharing station includes docking points and a rental terminal - connected with each other (Figure 19, Figure 20). The bike is locked to the electronically controlled docking point. The rental process takes place at the rental unit (terminal or at the docking point itself) (Figure 21), which can include touch screen display, card reader, RFID-Reader printer and keyboard. BSS stations also offer space for additional advertising and information measures (Figure 22, Figure 23).

Figure 17: Vélobleu Station Nice (Photo: CETE de Lyon)

Figure 19: Vélib' Terminal (Photos: Carlo Mellis, choice)

Figure 18: LEIHRADL-nextbike Station (Photo: nextbike)

Figure 20: Vélib' Station with Terminal (Photos: Carlo Mellis, choice)

Figure 21: Barclays Cycle Hire Station (Photo: TfL)

Figure 23: Cyclocity in Brussels (Photo: Creative Commons BY-NC 2.0 by Flickr-User Frank Dhooge)

Figure 22: LaBiGi Station in Italy (Photo: Bicincittà/ Communicare)

Software

Software is needed to operate the system at the back-end[5] and at the front-end[6] (Figure 24). The scope of operation depends on the hardware design and necessary interfaces. Common software features are listed in Table 4.

Figure 24: Detail Terminal in Hamburg (Photo: Benjamin Dally)

[5] Back-end system describes all IT-systems running on the operator's side, invisible to the customer.

[6] Front-end system describes all IT-systems with interaction and usage opportunities for customers and potential users.

Back-end	Front-end
Station Monitoring	Registration
Redistribution Planning	Rental
Defect Management	Information
Customer Data Management	Customer Data Management
Billing	Payment

Table 4: Software Functions

3.4.1.2 Service Design

Scheme Size and Density

The scheme size and density is determined by the size of the city or region itself, target groups, financial strength and goals of the BSS. Most urban schemes cover only central, dense areas of the city but provide a station every 300 meters or so, giving the user enough opportunities to move around in the system. Regional schemes are less dense but are usually designed for longer rentals. Table 5 gives an overview of the size and density of the schemes in the OBIS sample. Minimum and maximum values are added to illustrate that there is, in particular, a substantial variation in the number of bikes and stations per 10,000 inhabitants.[7]

	Average	Max	Min
Bikes per 10,000 inhabitants	14.8	105.8	0.1
Stations per 10,000 inhabitants	1.5	6.7	0.1
Docking points per bike	1.7	3.2	1.0

Table 5: Scheme Size and Density in OBIS Sample

Service Availability

The service hours and service seasons differ among the cities (Figure 25). Most schemes offer a 24/7 service. However, some close overnight.

The picture of seasonal availability is diverse too. Some schemes close down during the winter months while others run all year round. This is likely to depend on regional characteristics reflecting the climate and/or demand, and also costs of redistribution (fixed personnel cost during nights, for example).

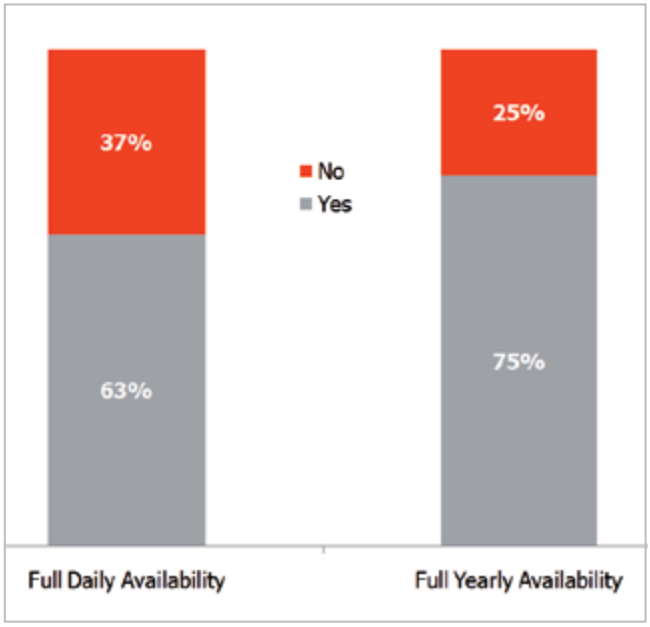

Figure 25: Scheme Availability in OBIS Sample (N=51)

Registration

Registration is required in almost all BSSs to avoid the loss of bikes by anonymous users and to ensure billing and payments. Most systems offer various types of registration to keep access barriers low: at the station, on the internet, by post, by telephone or in person. Registration costs differ from € 0 to some tens of €, depending on the registration period. Some common registration periods are:

> One-off registration;
> Daily registration;
> Weekly registration;
> Monthly registration;
> Yearly registration.

Most schemes offer registration charges that are cheaper than other modes of transport, such as PT, taxi or car. The charges often include a free rental period of 30 minutes for each ride within the registration period. Some systems, notably in France, require a substantial deposit at the time of registration.

[7] A main reason for variances is that population figures apply to the respective city in whole while the BSS often covers only parts of the city.

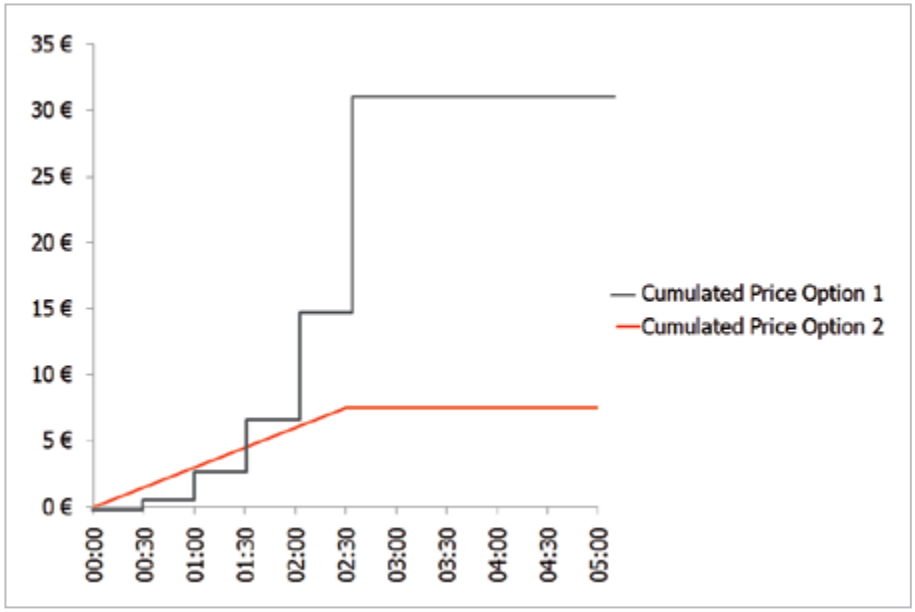

Figure 26: Usage Charge Illustrative Examples

Charges

Charges are designed to support the goals of the BSSs. Most schemes encourage daily short-term use. Thus the first 30 minutes of each ride are free in most systems. The rental price increases exponentially after the free period and reaches a high daily maximum or fine (Figure 26, Option 1). In other schemes the rental period with costs starts from the first minute with a linear charge per time unit reaching a lower daily maximum (Figure 26, Option 2). Most BSSs also include fines or withholding the user's deposit for not returning or damaging bikes.

Figure 27: Vélo Bleu Nice (App by: Intellicore)

Information

Information channels are available to communicate all BSS-related issues from awareness raising to registration and rental. Apart from traditional channels (such as advertisements, websites, newsletters, service centres and call centres), some operators have started using applications (Apps) for mobile handsets and Smartphones (Figure 27). Those Apps offer advertisement options, scheme information, registration opportunities, rental functions and real-time information about station and bikes depending on the current position of the user (see also Table 4).

Public Transport (PT) Integration

The integration with PT takes place on three levels: integration of information; physical integration; and in terms of technological access and charges.

Information integration: bike sharing information is combined with PT information. Station locations can be found on bike sharing maps (Figure 29), websites link to each other and intermodal routing is possible.

Physical integration: bike sharing stations are implemented as a parallel service to relieve PT in peak hours or in areas where PT cannot cover all mobility needs. Bike sharing stations are often located near PT stations (e.g. V3 in Bordeaux with V+ Stations outside the centre for usage in connection with PT).

Access & charges: some schemes offer access to PT and bike sharing with one card. PT users receive

Figure 28: eo'City Rennes - Integrated BSS-PT App, Start Screen (App by: NewLC)

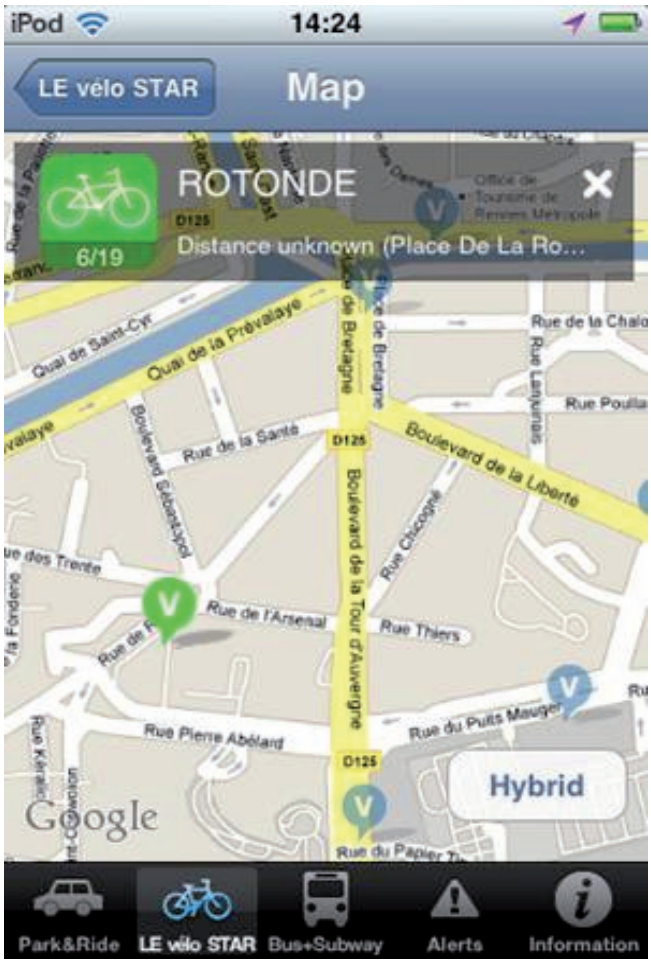

Figure 29: eo'City Rennes - Integrated BSS-PT App, Map (App by: NewLC)

special conditions in some cases, such as a single daily charge or discount when using a BSS and other modes.

Target Groups and Trip Purpose

Most BSSs have more than one target group. While the main focus in urban schemes is the daily user who rides to work or to leisure activities, regional schemes often focus on the tourist market. Different target groups are addressed by different communication channels and different charges (Table 6).

3.4.2 Institutional Design

3.4.2.1 Operators

Operators of BSSs can be divided into five main categories:

> Advertising companies, street furniture providers or other public services (e.g. JCDecaux, Clear Channel, Cemusa);
> Publicly or privately owned transport companies (e.g. Call a Bike – DB Rent, EFFIA, Veolia);

	Work + Education	Leisure	Errands	Tourism
Requirements	Dense station network	24/7 service	Dense station network	Stations near PT
	Stations near PT stations and living quarters	Safety during the night	Lock on bike	Stations near points of interest
	Bikes & slots available			
Problems	Lack of rush hour availability	High prices for longer rental	Lack of options to carry goods	High prices for longer rental

Table 6: Trip Purpose Requirements & Problems

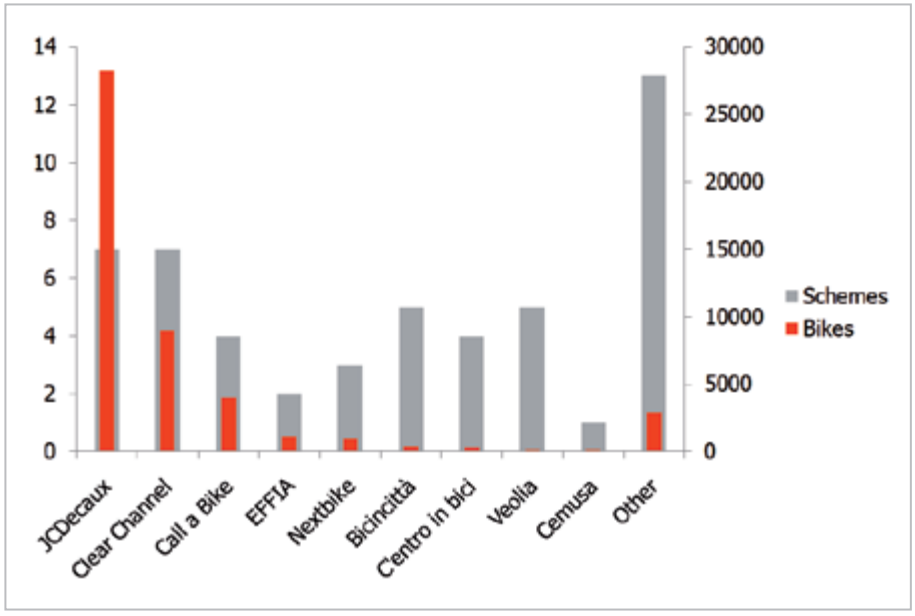

Figure 30: Operator Distribution in OBIS Sample (N=51)

> Bike sharing businesses (e.g. nextbike, Bicincittà, C'entro in bici);
> Municipal operators (e.g. Vitoria Spain);
> Associations, cooperatives (e.g. Greenstreet in Gothenburg, Chemnitzer Stadtfahrrad).

Among these, the first two are pertinent to large-scale systems, while the latter two are characteristic of small-scale systems. The OBIS sample reinforces this picture (Figure 30).

3.4.2.2 Contracts

Usually a contract between the municipality and the operator of a BSS is agreed. Contracts differ in terms of infrastructure ownership and length of the value-chain for each contracting party. Contract types can thus be divided into four main categories (Table 7). At the moment, the model of infrastructure and operation for which a single operator is responsible is the most common contract type (e.g. Clear Channel, JCDecaux).

	Infrastructure	Operation
Option A1	Contractor	
Option A2	Contractor A	Contractor B
Option B	Contractor	Municipality
Option C	Municipality	Contractor

Table 7: Contract Types

3.4.2.3 Costs and Financing

Costs and financing are crucial issues in bike sharing. Two different points of view that are often mixed up have to be considered: the costs for investment and operation of a BSS (operational point of view); and the costs arising in connection with the setting-up of a contract with an operator (municipal point of view).

The main costs from an operational point of view can be divided into two main categories: infrastructure & implementation and running costs.

Implementation costs in large-scale systems add up to € 2,500 - € 3,000 per bike, depending on the system configuration. A scheme without stations or a scheme with stations which do not need any groundwork (e.g. solar or battery powered stations) can be implemented at a fraction of the costs of conventional station-based schemes. Implementation costs are usually depreciated over the duration of the contract. If the municipality operates a scheme without the help of an external contractor, the implementation costs are depreciated over the lifespan of the BSS.

Infrastructure & Implementation	Share of total costs
Station implementation: terminals, docking points and locking technology, station planning, ground work and cabling	70 %
Bikes	17 %
Set-up operations: workshop and logistics	6 %
Communication	5 %
Administration	2 %

Table 8: Example - Implementation Costs Bicing Barcelona

Running costs in large-scale systems are stated as € 1,500 - € 2,500 per bike and year in most large schemes.

Running Costs	Share of total costs
Redistribution of bikes	30 %
Bike Maintenance	22 %
Station Maintenance	20 %
Back-end system	14 %
Administration	13 %
Replacements (bikes, stations)	1 %

Table 9: Example - Running Costs Bicing Barcelona

Cost structures in BSSs differ depending on the size of the scheme and the number of rentals. Since investment and personnel costs are mainly fixed costs, the average costs per rental decrease as the number of rentals increases. Other (running) costs are, to a large extent, variable costs. The higher the number of rentals per bike, the higher the number of maintenance, customer service and redistribution processes. Thus the costs per bike increase. This mechanism, however, results in lower costs per bike in many smaller schemes with few rentals per bike.

The main financing sources from an operational point of view are registration charges and usage charges paid by the customer. As many systems offer a 30-minute-period free of charge for each ride, registration charges are most likely to be the most important income source rather than the usage charges. Thus subsidies are needed for most BSSs because revenues from the scheme hardly ever cover the operational and investment costs. Depending on the type of contract with the operators, the scheme is co-financed by direct subsidies, various advertising contracts, sponsorships (whole scheme, single components, stations or bikes), parking enforcement incomes or congestion charges.

Contract Value Barclays Cycle Hire

As an example the contract costs for Barclays Cycle Hire in London are given:

Bikes (B):	6,000
Stations:	400
Contract duration (D):	6 years
Contract value (V):	£ 140,000,000
Contract costs per bike/day:	V/(B*D*365 days) =£ 10.65

3.4.3 Chapter Summary

<table>
<tr><th>Physical Design:
Hardware & Technology</th><th colspan="2">Physical Design:
Service Design</th><th>Institutional Design:
Operation & Financing</th></tr>
<tr><td>Access Technology:
- Card-based
- RFID
- Code-based
- Key
- Person in charge</td><td>Size and density:
- Number of bikes
- Number of docking points
- Number of Stations
- Station density</td><td>Availability:
- 24 hours or limited
- Service seasons: year round or limited</td><td>Operators:
- Advertising companies, street furniture providers
- Transport companies
- Bike sharing business
- Municipalities
- Associations</td></tr>
<tr><td>Bikes:
- Robust
- Unique design
- One size for all
- Advertising space</td><td>Registration:
- One-time
- Daily
- Weekly
- Monthly
- Yearly</td><td>Charges:
- Period free of charge included
- Increasing or decreasing price per time unit</td><td>Contracts:
- Ownership, responsibility
- Contract length</td></tr>
<tr><td>Stations:
- Low-tech
- High-tech
- Advertising space</td><td>Information:
- Websites
- Apps
- Maps
- Terminals</td><td>PT integration:
- Information integration
- Physical integration
- Access & charges</td><td rowspan="2">Costs and Financing
Operational costs:
- Infrastructure & implementation
- Running costs
Operational financing sources:
- Charges
- Advertisment on infrastructure
Sources for Subisides:
- Direct subsidies
- Advertisment contracts
- Sponsorships (scheme, single components)
- Parking enforcement, congestion charges</td></tr>
<tr><td>Software:
- Monitoring
- Redistribution / maintenance
- Billing
- User processes</td><td>Target groups:
- Commuters
- Tourists
- Leisure Users
- Business</td><td></td></tr>
</table>

Table 10: Chapter 3.4 Summary

3.5 Exogenous Factors

The configuration and outcomes of a BSS are determined by a number of exogenous factors (Table 3). Therefore, the OBIS data collection does not only include scheme information, but also information about various exogenous factors such as climate, cycling culture and demographic data. This information helps to present a differentiated picture of BSS-configurations.

3.5.1 City Size

BSSs in cities of different size show different characteristics and outcomes. Therefore a number of characteristics was analysed depending on city size.

Cities were classified by the number of inhabitants as follows:

> Large cities: more than 500,000 inhabitants;
> Medium cities: 100,000 to 500,000 inhabitants;
> Small cities: 20,000 to 100,000 inhabitants.

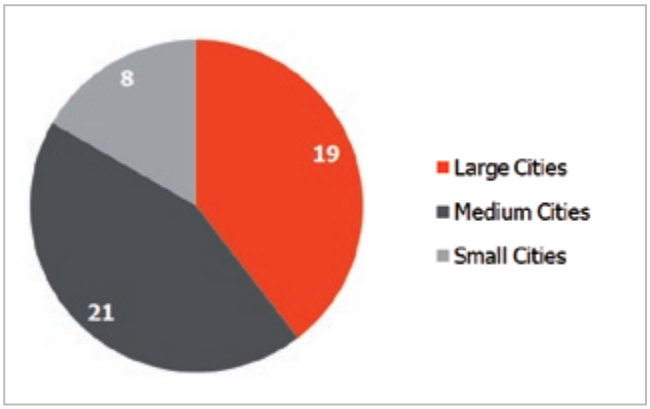

Figure 31: Number of Cities per City Size in OBIS (N=48)

3.5.1.1 Modal Split

The modal split can give hints about the local cycling culture. A comparison of modal splits (Figure 32) in cities of different sizes shows a regular pattern: the car share is substantially higher in small cities; PT share is higher in large cities. There is no significant difference between the modal shares of cycling in small, medium and larger cities.

3.5.1.2 Technology

Bike sharing technology generally differs according to city size. In most cases, large cities provide technologically advanced schemes, while smaller cities more often provide low-tech schemes (Figure 33).

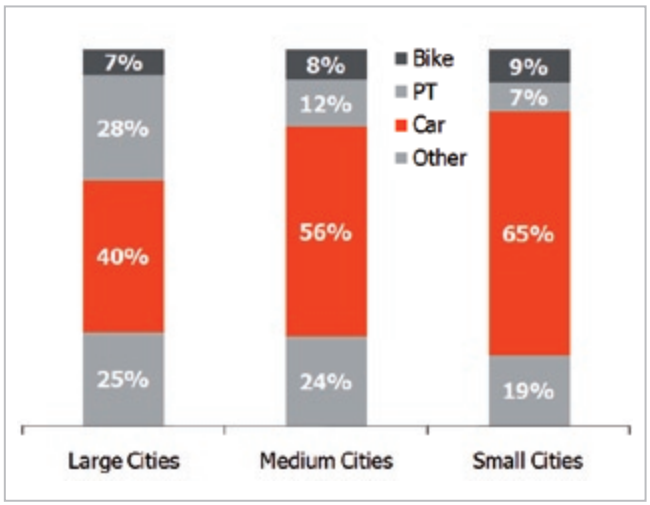

Figure 32: Average Modal Share by City Size (Car N=16/16/6, PT N=16/15/6, Bike N=15/15/7)

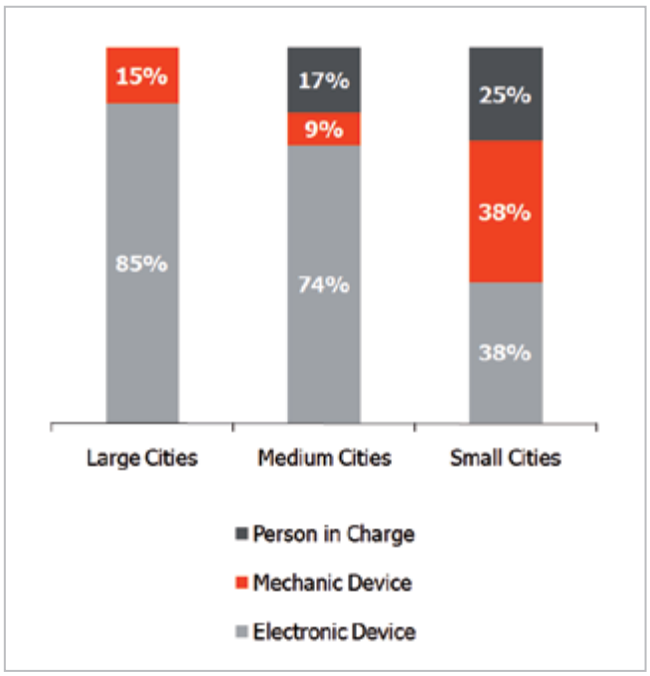

Figure 33: Bike Sharing Technology by City Size (Large N=20, Medium N=22, Small N=8)

	Value	Large Cities	Medium Cities	Small Cities
Bikes per 10,000 inhabitants	Average	15.6	14.4	14.0
	Median	6.2	6.8	12.7
Stations per 10,000 inhabitants	Average	1.5	1.3	1.8
	Median	0.5	0.8	1.4
Docking points per bike	Average	1.8	1.8	1.2
	Median	1.7	2.0	1.2
Bikes per station	Average	9.5	23.5	22.9
	Median	10.2	8.7	6.2

Table 11: Average and Median of BSS Key Figures in the OBIS Sample

3.5.1.3 Scheme Size and Density

Values for scheme size and density vary substantially within the OBIS sample (Table 11). Thus the average values are of limited use.[8]

Nevertheless it can be seen that schemes in large and medium sized cities offer more slots and bikes per station for automated schemes than small cities.[9] This eases the redistribution of bikes which is necessary in most schemes due to uneven demand.

3.5.1.4 Service Availability

Bike sharing availability differs between city sizes. Large cities tend to provide a 24-hour service, while smaller cities tend to close the service during the night (Figure 34). There is also interdependency between scheme technology and opening hours. Schemes that rely on a person in charge for operation are likely to close during the night.

3.5.1.5 Charges

Charges differ substantially between the city sizes in the OBIS sample (Figure 35). More of the small and medium-sized cities have schemes that are free of charge for at least 30 minutes (75 % and 82 %, respectively) than large city schemes (60 %).

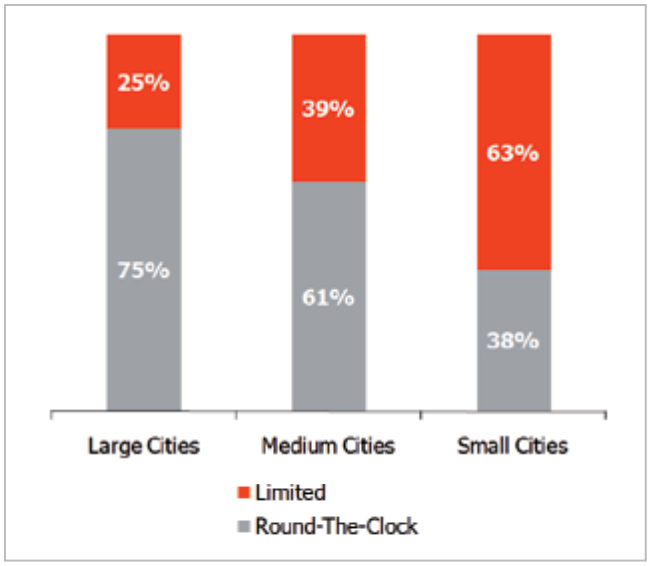

Figure 34: Opening Hours by City Size (Large N=20, Medium N=23, Small N=8)

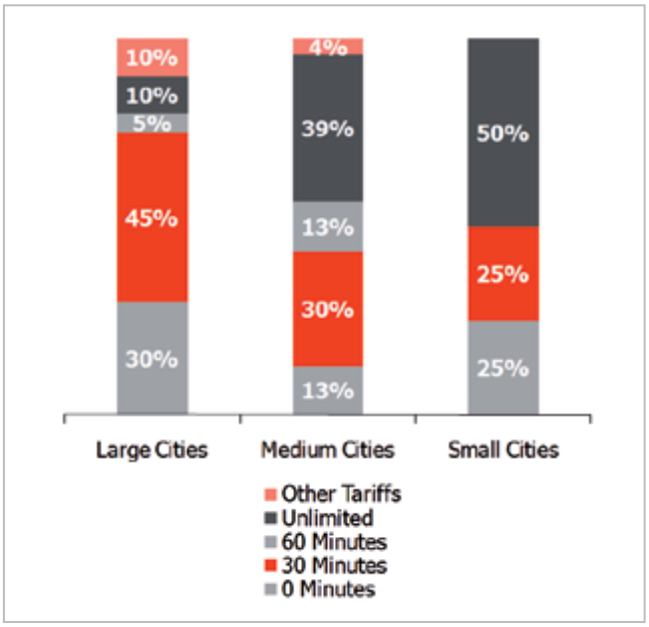

Figure 35: Minutes Free of Charge by City Size (Large N=20, Medium N=23, Small N=8)

[8] Figures for the number of bikes per 10,000 inhabitants are mainly influenced by the fact that the schemes mostly do not cover the whole city. The population figures apply to the whole city.

[9] High average values for the number of bikes in medium and small cities are caused by high number of bikes per station at a few non-automated schemes. Thus the Median is added.

3.5.1.6 Rentals

The number of rentals per bike is one of the most important direct success indicators of BSSs [10]. Rentals per bike are usually higher in large cities than in smaller ones (Figure 36). The reasons for this are diverse: in general, mobility demand is higher in big cities, because of the higher population and employment density. Therefore, schemes in large cities often offer higher station density, easy-to-use high-tech schemes and higher density of destinations, which influences the number of rentals in a positive way. Additionally, bigger cities often have more problems with congestion and limited parking space, which makes cycling more competitive with the car in terms of speed and flexibility on distances up to five - seven km and therefore attractive for daily usage. In some cities, where PT is crowded, BSSs provides an alternative mode of transport.

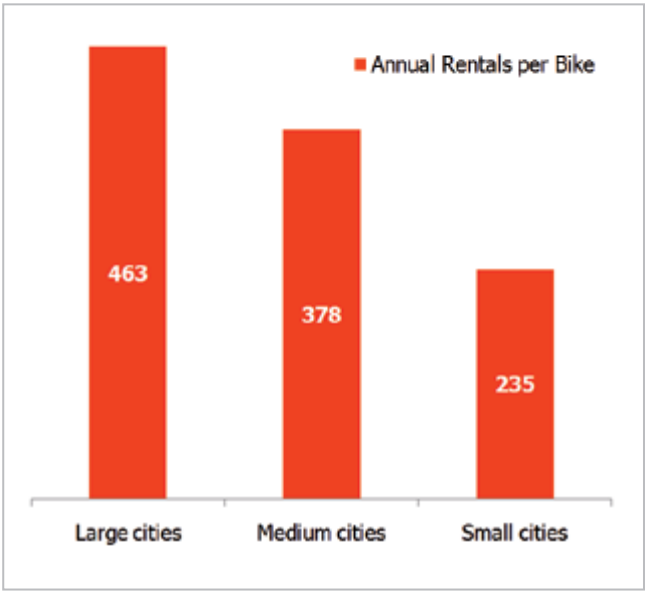

Figure 36: Average Annual Rentals per Bike by City Size (Large N=10, Medium N=9, Small N=4)

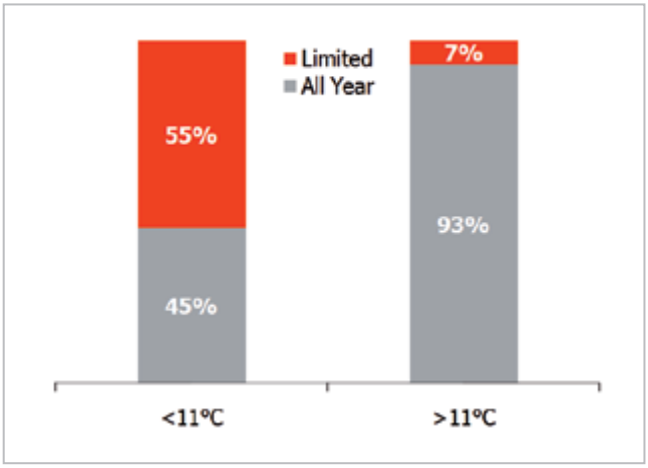

Figure 37: Availability through the Year by Average Yearly Temperature (<11 °C N=20, >11 °C N=14)

3.5.2 Climate

The local climate is an important influencing factor for cycle usage in different seasons. The OBIS sample shows different usage curves connected with the average temperature in the selected cities (Figure 38). During the cold season, the BSS demand is probably not only influenced by the weather itself but also by cycling infrastructure conditions (e.g. whether snow and ice have been cleared). The knowledge of those usage curves helps inform cost-orientated decisions about the seasonal availability of the system. In times of the year when usage is lower, the operator could limit availability of bikes or even close down the system for maintenance. More schemes in cold cities than in warm cities closed down during winter in the OBIS sample (Figure 37). At times of the year when demand is high, additional staff and maintenance activities might improve service quality.

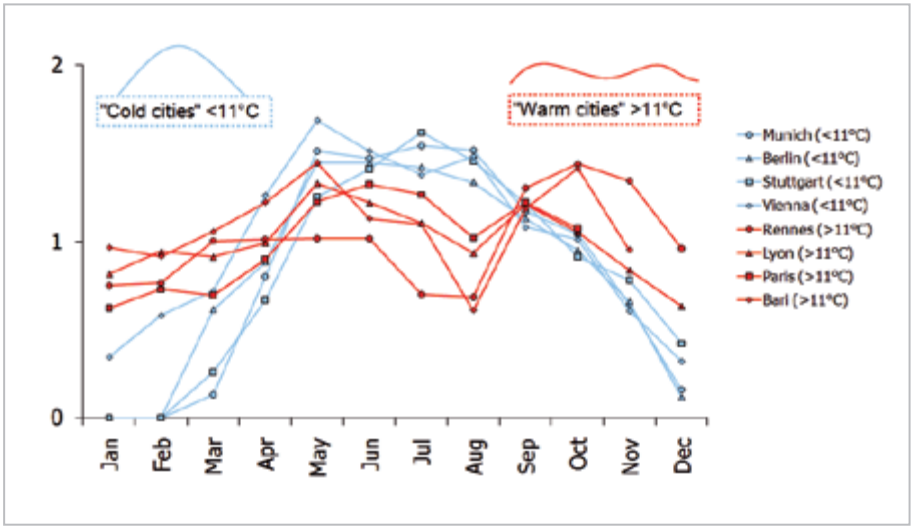

Figure 38: Monthly Rentals Divided by Average Monthly Rentals

[10] When measuring the impact of a BSS, the number of rentals per targeted people (e.g. population, tourists) is relevant. For a direct performance comparison, the number of rentals per bike has become a common criterion.

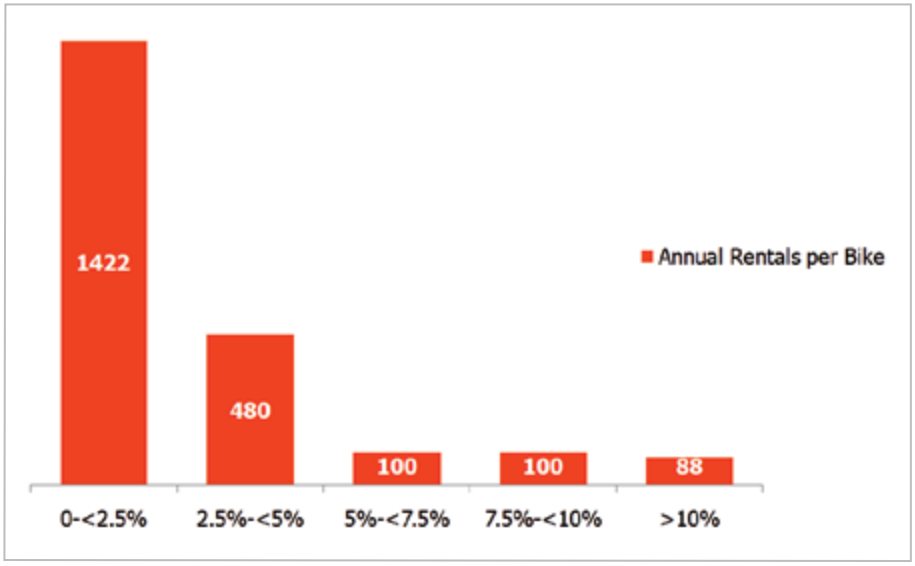

Figure 39: Average Annual Rentals per Bike per Cycling Modal Share Group (N=22)

3.5.3 Cycling Modal Share

The schemes of the OBIS sample were classified according to cycling modal share (Figure 39). In the OBIS sample the average rentals per bike were higher in cities with a low cycling modal share than in cities with a high cycling modal share.

3.5.4 Chapter Summary

The descriptive analysis of the OBIS BSSs reveals a few regular patterns, providing a snapshot of the current status of European bike sharing.

> The larger the city is, the more likely it is to have a high-tech system.
> The larger the city is, the more likely it is to have a BSS that operates 24 hours per day.
> In warmer countries, the BSS is more likely to operate 365 days a year.
> In cold cities, the peak in demand is in summer. Warm cities have two peaks in demand: one in spring and one in autumn.
> Small and medium cities offer longer periods free of charge.
> The number of bikes in the system depends on the size and expected demand in the area targeted. Automated schemes in large and medium cities provide more bikes per station and more docking points per bike than small cities.
> The larger the scheme/city, the higher the number of rentals per bike.

3.6 Success Factors for Bike Sharing Schemes

One aim of OBIS was to ascertain success factors for BSSs. In order to achieve that goal, success for BSSs is defined from different stakeholder's perspectives (*Chapter 3.6.1*). Subsequently central success indicators identified by OBIS are listed and described briefly (*Chapter 3.6.2*). The approach used within the project does not provide a benchmarking tool to determine economic success or success in terms of numbers but it does provide a methodology that helps to explain the complexity of measuring success for BSSs.

3.6.1 Definition of Success and Measurability

Definitions of success for bike sharing schemes are diverse. They depend on the point of view and on the stakeholder groups involved. The four main stakeholder groups identified are:

> Politicians and Planners;
> Operators;
> Users;
> Technology providers, which together with operators and decision-makers can improve accessibility, information and payment options as well as functioning of the bikes etc.

Among operators, several sub-categories were found, the most important being:

> Advertising companies, providers of street furniture or other public services;
> Publicly or privately owned transport companies;
> Bike sharing businesses;
> Municipal operators;
> Associations/cooperatives.

Different stakeholders have different understandings of success, and this has to be taken into consideration. Different notions of success are best measured by different indicators (Table 12).

Stakeholder group	Notions of success	Possible indicators	Positive if...
Politicians and Planners			
	Improve the 'city image'	Number of positive media articles	+
	Increase in cycling	Change in bike mode share (% points), % change in BSS rentals	+
	Reduce CO2 emissions	Number of car trips/ total trips replaced	+
	Manage (public) transport demand	Number of PT trips/ total trips replaced	+(if PT is crowded)
Operators			
Advertisement companies and other supply companies	Visibility	Number of BSS stations per km^2; number of daily BSS rents per day and night population; VAC (visibility-adjusted contacts)	+
	Contracts across jurisdictions	Number and share of contracts in the metropolitan area	+
	Low service and administration costs	Service and administration costs/bike	–
Transport companies	Usage	Number of daily BSS rentals	+
	Efficiency of investment	Number of daily BSS rentals/bike	+
Municipalities			
	See Politicians above, plus:		
	Public benefit	Time gain and financial gain of user per BSS rental	+
	No 'bad news'	Number of negative media articles, number of accidents/ thefts/cases of vandalism	–
Associations			
	Low investment costs	Annualised investment cost	–
	Low running costs	Running cost	–
Users			
	Accessibility	Density of stations, opening hours	+
	Reliability	Cases of full/empty stations	–
	Comfort & speed	Weight of the bike	–

Table 12: Notions of Success per Stakeholder Group

Survival of the scheme is the central indicator for success. The more indicators of success developing in a positive direction and the more the stakeholders are satisfied, the longer the system will survive. Determining exactly how to measure success depends on why you are measuring success. It is also important to define the stakeholder in question beforehand.

3.6.2 Survival of Bike Sharing Schemes

The most important aspects for the survival of BSSs can be summarised in seven categories:

1. Cycling infrastructure in the city;
2. User accessibility;
3. Safety;
4. Bike and station design;
5. Financing model (ownership and operation);
6. Integration with other modes of transport – technical and practical;
7. Redistribution traffic.

For each aspect a number of relevant indicators are listed. However, not all aspects have natural indicators, and some indicators are applicable to several aspects.

It is important to recognise that many of these indicators are ex post, (i.e. measurable only after the implementation of a BSS). Therefore, they can only be used as guidelines for cities planning to implement a BSS by comparison with similar cities that have already implemented one.

3.6.2.1 Cycling Infrastructure of the City

This category includes, for example, the existence and implementation of a cycling infrastructure plan for the city or region, one important element of which is the construction and maintenance of cycle lanes or paths, direction signs for longer cycle routes, different safety measures at places of interaction with cars (such as junctions) and pedestrians (such as zebra crossings and where cyclists pass bus stops), safe cycle parking places, especially at PT stations and bus stops, etc.

Indicators for cycling infrastructure are:

- In absolute terms:
  - Length of the cycle network in terms of cycle lanes or separated cycle paths;
  - Amounts invested by the municipality into cycling infrastructure: cycle paths and lanes, cycle parking, separated crossings, traffic lights, mobility centres etc.
- In relative terms:
  - Share of the cycle network in the total length of the road network;
  - Share of the investment amounts dedicated to cycling enhancing measures in total (municipal) traffic investments.

Traditionally, these numbers are rarely directly available, so the first step would be to collect this data in the municipalities.

3.6.2.2 User Accessibility

This aspect covers all measures taken to make the system easy to access, both in space and time. It covers the ease of the registration process to make it simple to use the first time; the density of stations, or in the case of systems without stations, density of bikes at demand nodes; the dynamic access to both functioning bikes at the stations, as well as empty slots at the destination; the rapid repair of malfunctioning stations and bikes; and the hourly and yearly opening times.

Many indicators could be connected to this aspect:

- Station-based systems: no. of slots/1,000 inhabitants;
- Systems without stations: no. of bikes/1,000 inhabitants;
- Station density (or bike density) in the effective area of the system/km$^{2;}$
- Average no. of slots/station;
- Opening hours per day/24;
- Opening days per year/365;
- Number of repairs per total rents (per time unit, e.g. year);
- Average and maximum repair service time;
- Reported number of missing bikes at a station, or parking failures (because of full station) at desired return station, as a percentage of total number of rents.

3.6.2.3 Safety

The BSS must be safe to use. In some cities, the BSS will increase the number of cycling trips significantly and thus the number of cycling-related accidents. In this context it is important to consider that relative figures (e.g. accidents per 1,000 trips) must be evaluated instead of absolute ones.

Much of this criterion also applies to the cycling infrastructure on the whole, but some aspects are scheme-specific, for example the location of the sta-

tions as well as the visibility and functioning of the bike sharing bikes (lights, brakes, parking etc.).

The location of the stations should be safe and not inconvenience other road and pavement users. It also must not interfere with other users of the public space, such as cleaning vehicles, snow clearing, disabled access and so on.

Indicators for safety are:

> Total cycle accidents per year/100,000 cycle trips;
> No. of death injuries/100,000 cycle trips.

3.6.2.4 Bike and Station Design

One important criterion of the bikes, and their locking into the docking stations, is that they should be robust enough to stop vandalism and theft. However, it is also important that this aspect does not make them too heavy or unmanageable. The bikes should also have a uniform and distinct appearance so that they are visible in the traffic, just like other PT modes, to strengthen the identity of the system and to improve safety. The robustness of bike sharing bikes easily makes them heavier and more difficult for users to ride stopping them from cycling as fast as other cyclists on their own high-speed bikes can.

Indicators for bike and station design are:

> Weight of the bike;
> Number of thefts per year/no. of slots/bikes;
> Number of severe damages to bikes or stations per year/total no. of slots/bikes/stations and development over years of operation.

3.6.2.5 Financing Model

Obviously the financing model is crucial for the sustainability of the BSS. Two aspects of the BSS are decisive for the financing model: the ambitions of the local government, and the size of the system relative to the city size.

Indicators for success in terms of financing are:

> Yearly total cost (annualised investment and operation) of the system/slot (station-based system) or bike (systems without stations);
> Daily no. of trips/slot (or bike if well-defined);
> Daily no. of trips as a share of total cycling;
> Cycling modal share in total daily no. of trips with at least one end of the trip in the effective bike sharing area, for:
  > Work trips;
  > Leisure trips;
  > Business trips;
> Cycling modal share in vehicle-km travelled.

Some of these are hard to measure, especially those which require travel surveys, normally not conducted every year because of the cost.

3.6.2.6 Transport System Integration and Information Technology

The integration of BSSs with other shared modes of transport (PT, car sharing, park-and-ride, ferries) in terms of registration, payment, common smart access cards etc. enhances the possibilities for the users to combine modes seamlessly and contributes to making their transport cheaper and more efficient. This is especially important in cities where there are not one but several PT providers, in which case their cooperation would need to be enlisted.

There are also important gains to be made with the new information and communication technologies: mobile mapping of the location of stations and availability of bikes, possible intermodal connections at PT stops, real-time travel time assessment with different modes and combinations of modes, new mobile phones that act as smart cards etc. For small scale systems, this line could be hard to pursue if the scheme is dependent on major investments; however, some of these small scale systems already rely on mobile technology.

Indicators for PT integration are:

> Maximum distance to nearest PT station or bus stop (over all bike sharing stations);
> Share of intermodal trips (e.g. PT + bike sharing) in bike sharing trips;
> Dummy indicator of technical integration, e.g. in the form of the same smart card;
> Dummy indicator of the existence of an integrated car sharing alternative in the same system.

3.6.2.7 Redistribution Traffic

In order to maintain the service level of the system and meet the local demand for bikes at the stations instantly, a constant redistribution of bikes from destination points to points of origin is needed. Normally, the origin and destination points shift roles throughout the day, when commuter flows change direction. In dedicated tourist systems this might work differently, but in these cases there are probably some or several points of interest that serve as destinations during the day, and shift to the origin in the afternoon.

This redistribution is a challenge both regarding capacity and environmental impact. In Barcelona, there are problems to overcome with the redistribution trucks in small passages, and the limit for the maximum number of users has actually already been reached. In other cities, there is an environmental concern, i.e. that the small benefit in climate change terms of making it easier for car users to switch to cycles is offset by the emissions from the redistribution trucks. One simple measure to reduce this offset is, of course, to use trucks powered by a more environmentally friendly fuel, such as biodiesel or biogas or electricity.

The redistribution trucks are not the only vehicles serving the system – there are also different types of service trucks and service cars, serving the stations, for example. Also in systems without stations there is necessary redistribution and service traffic.

Indicators for redistribution traffic are:

> Mileage of redistribution trucks and emission data of truck fleet; or
> Type of fuel and fuel consumption of the truck fleet.

3.6.3 Case Studies: Non-Survival of Bike Sharing Schemes

The OBIS analysis revealed reasons for closing BSSs as qualitative information. The data collection included three cities/regions with closed BSSs.

3.6.3.1 Brussels

In Brussels, the reasons for the failure were said to be an under-dimensioned system: too few stations and bikes, which means accessibility is insufficient

Figure 40: Cyclocity in Brussels (Photo: Creative Commons BY-NC 2.0 by Flickr-User Peter Forret)

Figure 41: LEIHRADL-nextbike (Photo: nextbike)

and the lack of a free rental period at the beginning of each ride. Another reason for the failure was presumably the weight of the bikes which were very heavy making them uncomfortable and difficult to use. The former system Cyclocity was replaced by the larger system Villo!

3.6.3.2 Austria

In Mödling, Austria, the tourist-oriented system FREIRADL closed due to low usage rates and probably insufficient finance. No user fees were charged, and an expensive manual operation was used. The awareness of the system was very low (although present in 65 towns) due to a sparse station network and stations that were hidden indoors. High bike ownership in the population was also identified as a reason for the failure. In April 2009, a new pilot scheme with stations in public spaces started: LEIHRADL-nextbike.

3.6.3.3 Rennes

Vélo à la Carte in Rennes was the oldest third generation system, provided by Clear Channel. It started in 1998 and the contract ended in 2009. Keolis – a French transport company – won the call for tenders for a new BSS. Rennes learnt from its first experience and from other cities systems: the new system, LE vélo STAR, is larger (900 bikes and 82 stations), the contract is separated from advertising, and the new system is better integrated with the PT system.

Figure 42: Velo á la Carte, the Former BSS, in Rennes (Photo: Ronan Mulet, Clear Channel)

In all these cases, new systems were set up which helped continuity so the idea of bike sharing wasn't lost, and neither was the political will. In this sense it is difficult to say that the systems were 'unsuccessful', the closures were mainly caused by institutional and physical design factors. These factors can always be improved upon; in the examples above, lessons were learnt, experience was built up, so that following systems could be improved.

3.6.4 Chapter Summary

The definition of success depends on the stakeholders involved. The survival of the scheme is taken as the overall goal of the BSS.

Key factors for survival:

> Basic cycling infrastructure and maintenance, e. g. snow clearance;
> Existing basic culture of urban cycling;
> Integral policies of cycling and sustainable mobility, and integration of BSSs in those policies;
> Accessible scheme with high bike and docking point availability, opening hours, seasonal availability;
> Usable, easy to understand, distinctive station and bike designs;
> Low theft and vandalism rate;
> Low total costs per bike/ride;
> Sustainable financing source;
> Combination and synergies with PT;
> Smooth and limited redistribution traffic.

Key factors for non-survival:

> Implemented without additional measures to promote cycling;
> Unsafe cycling conditions. No basic culture of urban cycling;
> High rate of cycle ownership;
> External conditions that make cycling difficult (topography, pedestrian dimension of the city);
> Spatial and other limitations of the BSS (time, spatial extent, zone, station density, unintuitive handling);
> Vulnerable to vandalism and theft;
> Too expensive for users;
> Not profitable for operators/no sustainable financing;
> Badly designed, clumsy bikes;
> Too much redistribution needed;
> Climate change benefits and credibility undermined by the use of non-sustainable truck fuel.

4. Guide and Recommendations

This part of the manual sums up the most important recommendations for stakeholders that are involved with BSSs at different stages of operation and/or experience. Since the evolutionary stages of BSSs are very different in Europe and throughout the systems that have been analysed during the OBIS project, this part of the manual is divided into three main parts: Planning – Implementation – Optimisation.

Whereas BSSs are well established in some countries and cities and therefore mainly need recommendations or ideas for improving and optimising the running systems, there are countries and cities that have not had any or only few experiences with sometimes very small scale BSSs. These different operational stages (Table 13) and levels of experience require specific recommendations. The structure of this chapter takes these differences into account.

4.1 Planning

The success of Vélib' in Paris attracted a lot of attention. BSSs had become 'chic' and were considered as a 'must have'; operators got countless requests from cities that also wanted to have a scheme in their city. However, the knowledge and expertise that is necessary in municipalities to introduce a BSS should not be underestimated. The more knowledge about BSSs that is gathered in municipalities during the planning phase, the better the (negotiating) position towards potential operators will be.

The planning phase builds the foundation for the success of a BSS. Objectives are set (see *4.1.2 Define Goals*), necessary knowledge about BSSs is gained (see *4.1.3 Get Information and Get Everyone on Board*) and a rough concept is developed (see *4.1.4 Get Ideas and Define a Rough Concept*). BSSs are a part of urban mobility and can have a considerable influence on the environment of a city. Political decision makers and municipal stakeholders of various departments and levels will get involved during the planning and implementation processes, so promoting the BSS among these stakeholders at an early stage of the planning process is highly recommended. Difficulties at a later stage will lead to delays, increasing costs and – in the worst case – to the failure of the system. If the objectives for the BSS in the municipality are set and a rough concept is developed, a call for tenders can be published (*see 4.1.5 Write a Tender*).

Planning	Implementation	Optimisation
Defining goals for urban mobility	Division of tasks: operator models	Steering demand
Defining goals for the BSS	Designing the operator contract	Enlarging the scheme
Getting information	Looking for funding sources	Optimise redistribution
Getting everyone on board		Finding new financing opportunities
Getting ideas		Developing new technologies
Defining a rough concept		Combining BSSs with other means of transport
Writing a tender		

Table 13: Evolutionary Phases of a BSS

Background: Modern Urban Mobility

The need for mobility is one of the most important drivers for the development of modern societies and urban development. Our cities and regions are modelled around increasing mobility needs. BSSs are a new mobility offer and transport option and are therefore connected to questions about urban and regional mobility. Municipalities and regions that consider the implementation of a BSS, should answer the following question at the very beginning of the planning phase: *What kind of mobility would we like to have?*

The data of the OBIS country reports (*see 3.5 Exogenous Factors*) shows, that the car is the dominant mode of transport in all European countries. This phenomenon of modern, individualised and wealthy societies brings with it the severe impact of motorised individual traffic: very high costs for transport infrastructure, congestion, noise, emissions, lack of public space, casualties and health problems and also climate change. Studies show that motorised individual transport produces high external diseconomies, particularly in big cities. Traffic problems are more extreme here but, on the plus side, the prospect of solving them are the best in big cities as well.

The need to define urban mobility strategies that reduce the negative impact of individualised car traffic has increasingly gained attention among various stakeholders in recent years. To address these questions and challenges, a green paper on urban mobility was published by the European Commission in 2007 (COM (2007) 551 final). National governments as well as regional and municipal stakeholders are working on strategies that lessen the negative impact of mobility demands.

Possible approaches for modern urban transport strategies can be found throughout the European Union: London and Stockholm have introduced congestion charges in the inner cities, several cities in Germany implemented environmental areas with restricted access for cars with high emissions. Extension of car traffic-free or restricted areas in city centres as well as parking demand management schemes are becoming widely accepted measures to regulate the limitations of public space. Eco-taxes are an efficient way to incorporate at least some of the arising external costs. Modern urban transport systems consist of powerful PT systems with flexible and easy intermodal interchanges between the different modes of transport. Flexible and attractive 'sharing' offers reduce the need for private cars. Global megatrends like 'Peak Oil' and climate change reinforce the need for a change in urban mobility that has already started in many places.

Figure 43: Using the BSS to Enjoy the Scenery in Stockholm (Photo: Tim Birkholz, choice)

4.1.1 Define Bike Sharing Schemes as a Catalyst of Change

Depending on the size of the scheme and the city, a BSS has the possibility to have an impact on urban mobility. Typically, in successful schemes like Stockholm and London, 5-8 % of the BSS-users say that they replace car trips. Setting the general goals regarding mobility issues has been identified as an important challenge for municipal stakeholders.

People's travelling habits are very fixed and not easy to change. Thus urban mobility strategies are usually developed on a long-term basis (e.g. year 2020 or 2025). If appropriate political support is there, BSSs can function as a catalyst for a change in individual mobility behaviour.

4.1.1.1 Establish a Cycling Master Plan

One significant piece of evidence of the current change in urban mobility is the (re)discovery of cycling as a very fast, flexible, healthy and cost efficient urban mode of transport. However, the level of cycling differs substantially between European countries and also within the countries – cycling modal shares between countries range between 1 % (Eastern and Southern Europe) and 27 % (Netherlands) and range up to almost 40 % in some Danish, Dutch, German and Swedish cities. These huge differences prove that there must be various parameters that have a significant influence on the individual choice of mode of transport. Within the last few years, national governments as well as regions and municipalities have developed and introduced cycling strategies (e.g. Netherlands 1990, Copenhagen 1995, Sweden 2000, Germany 2002, Berlin 2004, London 2004, Austria 2006, Barcelona 2006 or Hamburg 2008).

The implementation of a BSS is usually only one aspect of such a cycling master plan. Professional cycling strategies contain measures to improve cycling infrastructure and parking facilities, marketing and communication activities, educational programmes, mobility management programmes for companies, etc.

Investments in Cycling for Financial Reasons

Investing in cycling is relatively cheap compared to investments in other mobility measures like PT and car infrastructure. This has been one of the main reasons for Berlin to establish its cycling master plan in 2004. To date, this financial issue is one of the most important arguments for the city administration in debates about urban mobility. The results of cycling promotion in Berlin are worth highlighting: in 10 years, the cycling modal share in Berlin doubled to 13 %, reaching over 20 % in some inner cities districts. Nevertheless it should be recognised that cycling measures compete for funding with other measures in the mobility field.strategies that lessen the negative impact of mobility demands.

4.1.1.2 Invest in Cycling Infrastructure

It is highly recommended for cities to invest in cycling infrastructure to make cycling safer and more attractive. Investing in convenient cycling infrastructure (e.g. wide and safe cycle lanes) will increase the number of cyclists. Investing before the implementation of a BSS will most probably attract more users. In the case of Barcelona, the plans for extending the cycle lane network had to be accelerated: The BSS will most likely increase the demand for new cycling infrastructure. Customer surveys for LEIHRADL-nextbike in Austria revealed that one third of the customers considered the municipalities' cycling facilities to be inadequate. Public authorities should be aware of this concern and improve the quality of the facilities in order to attract BSS users and to encourage cycling.

4.1.2 Define Goals

A BSS can have various direct and indirect benefits, depending on the individual design of the scheme. Before a concept for a BSS is defined, it is necessary to know these implications in order to define individual goals for the scheme. Schemes in bigger municipalities often aim to have a visible impact on cycling and urban mobility. Possible implications of BSSs that can be defined as goals are listed below.

4.1.2.1 Cycling

BSSs with low entrance barriers in cities with low modal share (e.g. Paris, Barcelona, Lyon and London) are often used by citizens who have yet not recognised the bike as a daily mode of transport. Positive experiences with cycling are likely to enhance the cycling image and will contribute to a rising awareness of cycling as a comfortable, fast, flexible and healthy mode of transport. An increase of cycle trips can make cycling safer because other road users will be more aware of cyclists. Nevertheless a BSS is also likely to increase the number of inexperienced cyclists. Additional measures to make cycling safer are therefore recommended. Transport for London (TfL) launched a safety campaign for BSS users to improve their cycling skills and to increase the overall awareness of cycling safety issues. A BSS and cycle planning in general, will draw the attention to the fact that investing in cycling is a relatively cost efficient measure compared with investments in car and PT infrastructure; however, BSSs will compete with other cycling measures for the municipal budget.

4.1.2.2 Public Transport

BSSs are a flexible addition and complement to PT, but also an alternative: The BSS network can a) be implemented in areas were PT is not sufficiently available or b) be implemented in areas were PT is crowded. Thus BSSs are an option for PT operators to increase the attractiveness of their services with the more flexible, timetable independent and individual bike sharing offers. BSSs that are integrated into a PT system will make the whole system more flexible and thus more attractive

4.1.2.3 Labour

BSSs need staff, infrastructure and expert knowledge and offer new employment opportunities (see *4.1.4.3 Prepare a Mini Business Plan*). In a few cities, reducing unemployment is an important motive. In these cities, old bikes are renovated and set out for hire, creating job opportunities for e.g. unemployed people. The system is then mainly financed through national labour market programmes, so the municipal budget is not affected, but the total public budget is (e.g., Örebro, Chemnitz).

Local leisure oriented rental companies can benefit from the increased awareness of cycling, if a BSS is

only attractive for short-time usage or excludes tourists (like in Barcelona). An improvement of the overall cycling image can also lead to benefits for the local cycling industry. In particular, small specialist dealers benefit from an increasing interest in cycling.

4.1.2.4 Tourism

If BSSs are available for tourists to use, they can be a catalyst to explore the city by bike, but depending on the price structure, BSSs are also a competitor for traditional bike rental companies. In any case, tourists on bikes will experience the city in a sustainable way, saving money on transport that can instead be spent in local businesses.

4.1.2.5 Image

A BSS can contribute to the image of a sustainable and modern city, but this should not be the only motive. For big metropolises, such as Paris, Barcelona and recently London, the implementation of a BSS has been a major image factor in national and international contexts. The media coverage about implementing the schemes has raised a lot of awareness of the cities themselves, and the BSS topic and necessary changes in urban mobility in general.

4.1.2.6 Health

Cycling is a healthy means of transport. Numerous studies illustrate that modern societies suffer from the consequences of unhealthy lifestyles. Just 20 minutes of cycling per day has a noticeable, positive effect on health. The economic benefits can therefore outweigh the costs for a BSS by far. A study commissioned by the French Ministry of Sustainable Development revealed that in France positive additional benefits from cycling activity had a monetary value of € 4.8 billion in 2008 (with the highest figure related to health).

4.1.3 Get Information and Get Everyone on Board

Planning and implementing a BSS is a lengthy process which requires significant resources. Thus, getting information and advocating the BSS among municipal, political and other stakeholders at an early stage of the process is one of the most important tasks that must not be taken lightly. It is advisable to call BSS experts into these processes. A good way to involve local authorities, civil servants and user groups is to carry out a Bicycle Policy Audit (BYPAD) audit with the help of mobility experts.[11]

4.1.3.1 Activate Know-How and Capacities in the Municipality

The OBIS project has recognised that operators and municipalities have contradictory goals in some aspects of an operator contract for a BSS. In order to have a better negotiating position towards the operator, it is highly recommended to build up and concentrate practical and administrative skills within the municipality. A bike sharing 'task force' of practitioners and experts in the field of bike sharing (who are independent from any operator) help to discuss opportunities and limits of a BSS for the city/region. Consulting experts at an early stage of the process will most likely save costs and time in the long run, since many obstacles and problems can occur in the different evolutionary stages of a BSS.

4.1.3.2 Get the Support of the Politics

BSSs are dependent on political will to a large extent. Involving politicians from the governing parties as well as from the opposition makes political support more likely over several election periods. Political support at the highest level has been very important for the scheme in London, as the mayor, Boris Johnson (Figure 44, Figure 45), has championed the project among the boroughs, whose cooperation was essential for the scheme's implementation and success.

4.1.3.3 Set up a Committee with Municipal Stakeholders and Experts

It can be difficult to get different administrative levels to work together in a coherent way. In many cities (e.g. London, Stockholm, Vienna and German cities), building permissions are required for each of the docking stations. BSS stations that need construction work will compete with other interests for limited public space. In order to get building permissions, the comprehensive support from various municipal stakeholders is needed during the implementation process. In Berlin, the

[11] BYPAD Project (2003): BYPAD, an IEE European initiative, a participative audit process consisting of information gathering on the development in different areas of the local cycling policy (ranging from infrastructure, finances, coordination, user-needs, promotions and policy).

Figure 44: Mayor Boris Johnson Supports the London BSS (Photo: TfL)

Figure 45: Mayor Boris Johnson Supports the London BSS (Illustration: TfL)

operator DB Rent has deepened its cooperation with the city administration because of the ongoing change from a flexible to a station-based system.

Departments and experts in a Committee should come from planning, permission, budgeting, communication and operation departments. Involving these stakeholders at an early stage of the process will draw the attention to possible obstacles and difficulties before they occur. This will most probably increase the willingness to support the implementation process. External experts such as consultants, practitioners and/or researchers can assist in exploring the local opportunities and give an unbiased point of view.

4.1.3.4 Involve the Public Transport Operator

BSSs have the potential to make the whole PT system more attractive. If the operator of the PT system also has the opportunity to operate the BSS, this should be taken into consideration. Ensuring that the PT operator and the BSS operator cooperate is vital. However, some PT operators worry about: competition and loss of mode share to the BSS; future models where BSS operators receive funding from PT budgets; and daily conflicts, such as bikes in bus lanes. These problems would be minimised if the PT and the BSS have the same operator, the prime example being Transport for London. Therefore stakeholders, especially PT operators, have to be involved in committees and round tables that identify and resolve such conflicts.

In fact, integration of BSSs into the existing PT system is recommended. Discussions about the extent of such a cooperation or integration should start at an early stage. An integrated access for both systems is feasible, for example by the use of the same customer cards or electronic ticketing, even though implementation has proven difficult in some cases (e.g. Tczew, Czech Republic). Examples of successful cooperation between operators of BSSs and PT are Stockholm and Lyon.

4.1.4 Get Ideas and Define a Rough Concept

Depending on the individual goals, the designs of BSSs are quite different from each other. The institutional and physical design (see *3.4 Endogenous Factors (Policy Sensitive)*) should correspond to the individual goals set for the BSS beforehand. If commuters' daily routines are to be targeted, a different conception is needed from systems that mainly target tourists.

In order to get inspiration for an individual BSS, the Danish capital Copenhagen organised a BSS design competition. More than 100 entries delivered various concepts, ideas and innovative details[12].

[12] City of Copenhagen (2009)

4.1.4.1 Write a Feasibility Study for your Bike Sharing Scheme

Municipalities planning to implement a BSS should set the objectives beforehand and adapt goals to their individual framework. A professional feasibility study analysing other systems, cataloguing local conditions, drafting different scenarios and analysing future operational figures, should be the foundation of a later decision. It should not be over optimistic, but still optimistic enough to make all stakeholders believe in the idea that a BSS works in the respective city/region (A good example for a very detailed feasibility study is the one from London[13].).

Conduct Customer Surveys

A professional market analysis in the beginning of the planning phase is likely to deliver useful information about the potential of a BSS. It will be helpful to find out how many citizens may be willing to use a bike sharing system. An alternative is to poll the opinion in public media (newspapers, radio/television, internet blogs, etc.) Research into a population's mobility issues will reveal aspects of dissatisfaction and provide the benchmark for improvements. It will also reveal some useful hints for the potential of a BSS.

Become aware of the Exogenous Factors of your City

Exogenous factors of a city are not subject to change in the short term; for example the city population, average income, car ownership, bike ownership and mode share, cycling infrastructure, other PT etc. Additionally, and very importantly, the current policies and mobility planning also affect the overall propensity to cycle, and thus indirectly the propensity to use BSSs. The exogenous factors of the city have a great impact on both the willingness to have a BSS and the design of such a scheme. The density of domestic households and employers are decisive factors in the general transport demand in an area. The existing cycling infrastructure, general awareness of cyclists and the cycling experience of the population are also important factors for cycling overall and for the acceptability and success of a BSS in particular.

Topography and climate are significant for how and when people find it agreeable enough to use the cycling mode. The climate has an impact on cycling as well as BSS demand during the different seasons of the year and schemes in the north of Europe are more likely to close during the winter months (see *3.5 Exogenous Factors*).

Figure 46: Bike Sharing during Winter
(Photo: Creative Commons BY-NC-ND 2.0 by Flickr-User oriolsalvador)

Small Scale or Large Scale Systems

Large scale systems have significantly higher rentals per bike and are likely to have an influence on the populations' mobility patterns. Large scale schemes are also more costly in absolute terms. However, in larger systems, the average cost per trip is lower because of economies of scale and network economies. Small scale systems can be financially sustainable as long as their costs are small, the scale remains small and no large investments are required (for example no construction work for stations); examples of this kind of BSSs are Greenstreet in Gothenburg and Chemnitzer Stadtfahrrad. In Saragossa and Berlin, it has been decided to implement new schemes not all at once, but step by step. Both Paris and London have already expanded, or plan to do so, within a year after the initial implementation. In contrast, in Stockholm, a sluggish permission process has impeded the expansion – out of the initially planned 160 stations, only 80 stations are in place four years after the start.

High-Tech or Low-Tech Schemes

A huge variety of different BSS technologies exists. They all have their advantages and disadvantages and a comparison and 'pro-con' analysis is recommended. A correlation between high-tech systems (expensive) and higher rental numbers has been identified in the OBIS project. Easy, fast and auto-

[13] Dector-Vega, G.; Snead, C.; Phillips, A. (2008)

mated renting processes provided by modern technologies like customer or credit cards (and done at station terminals) have a high potential to be successful. There is also a trade-off between 'technology in the bikes' or 'technology in docking-station'. This decision has to be made depending on the goals and financial capacities of the stakeholders.

Station-Based or Flexible Scheme

Two 'ideologies' of BSSs exist: schemes that rely on a dense network of fixed stations and flexible schemes where it is possible to leave bikes at almost any place in a designated area. The flexible systems have mainly been operated by the German BSS operator DB Rent; however, this stakeholder is currently changing its strategy towards station-based systems (Stuttgart, Berlin, Hamburg, and Karlsruhe).

Depending on the chosen standard of technology, station-based systems are much more expensive because of the necessary groundwork. Thus, during the planning phase for Berlin's new station-based BSS (that will be implemented during 2011) an innovative development has been to develop racks made of concrete which reduces the amount of groundwork significantly (except for the terminals) (see *3.4.1 Physical Design*).

Compare Price Structures of Bike Sharing Schemes

The price structure of a scheme will influence the usage of a BSS. Depending on the goals of the individual city, an individual price structure should be chosen. The goal of a BSS can either be to attract customers for short term rentals or to target tourists for longer rentals. The price structure should be established according to the individual goal (see *3.4.1.2 Service Design*).

Redistribution of Bikes is Needed

Traffic and commuter flows in a BSS are asymmetric, and usually vary throughout the day. An active redistribution of bikes will therefore be necessary. Hilliness has been shown to have a significant impact on redistribution traffic, which tends to be directed uphill (since users naturally, by the law of the path of least resistance, tend to go downhill – the prime example here is Barcelona). Redistribution is a complex problem that will need a lot of study and optimising after the system has been implemented (see *4.3.3 Redistribution and Availability*).

Bike Sharing Schemes Might Need Financial Support

BSSs will most likely need financial support from the municipality or cross financing. Therefore, comparing the investments in BSSs with other possible measures to promote cycling is recommended. Different concepts and solutions to cross-finance a BSS exist (see *4.2.3 Funding Sources*).

Define Data Requirements to Optimise your Bike Sharing Scheme

Optimisation of service levels can only be addressed if data on usage and end-user satisfaction is collected and assessed. Customer surveys are a necessary tool to improve user processes and overall service quality. Since most of the useful and necessary data for optimisation will be under the control of the operator, it is recommended for municipalities to flag up the interest in this data and optimisation surveys well before the negotiation process has started.

4.1.4.2 Develop Standard Planning and Implementation Procedures and Foster Exchange of Knowledge between Cities

To save time and resources it seems to be useful to develop standard planning and implementation procedures and guidelines on a national or federal level. Public institutions are then in a position to include all stakeholders from the beginning of the project. They are aware of possible legislative barriers and how to avoid them. This is a task that should be initiated and coordinated at the national level, in order to advocate the exchange and standardisation of knowledge between different cities. In Germany, a first step towards this task has been a tender for expertise concerning legislative and financial issues in bike sharing. This tender was published by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). The expertise will provide general guidelines and advice in common BSS–related problems. Another best practice example is the Koordinationsstelle Bike Sharing in Switzerland, providing a platform funded by the federal/national government, allowing interested stakeholders to transfer available BSS knowledge.[14]

[14] Koordination bikesharing Schweiz (2011)

Mini Business Plan	
Staff for planning & implementation	- BSS experts - Financial and legal experts - Marketing and communication experts - Architects/urban planners for planning the system
Staff for operation	- Mechanics for repairing (possible subcontractor) - Drivers for redistributing (possible subcontractor) - Customer hotline
Costs	- Infrastructure & implementation costs (see Table 8) - Running costs (see Table 9)
Financing	- Schemes are often not self- sustainable - Different financing opportunities exists (see *4.2.3 Funding Sources*)
Hardware	- Bikes, docking points, station terminals - Trucks for bike redistribution (possible subcontractor) - Tools to repair the bikes (possible subcontractor) - Spare parts - Spare bikes
Software	- Back- end (see Table 4) - Front- end (see Table 4)
Marketing & Communication	- Writing a Marketing & communication concept - Designing advertising material - Keeping the website up to date - Organisation of (media) events - Ensure media presence
Integration with PT	- Integrating information systems - Integrating tariff systems - Signing in PT stations (e.g. Barcelona) - Usability with the same customer card or account (e.g. Stockholm)
Space	- Public space for stations/bikes - Workshop space for repairing and storing the bikes and trucks (possible subcontractor)

Table 14: Mini Business Plan

4.1.4.3 Prepare a Mini Business Plan

Many municipal stakeholders are not aware of the system components that are needed in the background to run a BSS. The following table gives a very brief overview of this (Table 14).

4.1.5 Write a Tender

Once all the figures have collected and all opinions have heard, there should be a clear and unanimous 'yes or no' decision within the municipality. The better relevant stakeholders are convinced, the less time and energy will get lost during the implementation phase. Depending on the designated BSS, the city starts out with a tender request where the prerequisites are stated. A budget for the planned BSS should be agreed within the municipality to assess funding opportunities and the likeliness of financial sustainability. The large scale systems, supported by the local government, have the largest opportunities to both design a trade-off between public and private involvement, and be sustainable in the long term, in a public private partnership (PPP). Different contract opportunities between a municipality and an operator exist (see *4.2.1 Division of Tasks*). PPPs can be designed in different ways, for example regarding who makes the investment, and who collects the revenues/stands the risk.

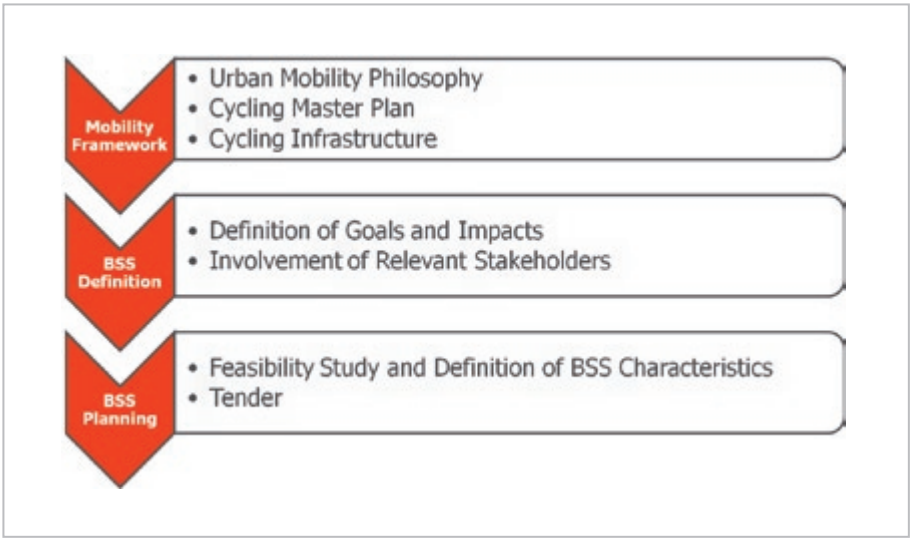

Figure 47: Planning Steps for a BSS

4.1.6 Chapter Summary

Planning a BSS (Figure 47) is more than defining the technical and organisation details. The process starts with developing a broad basis for cycling and clean urban mobility. Stakeholders should become aware of the goals for their BSS and define characteristics of the scheme to be able to put the plan into practice.

4.2 Implementation

4.2.1 Division of Tasks

The division of tasks between municipality and operator is the central decision in view of the call for tender and the operator contract. Contract models are diverse and consequently unique for each city or region. Nevertheless some general distinctions can be made (Table 15).

	Infrastructure	Operation
Option A1	Contractor	
Option A2	Contractor A	Contractor B
Option B	Contractor	Municipality
Option C	Municipality	Contractor

Table 15: Division of Tasks

4.2.1.1 Option A

The municipality concludes a contract with externals for the implementation of the BSS infrastructure as well as for the operation of the BSS. Normally one contractor is chosen for infrastructure and operation. In this case, the contractor is the owner of the infrastructure and bears the risk of operation. The municipality pays an amount per time unit (e.g. year). Complex contracts as part of other agreements such as advertising contracts can often not be assessed fully. The price of the service 'BSS' itself is not clearly stated. Therefore embedding BSS contracts in other agreements must be carefully considered.

Infrastructure implementation and operation can also be carried out by two or more separate contractors. In this case, the need for coordination among contractors might increase, but positive effects in terms of efficiency can occur if specialists in the field are chosen.

The duration of contracts should be geared to the lifespan of the infrastructure. Thus the contractor is able to depreciate infrastructure over the contract duration. Shorter contract durations increase the share of income needed for infrastructure refinancing.

Incentive Schemes

Usually the municipality is interested in achieving high BSS usage rates. This has to be considered when allocating incomes from user fees. An operator that cannot collect user fees might not have an incentive to maintain a high service level to ensure high usage rates.

The user fees coming from the Vélib' scheme in Paris are collected on behalf of the city. The operator JCDecaux can't gain additional amounts of coverage by increasing usage rates. This has been subject to later contract negotiations. Therefore other incentive schemes must be developed. The operator can be awarded with regular contributions and bonuses which depend on the usage level. Those bonuses must exceed the costs for improving the usage of the scheme.

4.2.1.2 Option B

The municipality contracts the implementation of the BSS infrastructure which is constantly maintained by the contractor. Up to the present this contractual model has not been of any relevance in the field of bike sharing.

E-bike Stations

In view of upcoming schemes which might include e-bikes (electric bikes), this option will gain importance. In the field of electric mobility energy suppliers implement charging infrastructure and provide them for the operators of fleets for a usage fee.

Figure 48: DB Rent E-Bike (Photo: DB Rent)

4.2.1.3 Option C

The infrastructure of the BSS is implemented and owned by the municipality. Operation is contracted to a third party. Thus operation contracts that are shorter than the infrastructure lifespan (see *4.2.1.1 Division of Tasks, Option A*) can be concluded. The municipality gains flexibility in terms of operation but is (at least financially) responsible for the costs of infrastructure maintenance. The operator must rely on a certain quality standard for the infrastructure provided to ensure operation. Infrastructure for the BSS Bicing in Barcelona was financed and implemented by the city (€ 15 million). As a result the scheme could be implemented faster than comparable schemes.

4.2.2 The Operator Contract

Conditional on the long contract duration and the complexity of tasks, operator contracts are broad and individual for each municipality. Additionally nondisclosure makes it difficult to consult existing contracts as examples and inspiration for new contracts. Depending on the allocation of tasks, various areas have to be covered. In accordance with EU Directives, tenders are usually necessary when awarding contracts for BSSs to third parties due to the dimension of contract orders. Thus the following explanations do also partly apply on a necessary tender framework. They can be used as an overview of the aspects which should be considered when issuing a call for tenders. Even if the municipality does carry out all tasks related to the BSS itself, the following contract contents for infrastructure and operation can be used as a reference point for the municipality's tasks.

Bike Sharing Schemes without Contracts (Germany)

Not all BSSs require a contract between the operator and the municipality. German BSSs were mainly introduced without contracts in recent years. DB Rent and nextbike operated at their own risk and provided the bikes in cities like Munich, Cologne, Berlin, Frankfurt and many others. Pricing structures differed from those in other countries – rentals were charged from the first minutes without any time span free of charge. Thus usage rates were substantially lower than in other countries. Nevertheless, the dedication of the operators contributed to rethinking within municipalities. Today there is a trend towards municipal contribution e.g. in Hamburg or the Ruhr-Region. First experiences show that usage rates and with that the effects of those BSSs are substantially better due to free rental periods at the beginning of each ride.

4.2.2.1 General Agreements

The contract duration depends on the allocation of tasks between municipality and contractor (see *4.2.1.1 Division of Tasks, Option A*). As a guide it can be said: if the contractor is responsible for the implementation and maintenance of the infrastructure, the contract duration should match the lifespan of the infrastructure. Contracts including operational tasks only can be shorter. The shorter the contract, the more flexibility the municipality has. If expectations concerning the BSS itself or the contractor are not met, adjustments can be made. On the other hand, short contracts require frequent tenders which also have cost implications. Options for termination of the contract should be included in the contract. The reasons for termination must be serious to ensure contract certainty for both parties.

Contracts should also include agreements concerning their prolongation if the goals set by the municipality are met with the scheme and the scheme is evaluated positively. Such agreements must be made in accordance with EU Directives concerning awarding of contracts.

4.2.2.2 Physical Design

Hardware and Technology

An overview of the general scheme configurations is shown in *Chapter 3.4.1.* Central specifications should be agreed in the contract with the operator. The main criteria for the technical and physical configuration of the scheme are:

> Usability;
> Easy maintenance;
> Costs over the lifespan of the scheme.

Access Technology

Most schemes in big cities provide access on the basis of cards (credit card, smartcards and PT cards) or similar devices.

Individual Access Devices

The offer of individual scheme access devices (cards, Radio Frequency Identification (RFID) tags) gives the operator additional advertising space on the device itself. The use of cards (e.g. credit cards) which the user already owns saves costs involved in the production and shipping of scheme cards or scheme devices. Operators can charge for issuing access devices to cover the costs for production and shipping e.g. Barclays Cycle Hire charges £ 3 per RFID key. This is in line with the charge for the London PT card.

Fewer schemes offer telephone-based access and some smaller schemes offer mechanic key-based access. Advantages of telephone-based rental are savings for rental infrastructure and the user's natural familiarity with their handset.

The contract with the operator should define in detail which means of access are provided and which interfaces and standards are necessary to ensure compatibility with other devices (such as future electronic PT tickets).

Bikes

The bikes of a BSS are one hygiene factor within a BSS. They determine user satisfaction and visibility of the scheme as well as a good share of maintenance costs for the system. As most BSSs offer only one type of bike, they should be well designed to fit the needs of as many potential customers as possible.

The operator contract should include agreements concerning bike design and technology. The bikes do have to be designed according to the local legal safety framework. They must, for example, include brakes and lights. Maximum weight, size, gear shift and additional equipment such as baskets can be agreed in the contract.

The lifespan, quality and costs of the bikes as well as maintenance costs have to be considered when wanting to choose one or another type of bike. Big operators usually use one type of bike at all of their sites to realise economies of scale. Most of the BSSs tend to have bikes with up to three gears and without suspension; only some offer up to seven gears and suspension. However, experience shows that many operators of BSSs with a high number of bikes and a high usage rate per day/bike tend to choose less costly bikes for their systems at the beginning. As a result, broken frames or handle bars occurred; in some BSSs, most of the bikes had to be replaced. At the end of the day, the choice of bikes and parts is a trade-off between purchase costs and maintenance costs over the lifespan of the bikes. Bikes of better quality and with easy maintenance processes might be more expensive at the beginning, but their longer lifespan will pay off in the long term.

Stations

Most BSSs are station-based. Using stations in a system offers various advantages: the system becomes more visible in public space, rental is easy and perceived availability is higher compared with systems without stations. The contract with the operator should include details for the design and technology used in the stations (Table 16).

Small schemes often offer low-tech stations which mostly need no elaborate groundwork, cabling and communication technology access. Thus they

are cheap to install but provide no monitoring opportunities. That said, the share of implementation costs can be reduced, while running costs tend to be higher due to limited monitoring opportunities.

Large schemes incorporate high-tech stations including terminals, docking points, electrification and data connections. Groundwork is often necessary and causes a considerable share of the implementation costs. The availability of electricity and data connections is an important station location factor due to considerable costs for cabling. Data connections allow detailed monitoring of the system by the operator and real time information about the scheme for the user.

Alternative Energy and Data Supply

Operators work on simplification of station implementation. Promising alternatives for necessary cablings are the use of solar panels for electricity supply and wireless local area network (WLAN) technology for data access. WLAN-technology can also be used to replace station hardware (see *4.3.5 New Technologies)*. The user finds a fixed spot where bikes can be rented, central monitoring is possible but installation costs are substantially lower if no physical docking points and/or no physical terminal are installed. The bike itself then includes a device which identifies it at the terminal or another device. However, wireless technology on stations is a 'high-tech' component that could be a sensitive and error-prone spot.

Figure 49: New Solar Terminal and New Docking Points for Berlin (Graphic: neo systems)

Station Configuration	
Terminal - Screen - Card reader/other reader - Printer - Keyboard	No/yes
Information - Rental Information - Registration - Station Information	Static/dynamic
Docking Points - Mechanical docking points - Electronic docking points	No/yes
Electrification	No/cable/other
Data connection	No/cable/other

Table 16: Station Configuration

Bike Locks

Bikes in schemes with high-tech physical stations are usually locked at the docking stations. In many of those BSSs, a lock is not available on the bike itself. If station density is high and short-term rental is encouraged, locks do not necessarily have to be provided on the bike. Providing locks on bikes may also increase the opportunity for theft as bike locks provided are generally not as secure as docking stations. This is one of the reasons why the newly implemented scheme in London is not providing bike locks. Early data indicates this has been successful with a low level of bike theft.

However, often locks are provided to give users the opportunity to lock the bike during the rental. BSSs without physical stations (e.g. Call a Bike and nextbike) or with stations which provide no mechanic or electronic devices (e.g. C´entro in bici) to lock the bike require bikes equipped with locks.

Software

The software used is determined by the incorporated station and bike technology. It facilitates user processes at the frontend and operation at the backend.

High-tech stations allow the operator to implement software that covers real-time customer and infrastructure management. The requirements for the software and its interfaces can be defined in the

operator contract. Appropriate software sets the stage for easy rental, defect management, real-time information for customers and operators, as well as redistribution management and performance control.

Purchasing Software

The software for a BSS usually comes from the operator or is programmed for the respective site. By now there are also options to purchase standardised BSS software (e.g. Spark) on a license basis which is hosted and managed on central servers by the software provider. The software allows the integration of several locking and station technologies and provides a browser-based front end and back-end system. This can be an alternative for small and medium-sized BSSs.

Design and Cityscape

The design of the stations is a trade-off between visibility and inconspicuousness.

Terminals give the opportunity to make the stations visible by using the corporate design of the scheme or existing designs or logos of the city or a local PT operator. They also offer space for additional advertising or information.

Implementing a number of stations in a city influences the city scape. Thus the design should fit with existing structures and street furniture.

Figure 50: BikeMi-Station in Milan (Photo: BikeMi)

Figure 51: Vélib´-Station in Paris (Photo: JCDecaux)

Experiences from London (Barclays Cycle Hire)

'It has been very important to design a scheme which is distinctive and recognizable, yet fits into the varied urban setting around the city, particularly in conservation areas. Moreover, reducing street clutter as far as possible has been a key priority, so the terminal design incorporates parking signage where this is necessary and also serves a dual purpose by providing two faces for Legible London mapping, the pedestrian way finding system that is being rolled out in central London.'[15]

Multifunction Terminals

Modern BSS terminals come with many technical opportunities for additional uses. Like PT ticket vending machines, additional products could be offered. BVG and S-Bahn vending machines in Berlin do not only sell tickets for PT but also provide the opportunity to buy concert tickets or charge prepaid mobile phones. BSS terminals could offer parking tickets or PT tickets.

[15] TfL.

4.2.2.3 Service Design

Scheme Size and Density

The definition of the scheme scale is a central agreement between municipality and contractor. It comprises the number of bikes, the number of stations (if needed), the number of docking points and specifications for station sizes.

The number of stations depends on the area to be covered. Large-scale systems such as Bicing in Barcelona, Barclays Cycle Hire in London or Vélib' in Paris offer stations which are usually not more than 300 meters apart from each other - a relatively comfortable walking distance. Larger distances are assumed to deter users from utilising BSSs for daily mobility routines.

Non-Linear Network Effect

In systems like BSSs, network externalities are important. This means that for each new station added, the utility for users increases not only by one, but by the number of previously implemented stations, since this is the number of new origin-destination pairs provided. Each newly added station therefore lowers the average cost of all the previous stations, and the average cost of each rent/trip. It is therefore not economical to implement systems on a too small scale: the average cost of the stations will be high, and the user availability will be limited.

Analysis in Barcelona showed that BSSs in big cities (> 0.5 M) should at least have 500 bikes. Smaller schemes cannot cover areas large enough to serve the users' daily mobility needs.

Experiences from Lower Austria (Freiradl)

One important reason for the low usage of Freiradl was that each town had very few stations, and moreover that they were located in indoor depots of official buildings.

Dense cities require an appropriate size of stations to match the expected demand. This avoids user frustration caused by full or empty stations. In the OBIS sample some large cities such as Paris and Vienna offer around 20 docking points per average BSS station. Medium cities such as Bari, Montpellier or Parma seem to be able to cope with less than 20 docking points per average station. Small cities like Terlizzi (Italy) or Farnborough (UK) had less than 10 docking points per average stations. This is no guarantee of the success of those schemes, but generally large stations are better than small ones especially in big cities. However, in some locations, notably outside underground or railway stations, the demand will always exceed the size of a BSS station – this is, for example, the case at London's biggest BSS station with 126 docking points at Waterloo station.

The bike-docking-point ratio for large schemes in the OBIS sample was between 1.5 and 2.3 docking points per bike in average. Those values are a good orientation for the necessary ratio. The fewer docking points per bike, the greater the danger of full stations. The more docking points, the more space is needed for the stations without having an appropriate number of bikes.

The number of bikes needed in the scheme can be derived from the number of stations necessary for the area to be covered and the number of docking points at each station.

Besides the definition of the scheme scale itself, the contract should include agreements concerning adaptations e.g. enlargement of the scheme.

Station Planning

Prior to closing the contract it can be useful to define station locations. A detailed municipal plan should include size of available spaces, traffic and safety aspects, expected demand, monument conservation, ownership structure and relevant surface and cabling conditions. It is useful to develop standard procedures for official approval before the implementation of the BSS. With the help of those procedures, the operator will be able to implement the stations faster.

Experiences from London (Barclays Cycle Hire)

'Identifying the sites for the docking stations has been a complex process in a city with little available space within the centre. Early on the decision was taken to occupy on-street-parking spaces where necessary, as it would not be possible to place all the stations on footways, particularly in areas where the footpaths are either too narrow, or extremely busy with pedestrians. Trees and underground utilities have also complicated the identification and construction process as they limit the area suitable for excavation.'[16]

[16] TfL.

Figure 52: Barclays Cycle Hire Groundwork 1 (Photos: TfL)

Figure 53: Barclays Cycle Hire Groundwork 2 (Photos: TfL)

Experiences from Barcelona (Bicing)

To address the bike redistribution problem, a protocol has been defined to ensure conditions of access to the bike stations for the redistribution vans. This work was not sufficiently anticipated when the stations were being implemented.

Experiences from Lower Austria (LEIHRADL-nextbike)

Customer surveys revealed that the new system LEIHRADL-nextbike which was implemented after closing Freiradl achieved greater public awareness than the old scheme. Visible stations placed outdoors were a factor contributing to this.

The allocation of stations within the city differs depending on the goals of the BSS (see *4.1.1 Define Bike Sharing Schemes as a Catalyst of Change*). If the BSS is supposed to cover daily mobility routines of the city, it should cover residential areas, commercial areas, shopping areas, points of interest, educational institutions and other common destinations. BSSs can also act as supplement or replacement for PT depending on the local conditions. Early municipal planning shortens approval processes and allows a faster implementation of the actual scheme by the operator.

Result from a Survey in Stockholm 2008/2009 (Stockholm City Bikes)

Having access to a bike sharing station close to home and having access to a station close to work (or school) are strong explanatory variables for frequent usage.

Service Availability

The operator contract must include agreements concerning the daily and seasonal availability of the scheme.

Most schemes in big cities offer their service 24h a day. Smaller schemes partly close their BSS during the night. On the one hand, this might avoid vandalism problems; however, on the other hand the user does not have the opportunity to use the bikes at the times when they are invaluable as they close the 'mobility gaps' that occur when PT shuts down during the night. Systems with 24/7 service show that there is a considerable mobility demand during the night.

The city of Milan is a good example of this where the local BSS stops working at midnight. Following a survey conducted in summer 2010, most of the users asked for the service to operate after midnight and Clear Channel is planning to meet their requests.

The seasonal availability depends mainly on the climate in the respective site. While schemes suffer from a low demand during winter (and thus often close the service) in many cold cities, demand is lower in summer in hot cities (e.g. Barcelona). In view of peaks in demand the operator should be aware of seasonal demand variations. Phases of low demand can be used to overhaul bikes and stations.

Registration and Charges

As the user takes possession of the bike in a BSS, a registration is usually needed to identify the user. Registration can be provided directly in advance of a rental at the station, on the website of the scheme, via telephone or by post. The operator contract should define different ways of registration considering the local conditions.

Registration by Post

As smaller Italian cities often do not have full internet coverage, operators offer registration by post as an alternative.

Registration must be fast and convenient including only information that is necessary for the operator-customer relationship.

The costs for registration are usually substantially lower than for PT. Yearly tickets cost between € 30 - € 50 in most schemes. Many schemes (e.g. Saragossa, Spain, Montpellier; France; Rome, Italy; Krakow, Poland) block a deposit from the customer's credit card – at least for short-term registrations. This does stop potential customers without a credit card or without sufficient account coverage from using the bikes. On the other hand, it prevents theft and vandalism.

The charges for the usage depend on the goals of the BSS. If the scheme aspires to a high usage rate, a certain time span free of charge at the beginning of each ride pushes up demand. Many schemes offer 30 minutes of each ride free of charge with a progressive increase in charges after

the free rental time. The free rental period corresponds more or less to the average cycle ride and most users end the rental before the end of that period. Thus the operator cannot expect major income from usage charges.

Daily maximum charges occasionally apply to schemes that are not focussed on very short rentals. Charges on the level of traditional bike rental attract tourists and leisure time users. This does also pose the risk of conflicts between traditional bike rental companies and the BSS operator.

The charging model should be agreed in the operator contract to support the municipality's goals.

Service Scape

The operator contract defines the elements of the service scape and its functions. Some elements can be considered quasi standard such as:

> Terminal Interface (if Terminal is available);
> Website;
> Hotline.

Others are optional:

> Points of Sale;
> Mobile Applications.

Element	Function	Service Design
Terminal interface	- Rental - Registration - Station information - Scheme information - Customer account information - Announce defects	- Front- end design - Language requirements - Account & payment security - Usability (Consideration of screen size, menus etc)
Website	- Registration - Station information - Scheme information - Customer account information - Contact	- Front- end design - Language requirements - Account security
Hotline	- (Rental) - Registration - Station information - Scheme information - Customer account information - Trouble- Shooting/Announce defects	- Voice- computer design - Availability (24//or limited) - Language requirements - Costs
Point of sale	- Registration - Station information - Scheme information - Customer account information - Contact	- Locations - Availability/opening hours
Mobile applications	- Rental - Registration - Station information - Scheme information - Customer account information - Announce defects	- Front- end design - Language requirements - Account & payment security - Usability (Consideration of - screen size, menus etc) - Availability & price

Table 17: Service Scape Elements

Platforms for Smaller Schemes (Czech Republic)

Smaller schemes can improve their visibility by using a joint internet platform. This reduces costs for the individual location and makes booking and gaining information easier for the user. The Czech Railways offer such a platform for 14 hire locations in Southern Bohemia.[17]

Bike Sharing Apps

Applications for mobile handsets (esp. Apps for iPhones) have become a useful addition to conventional service offers. They provide all the useful functions and information that are usually found at the Terminals or on the Internet. They are easy to develop and distribute on popular application platforms. Bike sharing as a modern means of transport benefits from the image of the applications and the presence of applications in the application stores increases the high profile of the schemes.

Applications can be found for many BSSs such as Bicing (iBicing), Call a Bike, Vélib' (Figure 54), Citybike Vienna, Stockholm City Bike or Vélo Bleu though not all of them are developed by the operator but by third parties.

[17] České dráhy (2011)

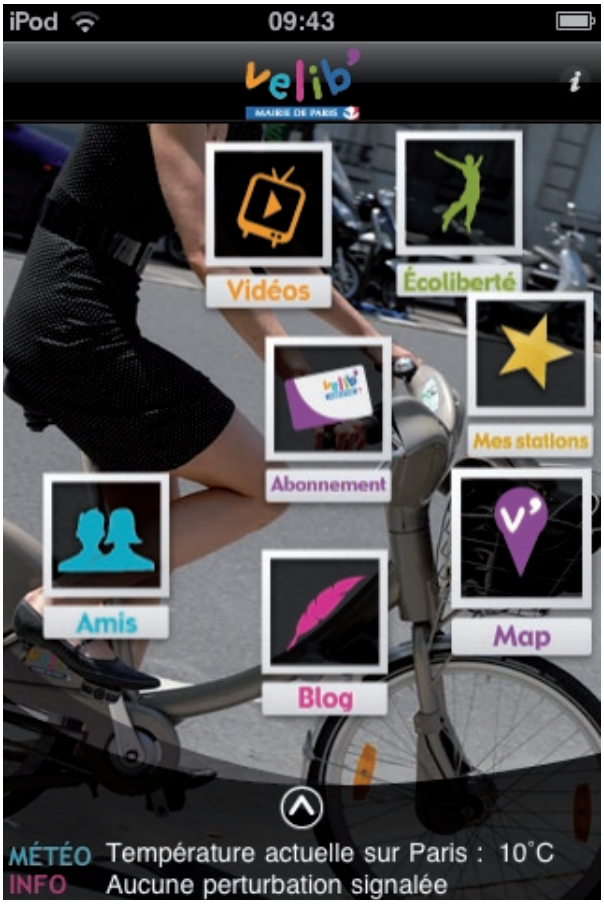

Figure 54: Vélib' App (App by: 770 PROD)

Public Transport Integration

Several customer surveys (e.g. Call a Bike, City Bike Stockholm, Vélib') have shown that bike sharing is often combined with PT. Therefore the combination of bike sharing and PT is obvious. The operator contract can contain agreements for different levels of PT integration (see *3.4.1.2 Service Design*). Integration is realised on three levels: the integration of information; the physical integration; and in terms of technological access and charges. The BSS can be integrated in existing information systems (city maps, PT maps, PT routing and pricing information see Figure 55), BSS stations can be erected near PT stations and the BSS and PT can be used with one single ticket. Some BSSs in the

Figure 55: Signing to Bicing-Stations in Barcelona's Subway (Photo: Barcelona Municipality)

Figure 56: The PT Card in Stockholm (SL-card) (Photo: Fredrik Johansson)

OBIS sample do offer a (partly) integrated tariff for the BSS and PT (e.g. Stockholm see Figure 56, Sweden; Cuneo, Bolzano Italy; Chalon-sur-Saône, Montpellier, Paris, Rennes, France; Terrassa, Spain; Leipzig, Germany). In those schemes the BSS can be used either within the PT tariff or PT users get discounts when using the BSS.

Even though the combination of BSSs and PT is a promising approach, there are several difficulties that have to be addressed when agreeing the operator contract. The PT operator is often not involved in the contract and is therefore not necessarily bound to the agreement between municipality and BSS operator.

Difficulties in terms of physical integration mostly occur when stations need to be erected on property around PT stations. Space is rarely available especially in crowded inner cities. Additionally PT operators struggle with the need to provide cycle parking for private bikes. Thus the process of authorisation by the PT operator can take a considerable time. Wherever BSS stations are erected close to busy PT stations, additional operational problems for the BSS operator occur. There is often a lot of redistribution traffic needed to ensure the agreed service level.

When it comes to tariff integration and the use of a combined ticket, PT operators and BSS operators quickly reach their limits in negotiation. A combined fare implies that turnover has to be shared, a combined ticket (e.g. card) implies that costs occur for both parties. It might be easier to integrate an existing electronic PT ticket into the BSS than implementing a completely new one. Even in those cases, problems might occur in terms of customer data management. Customer relationships are a valuable asset for BSS operators and PT operators. Therefore the question of data ownership for issued PT tickets is a potential trouble spot.

Municipalities can foster the integration by including certain technical and organisational criteria and standards to public tenders (e.g. for PT operators, BSSs)

Marketing and Target Groups

The focus on one or more target groups should be derived from the municipal goals for the BSS. Even though operator contracts rarely include target group definitions, they can still include measures that attract certain target groups.

Target Groups and Operation

Most BSSs focus on multiple target groups. This helps reduce imbalances of the scheme. Different target groups have different mobility patterns and thus utilise the scheme differently. While commuters use the bikes in the morning to ride from the train station to their office in the inner city, tourists use the bikes during the day. During the night bikes are taken from the inner city to the next station by leisure users. Focussing on one target group only would cause unidirectional bike movements which have to be balanced by the operator.

Target Groups and Tariff Structure

The tariff structure and the network design mainly contribute to the attraction of certain target groups. Periods free of charge and yearly registrations attract commuters and everyday users, while short-term registrations attract tourists. To avoid conflicts with local bike rental companies, the city might offer the service only for residents (e.g. Barcelona).

Target Groups and Network Design

The network also contributes to target group attraction. Commuters need stations at PT stations and a high availability level. Problems occur when no empty docking stations or bikes are available. Therefore the city might decide that busy train stations are not included in the service. Tourists need stations near the city's sights to use the scheme for their needs. They are fairly tolerant when it comes to unavailable bikes or docking points. An additional time span free of charge (e.g. 15 min) in case of full stations can help to reduce customer frustration. Residents and leisure users need connections between residential areas and the city centres to include the bikes in their daily routines.

Market the Scheme

BSSs have become a modern mode of urban mobility. Thus communication and marketing can utilise this modern image. The launch of a scheme should be accompanied by a professional media campaign in the city. To strengthen the connection with the city image, the BSS can incorporate available city

designs. StadtRAD Hamburg by DB Rent is a good example for a BSS with a city design (Figure 57). It bears the name of the city, the infrastructure has the colours and logo of the city and marketing campaigns are carried out in cooperation with the city.

Figure 57: Station and Terminal in Hamburg (Photo: Benjamin Dally)

Combination of awareness raising measures

BSSs are particularly suitable as part of combined communication measures. Cycling measures such as car-free weekends or 'Critical Mass' can be used to market the BSS. Additionally, a combination of BSS communication measures and cycling safety measures can increase both: the overall awareness of cycling safety issues and the improvement of safety when using the BSS:

Additionally certain target groups can be attracted by marketing measures:

> Commuters: Information and visible (sponsored) stations at workplaces, information on trains and buses;
> Tourists: Information at tourist information centres in the city or on the internet, combination with tourist tickets;
> Students: information with university inscription documents, integration with student ticket;
> Leisure users: Postcards in restaurants and clubs, promotion activities, incorporation of local blogs.

Figure 58: Facebook-Sites of Vélib´ (Screenshot)

Figure 59: Facebook-Site of Vélo´V (Screenshot)

Figure 60: Starter-Kit in London (Photo: Kaya Toyoshima)

Operation and Performance Levels

The municipality should define certain performance standards to benchmark the services of the operator. When defining goals for the BSS, the municipality must define measurements at the same time. To be in a position to monitor the scheme appropriately, the municipality should agree on data provision standards with the operator. In order to receive regular key figures, the municipality can commit the operator to deliver regular reports e.g.:

> Usage data: number of rentals, number of customers, tickets purchased;
> Performance data: down times, defects, average availability of bikes/stations, redistribution tours;
> Customer satisfaction: number of inquiries, troubles, survey data.

With the help of such regular reports, the municipality can compare the actual performance level to agreed standards. The operator contract should include minimum standards for an acceptable service level e.g.:

> Minimum usage level;
> Maximum down time, defects;
> Minimum availability at respective stations: maximum time for full station and empty station;
> Minimum number of bikes in service;
> Minimum number of staff involved;
> Minimum availability of customer contact; points (website, hotline and point of sale).

If the agreed performance levels are not met, the operator can be committed to paying a fine. If the indicators are exceeded, the operator can be rewarded with a bonus payment. In all cases, the operator should get an advantage from meeting the performance levels.

Effects of Performance Levels

Whenever introducing fines or bonus payments, the municipality has to be careful about the effects of hitting or missing a performance indicator e.g.: if the BSS is completely free, the number of rides might be exceeded but no income from charges can be gained. If the municipality gains the income from the scheme, the operator might not be interested in the level of income from user charges. An additional problem could be a standard level which cannot be reached by the operator or fines that are too low to incentivise the operator to maintain the service level.

Additionally, the municipality can contribute to compliance of local standards in terms of environment or labour. The tender for the London scheme included payment standards for labour (Living Wage). The Living Wage is higher than the legal minimum wage, but the city made it a standard for the BSS. Environmental standards for redistribution vehicles (e.g. tender in Gothenburg) contribute to municipalities' efforts to fund sustainable services.

4.2.2.4 Payment

Paying the operator appropriately for the service is one of the most challenging tasks for the municipality. Two questions arise for the municipality:

1. Why are additional payments necessary?
2. How can the amount of necessary payments be calculated?

BSSs are similar to PT when it comes to costs coverage. To ensure a high frequency usage, prices must be relatively low compared with other means of transport. Thus most schemes offer a fixed subscription price and a certain period of time free of charge for each ride. Operational income is thus gained mainly with subscription fees. Those fees do not cover the costs of the BSS in most cases. Additional funding must be found to ensure a sustainable operation. Some operators use the stations and the bikes for additional advertising income (e.g. nextbike). Other schemes find sponsors (e.g. Barclays Cycle Hire) for additional funding. Differences between those two models are minor. The consequence of both is advertising on the infrastructure for a corresponding payment. Whenever the operator has permission for additional advertising at the stations or on the bikes, it has to be clarified whether those agreements conflict with local advertising contracts. Additionally bike sharing stations are not always located in a way that makes them attractive for advertising. In Stockholm, this problem has been solved by a case-by-case permission for a separate implementation of BSS station and advertising panel.

In large schemes even those two funding sources might not be enough. If additional funding is needed, the municipality must calculate the amount of additional

Figure 61: Need for Additional Funding

funding which is necessary (Figure 61). The total scheme costs minus operational income show the actual need for additional funding. However, if the operator draws a veil over costs or incomes, the additional funding need communicated includes a 'delta' (an unknown or unspecified amount) which represents the additional margin for the operator. The municipality should try to minimise this 'delta'. Thus a good knowledge of the scheme costs and incomes is helpful.

The operator can be awarded with additional funding as a fixed amount per time period (e.g. year) or depend on the performance of the scheme. The latter is more likely to be useful in increasing the usage of the scheme because a fixed payment does not provide any incentive for performance optimisation (see *3.4.1.2 Service Design*).

4.2.3 Funding Sources

Many large BSSs, such as schemes in Paris or Rennes, were implemented in the framework of advertising contracts. BSSs were implemented as a 'side effect' while advertising space in the city was the main concern. BSSs were implemented in the city without additional costs for the municipality and thus the false impression of schemes without the need for additional funding did arise. In fact, the schemes are financed by lost gains for advertising space. Cities trade advertising rights for BSSs instead of marketing advertising space and contracting BSSs separately. It can be assumed that combined contracts (e.g. BSSs and advertising) are less cost efficient than separate contracts.

A prominent example for an alternative funding option is Barcelona where the city gains money from parking management which is (partly) dedicated to the scheme. This allows the city to optimise both deals independently without losses of efficiency by risk combination.

Some countries offer national or regional funding for the implementation costs of the schemes. It should be noted that an isolated examination of initial funding harbours the danger of an unsustainable scheme. If additional funding sources for (parts of) the running costs are not considered, the scheme might have to stop operation shortly after the launch.

Long-Term Commitment

No matter what the source of additional public funding is, it must be embedded in a long-term commitment to the scheme. Changing travel habits is a slow process and thus it takes time for citizens to integrate the scheme in daily mobility routines. Constant monitoring and measurement, long-term financing commitment as well as the integration of the BSS into a broad cycling policy is essential for the success of BSSs.

4.2.4 Chapter Summary

The operator contract should reflect and support the aims and goals of the municipality for a BSS. Thus the decision for operator constellations and contract contents is essential for the implementation and success of a BSS (Figure 62).

Figure 62: BSS Contracts and Implementation

4.3 Optimisation

One of the main drivers of the OBIS project was the search for concepts that make BSSs not only good but even better. Thus the project included pilot schemes and proof of concepts. Those ideas and projects covered single aspects of BSSs as well as the improvement of a whole scheme. The main goals of all concepts were the simplification of implementation and the creation of a sustainable foundation in terms of financing and usage. The following chapter will list the main challenges of BSSs and approaches to master them.

The basis for optimisation is knowing current conditions. BSSs still suffer from a lack of scientific results and a lack of available operational data. OBIS revealed a lot of information, but available data is only a snapshot of the current situation. To gain information over the lifespan of schemes, it is important to ask the right questions such as:

> Which impacts do BSSs have on mobility behaviour?
> How efficient are BSSs compared with other measures?
> What are reasons for customer satisfaction?
> Where can optimisation potential be found?

The OBIS consortium developed some general recommendations for BSSs:

> Municipalities must be aware of the importance of operator data and should express their demands accordingly.
> Customer surveys or pilot schemes are a good opportunity to find out what the customer needs.
> The development of performance indicators and standardised data requires a lot of effort but is necessary to ensure a sustainable operation in the long term.

4.3.1 Steer Demand

The main challenge in the first phase of running the BSS is that the expected demand does not match the actual demand.

A common phenomenon in large schemes is that demand is higher than expected which causes low availability of bikes and results in customer dissatisfaction. To avoid this, demand must be managed from the outset. In some schemes such as London or Barcelona, access for customers was limited at the beginning. Barclays Cycle Hire in London was available for users who registered for a subscription at the beginning. Casual/short-term registrations were only allowed after the starting phase. Bicing in Barcelona limited the number of subscribers per bike and allowed new registrations only after the enlargement of the scheme. Additionally, the subscription fee started at a low level and was increased with the expansion of the scheme. Since a considerable share of BSS trips replaces short walking trips, one option is to charge a very small amount for the beginning of the trip and lower registration charges in return. This might discourage pedestrians from using the BSS.

Bike Quality and Demand

With high demand, breakdowns of the bikes occur in addition to the vandalism problem that often occurs with BSSs. To improve the overall durability of the bikes, special BSS bikes should be developed which meet a higher quality standard than private bikes (see *3.4.1.1 Hardware & Technology*). Operators should additionally be prepared to employ additional maintenance staff to tackle the teething problems of the scheme and the infrastructure wear and tear. The operator contract should include agreements about the costs share between operator and municipality in the case of vandalised and stolen bikes.

In case of lower demand than expected, the municipality and the operator should take short-term actions, such as improving marketing and communication. Additionally, long-term measures such as making the network denser, enlarging the fleet or relocating the stations should be taken. Customer surveys reveal customer needs. If the expected demand is substantially higher than the actual demand in the long run; the goal might not fit the local framework. Cycling culture, climate and topography can influence the expected demand (see *3.5 Exogenous Factors*).

Austria

From 2004 to 2009 the scheme Freiradl operated in about 60 towns of Lower Austria (19,200 km², 1,610,000 inhabitants). The system was technologically underdeveloped and required staff for hiring bikes. Most of towns were provided with only one station which was normally a depot effectively hidden in representative buildings e.g. town

halls. The rental was totally free but even so the scheme suffered from low demand. The LEIHRADL-nextbike pilot project was launched in April 2009 in a small agglomeration of seven towns close to Vienna (which operates its own BSS), as a technological upgrade of Freiradl which was disbanded at the end of 2009. The rental cost is € 1 per hour and € 5 per day. In April 2010 LEIHRADL-nextbike expanded and currently some 700 bikes are being used in 70 towns. LEIHRADL-nextbike has experimented in 2010 in several towns. The first 30 minutes are free of charge in order to attract local (non-tourist) use. Stations are now visible as they are located outdoors and densification and enlargement of the scheme has contributed to an increased demand.

4.3.2 Scheme Densification and Expansion

If a BSS runs successfully during the initial phase, an expansion of the scheme might be requested. Such an expansion must be well planned and the ongoing success of an expanded scheme depends on a set of factors.

4.3.2.1 Barcelona

A broad scheme monitoring programme was introduced for Bicing as part of a contract revision in 2009. Thus it became possible to analyse station utilisation and customer satisfaction. The geographic conditions in the city affect the usage of the scheme. Usage in elevated areas in the north (Figure 63, narrow red lines) is lower than in the flat areas in the south. Additionally, movements are unidirectional from north to south, requiring additional redistribution efforts.

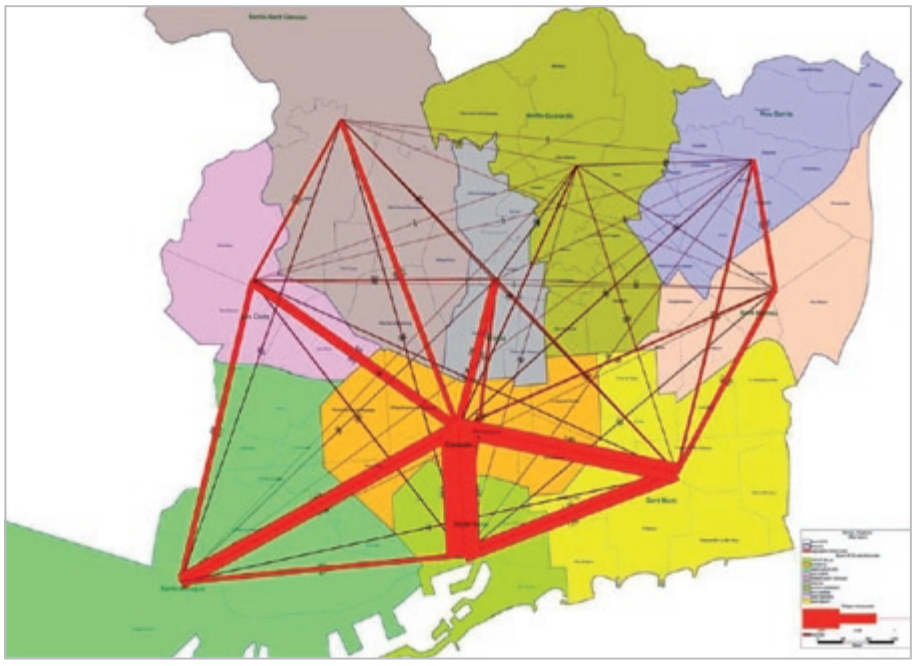

Figure 63: Bicing Usage in Barcelona (Figure: Barcelona Municipality, Mobility Department)

The availability of bikes and empty docking points was found to be one of the most important factors for customer satisfaction. An improvement in overall customer satisfaction goes along with a decrease in overall registrations. Bicing is in an optimisation phase, trying to balance supply, demand and costs.

In the near future, the number of bikes will be kept at a constant level of 6,000. Operators and the municipality concentrate on the improvement of the existing network by applying the following strategies:

> Station utilisation is monitored in detail.
> The scheme area is subdivided into zones. To keep the service in those zones homogenous, station capacity is enlarged or stations are added near existing ones wherever this is necessary.
> Newly implemented stations of sufficient sizes are planned.

4.3.2.2 Berlin

Berlin has an existing flexible Call a Bike scheme (without stations). The German Ministry of Transport funds a pilot project for the assessment of a new station-based scheme. The existing scheme covers the inner city with about 100 km² and suffers from low demand due to insufficient density. The new scheme StadtRAD Berlin currently covers one borough (Mitte) with pilot stations and will be expanded to another borough (Pankow) in the next stage. As a result, the scheme will provide almost the same number of bikes at 90 stations which cover around 15 km². The availability of bikes will increase. It must be taken into account that neighbourhoods in Berlin are mixed. In other words, they are residential districts as well as work-

ing districts and thus work as self-contained systems. Thus it is important to cover everyday mobility habits in those neighbourhoods.

The main strategies are thus:

> To replace the existing scheme with a new station-based scheme starting in a smaller area;
> To cover high-density areas first;
> To provide higher availability and reliability;
> To analyse usage; and
> To expand the scheme only if new areas are either self-contained systems or complement the existing scheme.

4.3.2.3 Further Observations

It has been found difficult to expand existing schemes due to difficult permission processes (e.g. in Stockholm). Thus decision makers could play a big role by introducing permission standards and prioritise permissions for BSSs in the framework of Cycling Master Plans or Traffic Planning Plans.

Customer surveys in Lower Austria revealed that regular use requires higher station density than tourist use. A scheme that is focussed on tourist use needs adaptations in terms of station density and location to attract commuters or other everyday users.

4.3.3 Redistribution and Availability

Redistribution of bikes is one of the main cost factors in BSSs and reduces the ecological effect of bike usage itself. To keep users satisfied, bikes and empty docking points must be available at all times. Thus redistribution is necessary to ensure usability of the scheme and customer satisfaction. Two starting points can be considered to overcome redistribution problems: optimise redistribution itself; and reduce pressure coming from customer dissatisfaction.

Redistribution can be improved in many ways. At a high level, station utilisation analysis is necessary to estimate the need for redistribution. Once the operator knows the usage patterns at each station, redistribution needs can be anticipated by using thresholds and automated alerts for central management. Important stations that suffer from regular imbalances might be enlarged to prolong reaction time for the operator or allow natural balancing. Stations that are costly to manage and not essential for the scheme for any reason (e.g. use by pedestrians only) might also be closed.

Topography is an important factor for the continuous need for redistribution. Stations located on elevated sites are often used as a source for a ride rather than as destination. Thought should be given to whether to open such stations at all. Barcelona introduced a protocol that ensures certain conditions for stations concerning the access for redistribution vans. Velomagg' in Montpelier incorporates electric vans to redistribute the bikes.

Customer satisfaction can be stabilised in order to reduce redistribution efforts. Terminals at stations or mobile handsets can give information about the nearest stations with available bikes when a station is empty. Customer dissatisfaction can also be reduced by allowing the user a limited amount of extra time free of charge when a station is full.

Figure 64: Redistribution and Repair Ship of Vélib´ (Photo: JCDecaux)

Figure 65: Redistribution and Repair Ship of Vélib´ Interior View (Photo: JCDecaux)

Figure 66: Redistribution Truck Stockholm (Photo: Tim Birkholz, choice)

Figure 67: Barclays Cycle Hire Redistribution Vehicle (Photo: TfL)

Hub-Stations in Barcelona

Hub-stations are a new solution implemented in Barcelona for high demand areas with narrow streets. The Hub-station has a high capacity and is accessible with trailer wagons (30 bicycles). It works as a distribution centre to nearby stations in narrow streets which can be accessed by simple wagons (15 bicycles) only.

RFID-technology in Germany

DB Rent started to supplement RFID technology to their BSS in Hamburg and Berlin. With that technology, it is also possible to return a bike when all docking points are occupied. Even though this development does not make redistribution unnecessary, it improves both, availability of parking options for customers and the overall need for redistribution.

4.3.4 Financing Opportunities

Most BSSs are not self-sustainable and sources for additional funding are limited (see *4.2.2.4 Payment, 4.2.3 Funding Sources*). Thus additional funding options must be developed to create sustainable financial opportunities.

4.3.4.1 Involve Sponsors

Barclays Cycle Hire in London is the first scheme which is notably supported with a third-party sponsor. Barclays Bank is the third largest bank in Great Britain and has its headquarters in London. Thus it has a strong connection with the city. Barclays paid a total amount of £ 25 million. In return, the BSS as well as the emerging Cycle Superhighways (a network of cycle lanes) carry the company's name and its corporate identity colours (Figure 68). By providing a notable contribution to scheme costs, this funding option can carry certain dangers connected with the choice of sponsoring company. A bad company image could rub off on the BSS. On the other hand, sponsoring is attractive for firms to improve their own 'green image' when the BSS becomes a success. Small scale examples for third party sponsoring can be found in other sites as well. The company Unilever contributed to the implementation costs of a BSS station in Hamburg. The advantage for the operator is not only this monetary contribution, but also a simplified implementation process since Unilever provides the land for the station.

Figure 68: Barclays Cycle Hire Bikes (Photo: Tim Birkholz, choice)

4.3.4.2 Involve Companies and Employees

From a company perspective, investigating employee willingness to adopt bike sharing and other energy efficient travel alternatives is of significant importance because it is a way to: a) reduce costs from inefficient business travel and employee commuting to work - emissions and costs often go hand in hand; b) be farsighted and prevent risks from unstable energy prices and stricter restrictions on travel in order to counteract the greenhouse effect and local traffic problems in the future; c) improve public relations and raise the standard for environmental audits by developing robust climate strategies; d) provide employees with good communication and transport alternatives in order to attract efficient, competent and healthy staff and e) remove car parking spaces as cycle parking spaces are a much more efficient use of land. Thereby a company can reduce future operating costs. These aspects could most likely be used as vital selling points for bike sharing operators in information/advertisement campaigns and marketing dialogues with companies, the municipality and other stakeholders in the city.

Several schemes e.g. in Stockholm or Hamburg try to attract local employers and their employees to improve operational funding for the BSS. Special company tickets could be an inducement for companies to let employers carry out their local business trips by bike. The integration of BSSs in PT tickets is a strong inducement for employers to use the bike for commuting purposes.

4.3.5 New Technologies

BSSs in large cities work with the same functional principles and vary in design only. Even though they work well, there is optimisation potential in terms of implementation costs, space consumption and usability.

Berlin

The newly developed station technology for StadtRAD Berlin was tested in a laboratory scheme first. Two station options, one with and one without physical docking points (Figure 69) were tested.

Customer surveys and frequent meetings with the municipality and the operator led to the decision to implement stations with physical docking points. A newly developed rack (Figure 70) which requires no groundwork or cabling results in lower implementation costs than conventional BSS docking points. The 'intelligence' of the system as well as the fixation mechanism is integrated in the bike lock. This lock communicates wireless with the terminal.

Figure 69: Station without Physical Docking Points (Photo: DB Rent)

Figure 70: Concrete Docking Point (Visualisation: DB Rent)

The development of new station technologies (WLAN, RFID) can reduce implementation costs and speed up the overall implementation process. Additionally stations can be removed or relocated easily.

Additionally the rental process was simplified. The return of the bikes is possible without an additional process at the terminal. Smart applications (Apps, Figure 71) with integrated rental functions serve as additional 'individual terminal'.

Figure 71: Call a Bike Application (Photo: DB Rent)

4.3.6 Combination with Other Means of Transport

BSSs are considered a modern form of PT even though one main characteristic distinguishes them from PT: the usage of a bike is a form of individual transport while using traditional PT is always a collective form of transport. BSSs also complement other shared services such as car sharing. The combined use of PT, BSS and car sharing provides appropriate mobility for all purposes and reduces the need to own a car.

4.3.6.1 Stockholm

A survey among almost 2.300 users of Stockholm City Bike revealed that:

> Frequent BSS users more often tend to combine bike sharing trips with regular PT trips.
> Frequent BSS users more often have monthly or seasonal PT tickets.
> Present BSS users state that the main mode replaced by bike sharing is PT.

Thus BSSs should be considered as a complement to existing PT. There is a potential for a win-win situation for BSSs and PT. Joint measures by both stakeholders could attract PT users or non users who wish to have more flexibility than existing PT can offer. A joint access technology (e.g. RFID card) could make this potential accessible.

4.3.6.2 Czech Republic

The regional BSS ČD BIKE is operated by the Czech Railways (ČD). The best results are visible in South Bohemia. A total of 200 bikes are available at 13 stations in the region. Czech Railways complement this service with free bike transport on selected train lines or free bike deposit at several stations. While bookings were made on site or via telephone first, an online booking platform (Figure 72) was implemented in 2010. The number of bookings improved due to better visibility and marketing of the scheme.

Figure 72: Czech Railways Booking Platform http://cz.pujcovnykol.cz/ (Screenshot)

4.3.6.3 Tczew

Tczew, a city of 60,000 inhabitants in Poland has encountered severe difficulties in developing a system as part of the bus transport supply contract. The delay in implementation of a BSS had been influenced by substantial lags in the development of an electronic PT ticketing system. When finally introduced, an electronic city card has become a matter of a serious dispute between local authorities and the PT operator. Additionally the reprioritisation of other investment projects caused an additional delay in the planning and implementation process of '75 bikes for the 750th anniversary of the city'. A valuable lesson learnt is that when the city selects a BSS operator, it is important to assure that the BSS is integrated with the city PT ticket system. However, it is important to ensure that the costs of integration of those systems are borne by the BSS operator and not the city.

Figure 73: Keepod Device Usage at BikeMi-Station (Video by Bloonn and Legambiente)

4.3.6.4 Austria

The operators of LEIHRADL-nextbike have focused their efforts on the improvement of the interconnection between the BSS and the railway network. As a result, every LEIHRADL-nextbike town has a BSS terminal at the railway station, even in those towns that only have one BSS station.

4.3.6.5 Milan

Around the time that OBIS started, the City of Milan Administration launched BikeMi - a BSS that at the end of 2010 could offer 1,400 bikes to its customers. BikeMi is positively accepted within the city. In cooperation with further partners, the operator Clear Channel and OBIS partner Fondazione Legambiente Innovazione have started testing an access device, Keepod, which allows the combination of BikeMi with other services, especially car sharing. The Keepod can be loaded with different applications and interfaces to provide access for different mobility services. To allow this, the Keepod contains, next to an innovative software platform, a hardware setup with flash memory, smartcard, near field communication (NFC) antenna and universal serial bus (USB) interface. A field test with Keepod (Figure 73) is being conducted in four phases. Phase 1 has already been successful: The technical testing and verification of compatibility of Keepod as a tool for access and use of BikeMi service. In Phase 2, a test phase within 2011, the Keepod will be offered to a sample of BikeMi customers in order to verify the degree of user satisfaction. Phase 3 will contain the technical testing and verification of compatibility of the Keepod as a tool for access and use of the car sharing service GuidaMi. In Phase 4, planned to be carried out at the end of 2011, the Keepod will be supplied and distributed to car sharing and bike sharing customers. It is also planned to extend the functionality of the Keepod to a new BSS that will be launched in the province of Milan by the company Comunicare (It is expected that Phase 4 will start by the end 2011).

5. OBIS Country Studies

5.1 Austria

Although most of the country is covered by the Alps, large cities are located on the plains which are mainly situated in the northern and eastern regions. Austria is under the influence of continental, Atlantic and pannonic climate, therefore winters are cold and summers warm while rains are moderate throughout the year. Austria has 8.4 million inhabitants and employees receive on average € 22,700 per year as net income (in Purchasing Power Standards, PPS).

Bike ownership is almost 669 bikes per 1,000 inhabitants, which shows a strong cycling culture. The national Cycling Master Plan was edited in 2006 and shows good practice and strategies to promote cycling. Helmets are not obligatory for cyclists in Austria.

In 2010 the following five BSSs are working in Austria:

> Citybike Wien, operating in Vienna since 2003;
> Citybike Salzburg was launched in 2005 and has only one station;
> Nextbike-Burgenland operating in 9 Austrian towns (and one more in Hungary) which surround the National Park Neusiedl Lake;
> Nextbike-Bregenzerwald, operating in 8 towns of Vorarlberg; and
> LEIHRADL-nextbike, operating in 65 towns.

Apart from these five current BSSs, two other schemes were previously closed and they do not operate anymore in Austria:

> Vienna Bike, a similar system to the Citybikes of Copenhagen, which was introduced in 2002;
> Freiradl which started operation in 2003 and provided the bike rental service in up to more than 60 towns of Lower Austria.

The BSS Citybike Wien, Citybike Salzburg, nextbike-Burgenland and Freiradl were studied in detail by the OBIS project.

The bike sharing market in Austria is shared by only two companies: Gewista (Vienna, Salzburg) and nextbike (Burgenland, Vorarlberg, Lower Austria).

BSSs have different success rates in large and medium cities in Austria. Although Citybike Wien, is a popular and daily usage oriented scheme which is currently in the process of expansion, Salzburg is still a prototype with only one station because of the lack of funding. In contrast, small Austrian cities show a perceptible willingness to invest in BSSs. Despite the closing of Freiradl, the operation of the existing nextbike's scheme in Burgenland together with the launch of new nextbike's BSS in Vorarlberg and in Lower Austria in 2009 reveals intense bike-sharing activity in small Austrian cities.

Diverse BSSs currently work in Austria. They exist in large cities as well as in small cities, and daily usage orientated BSSs as well as more tourist orientated ones. Most relevant for the analysis are BSSs located in small cities. Group of towns in a tourist region share the same BSS and as a result of this homogenisation and the introduction of higher level of technology in the system, the access barriers to the system have decreased.

General	
Population (a)	8,402,549 inhabitants
Net income (b)	€ 22,742/person*year (in PPS)
Area	83,871 km²
Number of cities per category	>500,000 inhabitants = 1 >100,000 inhabitants = 4 >20,000 inhabitants = 19
Internet access (c)	69 % of households
Mobile Phone access (c)	83/100 inhabitants
Traffic Framework	
Car ownership (d)	507 cars/1,000 inhabitants
Bike ownership (e)	669 bikes/1,000 inhabitants
Modal Split (f)	28 % Car, 40 % PT, 27 % Pedestrian, 5 % Bike
Bike Framework	
Bike Policy Guideline	Masterplan Radfahren. Strategie zur Förderung des Radverkehrs in Österreich, 2006 Main Objective 1: Attractive and safe infrastructure; Main Objective 2: Optimizing of intermodal connection; with PT Main Objective 3: Education and organization of the actors.
1st Bike Sharing System	Vienna Bike, Vienna, 2002, had to close after two months due to vandalism
Number of BSSs working in the Country (g)	84
Number of BSS Companies working in the Country (g)	2
(a) Statistik Austria (2010) **(b)** Eurostat (2011); 2008 **(c)** Eurostat (2011); 2009 **(d)** Eurostat (2011); 2006 **(e)** 2007 **(f)** 2008 **(g)** 2010	

Table 18: Facts and Figures Austria

5.2 Belgium

Belgium is one of the smallest countries in the European Union. It has 10.8 million inhabitants and a very high population density (346 inhabitants per km²). Belgium covers three topographical regions: a low coastal plain, a gently hilly central plateau and a high plateau at an average altitude of 488 m in the south-eastern part of the country. Belgium has a temperate, maritime climate, with an average annual temperature of 8 °C. In the coastal region the climate is mild and humid, whereas farther inland the seasonal temperature changes are greater and the rainfall higher. The average net income per capita (in PPS) is € 23,800

Cycling modal share in Belgium is 8 % at an average, but very different depending on the region. In 2009 it was 14 % in the Flanders region and only 3-4 % in the Brussels capital region (up from 1.7 % in 1999). The federal government has recently appointed a civil servant who is specifically responsible for questions relating to the bike and a national TV advertising campaign took place in 2010 to encourage bike use.

Brussels is the only city in Belgium which has a BSS. Its previous scheme (Cyclocity) and current one (Villo!) were studied by OBIS. The first BSS in Brussels, Cyclocity, was instigated as part of a global cycling policy package in 2006. There were initially 250 bikes and 23 bike stations, at 400-500m intervals. After one year a very low number of rentals (55 per day) were reported. This low figure was mainly attributed to the high number of bikes per inhabitant (580 per inhabitant in Brussels, 104 in Paris). Moreover, the duration of rents was too high (56 minutes) to be efficient, and the bikes were said to be too heavy (although they are the same bikes as those used in Lyon and Paris). Free rent was not offered and the first 30 minutes cost € 0.50. To boost BSS policy in Brussels, a new system, Villo! was launched in 2009.

Villo! is available in eleven municipalities in the Brussels Capital Region. At present, there are 2,500 bikes and 180 bike stations. A second phase is destined to extend the system to the whole region. Villo! like Cyclocity, is operated by JCDecaux. The first half hour is free, bikes can be rented by bank card and, as in Paris, different subscription durations are possible. The bikes have also been redesigned. However, redistribution between stations remains a major problem in this hilly city. Like the first scheme, Villo! is coupled with a five-year global bike policy conceived along BYPAD guidelines.

Belgium is one of the few countries where one BSS has been replaced by another with different conditions. Thus, the experiences with Villo! might be important for further developments of BSSs. In general, challenges that have been identified are to improve infrastructure planning, to improve communication and to integrate cycling policy into a global mobility policy.

General	
Population (a)	10,753,080 inhabitants
Net income (b)	€ 23,826/person*year
Area	33,990 km²
Number of cities per category	>500,000 = 1 >100,000 = 7 >20,000 = 129
Internet access (c)	66 % of households
Mobile Phone access (c)	108/100 inhabitants
Traffic Framework	
Car ownership (d)	470 cars/1,000 inhabitants
Bike ownership (e)	691 bikes/1,000 inhabitants
Modal Split	Modal split data is available on a regional basis only. The cycling modal share is very diverse, depending on the region.
Bike Framework	
Bike Policy Guideline	A « Note de politique générale de la mobilté » published in 2009 suggests that bike use will be encouraged amongst functionaries and via new driving rules. Most bike policies are left to the regions, however.
1st Bike Sharing System	Cyclocity, Brussels, 2006
Number of BSSs working in the Country (f)	1
Number of BSS Companies working in the Country (f)	1

(a) La Direction générale Statistique et Information économique (2009) **(b)** Eurostat (2011); 2008 **(c)** Eurostat (2011); 2009 **(d)** Eurostat (2011); 2006 **(e)** 1998 **(f)** 2010

Table 19: Facts and Figures Belgium

5.3 Czech Republic

The Czech Republic is a landlocked country, lying in the central part of Europe. The climate of the Czech Republic is affected by the interaction of oceanic and continental effects, which is why winters are cold and summers warm. Rains are moderate throughout the year. However, altitude and relief influence the climate to a large extent. About one third of the country's whole territory can be found at an altitude above 500 m. The Czech Republic has 10.5 million inhabitants. Employees receive on average € 13,500 per year as net income (in PPS).

The cycling modal share in the Czech Republic is at 5 %, still very low compared to other European countries. The Cycling Master Plan was edited in 2004 and shows good practice and strategies to promote cycling. The role of the Ministry of Transport within the Cycling Master Strategy is to coordinate cycling activities at national, regional and local level, to create a systematic and financial background, and to include the development of cycling into the projects prepared for co-financing from the EU structural funds. Since 2006 helmets have been obligatory for minors. However, bike sharing, as bike rental for everyday use, has only been discussed in some press articles and on the websites of groups promoting cycling.

In 2005 the city of Prague introduced an automatic BSS called Homeport with 30 bikes at 16 stations. This system has been studied during the OBIS project. Furthermore, the Czech Railways company (ČD) has introduced a bike renting service in regions attractive to tourists. The rented bikes can be transported by train and deposited at all stations on selected lines free of charge. Bikes do not have to be returned to the place where they were rented. Additionally, private bike rental firms operate in many tourist resorts, offering bikes mostly for short-term recreational rides.

Analysis showed that ČD's bike rental system is not cost-efficient. The system also suffered from a decline of bike rentals in 2007 and 2008. Nevertheless, feasible solutions for the development of the system for the ČD network were explored and found. A bike rental was proposed and implemented on the base of a contract between a municipality and the ČD. This system is inaugurated in Kroměříž; it will be further monitored and recommended in other towns. Another approach has been developed in the region of South Bohemia where great interest in the system was 'awakened' and a compact network of bike rentals is about to be established. Nowadays the Czech Railways bike hire service includes 14 regions, 30 train stations and 300 bikes.

BSSs are not very common in the Czech Republic so far. Only one very small system exists, further bike rental services are present in tourist regions. The Czech Republic has many small cities which could make the implementation of BSSs more difficult. However, the Austrian example shows how BSSs can work also in cities of small sizes.

General	
Population (a)	10,526,685 inhabitants
Net income (b)	€ 13,500/person*year (in PPS)
Area	78,866 km²
Number of cities per category	>500,000 inhabitants = 1 >100,000 inhabitants = 4 >20,000 inhabitants = 63
Internet access (c)	54 % of households
Mobile Phone access (c)	136/100 inhabitants
Traffic Framework	
Car ownership (d)	399 cars/1,000 inhabitants
Bike ownership	NA
Modal Split (e)	23 % Car, 67 % PT, 6 % Pedestrian, 5 % Bike
Bike Framework	
Bike Policy Guideline	The Czech cycling development strategy, 2004 Main Objective 1: Development of cycling as a means of transport equal to others; Main Objective 2: Development of cycling to strengthen tourism; Main Objective 3: Development of cycling to help protecting the environment and strengthen health; Coordination of activities with other bodies and fields.
1st Bike Sharing System	Homeport, Prague, 2005
Number of BSSs working in the Country (f)	2
Number of BSS Companies working in the Country (f)	1

(a) Český statistický úřad (2010) **(b)** Eurostat (2011); 2008 **(c)** Eurostat (2011); 2009 **(d)** Eurostat (2011); 2006 **(e)** Český statistický úřad (2002) **(f)** 2010

Table 20: Facts and Figures Czech Republic

5.4 France

France has 62.8 million inhabitants, 75 % of whom live in urban areas. The average population density is 107 inhabitants/km², ranging up to 20.500 inhabitants/km² in inner-city Paris. Covering 550,000 km², France has the largest surface area in the European Union. Although plains account for two thirds of this area, France also has various mountain ranges. The west of France is influenced by an oceanic climate, the south by the Mediterranean whereas the centre and the east have a more continental climate. Employees receive on average € 21,100 per year as net income.

There is no cycling master plan in France, but in 2006 a programme called 'A road for all' was instigated. A cycling coordinator at the Transport Ministry had been established to cooperate with organisations like the user group 'Fubicy' and local authority group 'Club des Villes Cyclables', as well as the National Energy Agency. 35 million French practice cycling (25 million regularly), of whom 15 million for leisure or tourism. The cycling modal share is quite low at around 2%, but is on the increase in large cities. Helmets are not obligatory in France.

BSSs in France have been developed over three periods of time. In 1998, the first computerised system in the world was established in Rennes (Vélo à la carte), operated by the private company ClearChannel. 2005, Velo'v in Lyon as one of the first large-scale schemes immediately exceeded expectations in terms of users and number of rentals. The start of Vélib' in Paris in 2007 had a huge impact on the visibility of BSSs in France (and worldwide). Since then, new BSSs have been implemented in France at a rate of 6 - 11 new towns per year. 34 schemes are operating in France (September 2010). Eight of them (in seven cities) were studied by OBIS: Velo'v (Lyon), Velomagg' (Montpellier), Reflex (Chalon-sur-Saône), Velodi (Dijon), Vélib' (Paris), Vélo'+ (Orleans) and Vélo à la carte and Velo Star in Rennes.

The development of bike sharing in France is still growing. Most of the big cities provide BSSs and medium-sized suburbs benefit from the BSSs of their inner cities (29 towns are part of Vélib' in Paris including Gentilly with 17,000 inhabitants). Several medium-sized towns (Vannes, Cergy-Pontoise, La Rochelle, Avignon, etc.) and even small towns (Chalon-sur-Saône with 48,000 inhabitants) have implemented their own BSS. In spite of the world economic crisis, the willingness to invest in bike sharing in France seems to be in a dynamic period. It turns out that more medium-sized and small cities, like Lorient, are studying the opportunity of implementing a BSS. It can be seen that cities can learn from the experiences of current systems, especially regarding vandalism, interoperability (town centre - suburbs), the cost of the BSS to the local authority and the capacity of advertising to remunerate the operator and usage rates for BSSs in medium sized cities. New schemes will be more dependent on the local investment capacities. The integration with the PT system (e.g. Lille 2011) and new technical options like electric bikes will be options for the future.

BSSs have raised the general awareness of cycling and mobility issues in France. Stakeholders have started to take into account a more global approach, including infrastructure development and use, and the relationships between the different modes of transport. Authorities are becoming aware of the need for car-free public space and the two-way access (cycle contraflows) of one-way streets to cyclists is ongoing. In this context it can also be mentioned that Autolib', the first free-access, one-way car sharing scheme on its scale, is programmed to begin in Paris in autumn 2011.

> France is an example of how a country without a strong 'everyday' cycling culture can increase the cycling modal share in cities in a short period of time by experimenting with an idea or a concept. The attractiveness of a national commercial offer, often linked to urban advertising in France, and its popularity among local officials surely helps this development. Thanks to Vélo'V in Lyon and Vélib' in Paris, BSSs became very popular in Europe, as a new form of mobility which every city should have, and as an option for cities to present themselves as modern.

General	
Population (a)	62,793,432
Net income (b)	€ 21,080/person*year
Area	543,965 km²
Number of cities per category	>500,000 = 10 >100,000 = 49 >20,000 = 339
Internet access (c)	62 % of households
Mobile Phone access (c)	95/100 inhabitants
Traffic Framework	
Car ownership (d)	489 cars/1,000 inhabitants
Bike ownership	57 bikes sold yearly/1,000 inhabitants
Modal Split (e)	Car 77 %, PT 5 %, Pedestrian 16 %, Bike 2 %,
Bike Framework	
Bike Policy Guideline	NA
1st Bike Sharing System	La Rochelle, 1974
Number of BSSs working in the Country (f)	34
Number of BSS Companies working in the Country (f)	11
(a) Institut national de la statistique et des études économiques (2010) **(b)** 2007 **(c)** Eurostat (2011); 2009 **(d)** Eurostat (2011); 2006 **(e)** Certu 2008 **(f)** 2010	

Table 21: Facts and Figures France

5.5 Germany

Germany, the most populous country in the European Union with 81.8 million inhabitants, is situated in central Europe. It is influenced by a temperate seasonal climate. Elevation ranges from the mountains of the Alps to the shores of the North Sea and the Baltic Sea. While the north of the country is rather flat, southern parts are more elevated. Net income per capita (in PPS) is € 22,800 per year decreasing from; the south to the north and from the west to the east. In other words, incomes are lower in the north and the east.

Germany has a distinctive cycling culture. However, the car is the dominant mode of transport and cycling has been neglected by most of the planners and politicians for many decades. For this reason, in 2002 the National Cycling Plan 2002-2012 was established (Nationaler Radverkehrsplan 2002-2012). Lots of activities to promote cycling have been initiated since then. The government has already announced that it will continue with a new plan in 2013. Cycling has a 10 % share of the modal split. 19 % of the population uses bikes (almost) daily, but 47 % seldom or never cycle. In rural areas this share is only 29 %. 82 % of the households own at least one bike. Bike ownership is approximately 854 bikes per 1,000 inhabitants.[18]

There are currently four BSSs in Germany at present: Call a Bike, nextbike, Bikey and Chemnitzer Stadtfahrrad. Call a Bike offers the largest systems in Berlin, Munich, Hamburg, Frankfurt, Cologne, Stuttgart and Karlsruhe and belongs to the German railway company 'German Railways'. Nextbike, a private company, offers the scheme in around 35 cities. Bikey is a very small bike garage system in three cities (Bottrop, Grevenbroich and Witten). Chemnitzer Stadtfahrrad is a local initiative in Chemnitz. Financing by municipalities is a relatively new phenomenon in Germany. Thus many schemes are operated without additional funding. However, after a competition launched by the Ministry of Transport in 2009, public funding becomes more common. As a result of the competition, the BSS Metropolrad Ruhr has already been started. It is run by nextbike in several cities of the Ruhr area. A BSS in Mainz is supposed to start in 2011. Although some difficulties in the implementation process occurred, more systems might start in the future due to the Ministry of Transport's competition.

Seven schemes were analysed within the OBIS project in 2008: Call a Bike in Berlin, Munich, Karlsruhe and Stuttgart, nextbike in Düsseldorf and Leipzig and Chemnitzer Stadtfahrrad.

Since the willingness to invest in BSSs in Germany seems to be lower than in other European countries, cities are dependent on additional e.g. governmental funding. The participants in 2009's Ministry of Transport's competition will therefore be the main actors in future bike sharing development. The tender was focussed on large cities. Thus a further development in those areas can be expected. The number of cities with BSSs as well as the number of bikes in the respective cities is expected to grow.

The German market of BSSs at present is mainly divided between the two big companies Call a Bike and nextbike. Because of existing advertising contracts in many cities the link between operator and street furniture regarding advertising is difficult. The Ministry of Transport competition in 2009 has attracted a lot of attention and raised awareness of BSS which is why new developments can be expected in the future.

[18] DLR, infas (2010), pp. 2, 21, 60, 105 f.

General	
Population (a)	81,751,000 inhabitants
Net income (b)	€ 22,783/inhabitant*year (in PPS)
Area	357,112 km^2
Number of cities per category	>500,000 inhabitants = 14 >100,000 inhabitants = 67 >20,000 inhabitants = 620
Internet access (c)	78 % of households
Mobile Phone access (c)	132/100 inhabitants
Traffic Framework	
Car ownership (d)	566 cars/1,000 inhabitants
Bike ownership (e)	~854 bikes/1,000 inhabitants
Modal Split (e)	58 % Car, 9 % PT, 24 % Pedestrian, 10 % Bike
Bike Framework	
Bike Policy Guideline	National Cycling Plan 2002-2012 Main Objective 1: Increase of cycling modal share; Main Objective 2: Establish cycling as element of sustainable, integrated transport strategies; Main Objective 3: Improve cycling safety.
1st Bike Sharing System	Kommunales Fahrrad, Bremen, 1978 (not existing anymore)
Number of BSSs working in the Country (f)	~45
Number of BSS Companies working in the Country (f)	~4
(a) Statistische Ämter des Bundes und der Länder (2010) **(b)** Eurostat (2011); 2008 **(c)** Eurostat (2011); 2009 **(d)** Eurostat (2011); 2006 **(e)** DLR, infas (2010), p. 60 **(f)** 2010	

Table 22: Facts and Figures Germany

5.6 Italy

Italy is a peninsula located in the south of Europe. The elevation ranges from the mountains of the Alps in the north to the shores of the Mediterranean. Most of the inland northern regions of Italy have a humid continental or temperate climate. The coastal areas generally fit the Mediterranean stereotype. With 60.3 million inhabitants, Italy has the fourth largest population in the European Union. Population density is higher than 200 inhabitants/km². Whereas the highest density is in Northern Italy, as that third of the country contains almost half of the total population. The largest Italian conurbations are: Milan (7.4 million), Rome (3.7 million), Naples (3.1 million), Turin (2.2 million). Italy has almost 500 cities with more than 20,000 inhabitants. Most of them are medium to small sized towns. Net income per capita (in PPS) is € 21,100 per year decreasing from the north to the south.

A proposal to allocate € 300 million to cycling related issues for the years 2010 and 2011 was rejected by the Italian Parliament.

On the other hand, the Ministry of Environment promoted a co-financing programme related to bike sharing and renewable energies in 2010. Each project could receive a sum up to € 500.000; the total amount of financial resources available was € 14 million. The Lombardy region dedicated a sum of € 5 million to cycling plans for municipalities and provinces for 2009 and 2010.

A realistic national cycling plan doesn´t exist yet and often the local cycling office (not every municipality has got one yet is in charge of the local actions. Finally, the two cases mentioned above do not reflect the recent tendency in Italy to allocate mobility resources primarily for motorists' facilities and infrastructure.

However car ownership and bike ownership are approximately the same; the cycling modal share is still rather low (3 %) in comparison to cars (79 %).

Overall, less than half of Italy is covered by BSSs. C'entro in bici was the first BSS introduced in Italy (Ferrara, 2000). It was mainly designed for compact medieval towns and spread quite quickly, used in 95 small to medium sized municipalities by March 2011. Its direct competitor is Bicincittà operating in 60 small to large cities. Eleven schemes were studied by OBIS: BikeMi Milan, Noleggio bici Bolzano, C'entro in bici (Modena, Rimini, Senigallia and Terlizzi), Bicincittà (Cuneo, Parma, Roma, Bari and Brescia).

In September 2008, six hinterland municipalities of Turin (Piemonte) have set up a BSS called Bicincomune, a public automatic bike rental system designed to improve transport links between Collegno, Alpignano, Druento, Rivoli, Grugliasco and Venaria with 22 stations. In the next few years BSSs will be introduced in further provincial areas. At the end of 2011 BikeMi will be extended to Milan's suburban municipalities.

In Italy BSSs spread out quickly throughout the country. It is remarkable that BSSs are as present in regions with many small municipalities as in metropolitan areas. All the systems cost between € 10 and € 25 for registration. One third of them are card-based and users pay a further fee after the first 30 minutes of use (in the biggest cities). The rest of the schemes are key-based and the usage is free. Some cities (e.g. Cuneo) subsidise BSSs with the revenues from car parking fees. Since the internet coverage is still rather poor in some parts of the country, registration must be made in person in some cities.

General	
Population (a)	60,340,328 inhabitants
Net income (b)	€ 21,078/person*year (in PPS)
Area	301.336 km²
Number of cities per category	>500,000 = 6 >100,000 = 36 >20,000 = 431
Internet access (c)	46 % of households
Mobile Phone access (c)	151/100 inhabitants
Traffic Framework	
Car ownership (d)	597 cars/1,000 inhabitants
Bike ownership (e)	580 bikes/1,000 inhabitants
Modal Split (f)	79 % Car, 15 % PT, 6 % Other
Bike Framework	
Bike Policy Guideline	NA
1st Bike Sharing System	Ferrara, 2000
Number of BSSs working in the Country (g)	157
Number of BSS Companies working in the Country (g)	4
(a) Istituto Nazionale di Statistica (2010) **(b)** Eurostat (2011); 2008 **(c)** Eurostat (2011); 2009 **(d)** Eurostat (2011); 2006 **(e)** 2009 **(f)** 2006 **(g)** 2011	

Table 23: Facts and Figures Italy

5.7 Poland

Poland is a country located on the Central European Plains with postglacial hilly regions in the north and some medium height mountains (the Sudety and Carpathians) in the south. Southern, relatively more industrialized regions of Poland have some more densely populated areas. Since 1990 the country has been a subject of a rapid transition towards the market oriented economy. Poland became a member of the European Union in 2004. The country has a temperate, seasonal climate. Most of the country has rather mild winters with not more than 3-4 weeks of snow cover per annum; only the north western and southern mountainous regions are subject to somewhat harsher and longer winter conditions. Poland has 38.2 million inhabitants and the average net income per capita (in PPS) is € 14,200.

A quite varied, generally medium level of bike ownership in Poland is not reflected in the level of daily cycle use. Instead, car ownership has radically increased in the last years. Cycling is considered by officials (and a large part of adult inhabitants) mostly as a recreational activity. In certain urban areas, however, some signs of recovery in daily cycling usage can be observed, but exact data are not available, since no consistent system of studying the density of cycling traffic is in place. Rough estimates suggest that the cycling modal share amounts to 1-3 % in some cities. A Green Paper on the Regional Cycling System was prepared by a Pomeranian non-governmental organisation in 2008, but has only been made available to the general public on the internet. Helmets are not obligatory for cyclists in Poland.

The level of development of the cycling infrastructure is very low, it is often fragmented and usually of poor quality. Some cities tend to allow cycling in the car-free areas in urban centres, while in other cities quite often cycling is formally prohibited there. There are practically very few if any secure bike facilities in urban areas, at railway stations or at PT hubs. The low level of understanding of the potential value of cycling as an urban transport mode among city decision makers and city planners, results in a situation where the potential of BSSs is only perceived among a very small number of larger cities.

There is no country or region wide bike rental system, only some private bike rental facilities in tourist areas. Krakow's BikeOne was the first BSS implemented in Poland and was analysed within the OBIS project. Initiated on 15th November 2008 as a pilot project, it was closed after four weeks and was reopened in March 2009 with 120 bikes located at 16 stations. It is operated by a cycling subsidiary of the Sanmargar company. In Rzeszów a BSS called RoweRes with 20 stations operated by a local company is likely to be operational in March 2011, while in Wrocław a BSS offering 140 bikes in 17 stations operated by Nextbike Polska will open in June 2011. In Gdansk a private operator plans to open a BSS with 1,200 bikes at 50 stations located in Gdansk and Sopot in summer 2011. Lodz and Warsaw announced the intention to initiate public tenders for a BSS operation which have not yet been concluded with concrete implementation plans.

In view of substantial traffic congestion problems, combined with poor, often unsustainable car parking demand management policies, there is a considerable potential to introduce BSSs in a number of other large conurbations and popular tourist regions. However, the difficult financial situation in cities due to the world-wide crisis results in cuts in the amounts devoted to the development of cycling in some municipalities. In February 2011, however, the Polish parliament adopted some pro-cycling changes in the traffic code, as a result of a long term effort of the Cities for Cyclists group and the Parliamentary Group for Cycling Issues, providing ground for positive developments in this respect in the future.

> Poland is affected by a very poor cycle network which is not developed according to a consistent plan. The funding is usually limited and not always spent in a productive way. With a relatively high bike ownership and high PT use in the big cities an important unused potential for BSSs can be assumed.

General	
Population (a)	38,186,860 inhabitants
Net income (b)	€ 14,211/person*year (in PPS)
Area	312,679 km^2
Number of cities per category	>500,000 = 5 >100,000 = 34 >20,000 = 192
Internet access (c)	58 % of households
Mobile Phone access (c)	118/100 inhabitants
Traffic Framework	
Car ownership (d)	351/1,000 inhabitants
Bike ownership (e)	64 % of households have at least one bike
Modal Split	The share of cycling in the modal split is not subject to regular monitoring; estimated cycling modal share in some cities is 1-3 %
Bike Framework	
Bike Policy Guideline	NA
1st Bike Sharing System	Bike One, Krakow, 2008
Number of BSSs working in the Country (f)	1
Number of BSS Companies working in the Country (f)	1
(a) Główny Urząd Statystyczny (2010) **(b)** Eurostat (2011); 2008 **(c)** Eurostat (2011); 2009 **(d)** Eurostat (2011); 2006 **(e)** 2005 **(f)** 2011	

Table 24: Facts and Figures Poland

5.8 Spain

Spain has a total population of 47 million inhabitants and an area of roughly 505,000km² with a concentration of population around the coast and the central capital, Madrid. Spain is a mountainous country with varied local climate conditions. From the cycling point of view many areas have high temperatures in summer since most of the country is dominated by Mediterranean climate. The average net income per capita (in PPS) is € 18,800.

Unlike other European countries, Spain did not have a long cycling tradition before the implementation of the first public bike systems. Many cities did not have good cycling infrastructure, since cycling was mainly considered for recreational purposes. In this context, BSSs have been a factor of great importance for the promotion of bike use. Nowadays it can be said that cycling is much more in evidence in many Spanish cities due to the successful implementation of BSSs.

BSSs have expanded rapidly during the last few years. Their development can be divided into three steps: in the early stage (from 2002 to 2005) the first automatic systems appeared and the existing manual systems started to be promoted. In the second stage (from 2005 to 2007), 20 new systems were implemented. There was clear support with funding being granted by national administrations. The third, 'boom' stage (from 2007 to 2009), brought about the first of the large scale systems, of which the biggest and most popular one is in Barcelona (Bicing).

Currently Spain is facing a maturing stage, enlargement of public urban biking projects, further and larger grants (IDAE and other administrations) and studies at a national level. A national conference to share experiences of public bike schemes has run annually since 2007. Participation in the European OBIS project is also an important achievement for benchmarking these experiences and developing a pan-European perspective.

Spain's situation is characterised by the diversity of the systems, cities and uses. There are different sorts of systems: automatic as well as manual. Frequency and use of bike sharing also varies widely depending on the city. Most of the Spanish systems have a high technical standard and offer Radio Frequency Identification (RFID) Cards to rent the bikes. Within OBIS a total of seven cases (Barcelona, Pamplona, Seville, Terrassa, Saragossa, Ribera Alta and Vitoria) were studied which includes small, medium and large population centres with manual and automatic systems. These seven case studies represent around 350,000 subscribers, 800 stations and 10,000 bikes in total. The large BSSs in big Spanish cities have achieved high usage levels in cities that are newcomers to cycling (nevertheless the levels of cycling still account for less than 1 % of total city mobility). The impacts of BSSs in smaller cities are less evident. Central funding does not support BSS maintenance.

Grants from the central government supporting the implementation of BSSs are mainly taken up by small and medium cities. The first large scale systems implemented in Seville and Zaragoza are based on the financing model developed by French cities, while Barcelona developed a new financing model based on revenues from car parking services. To support short rental and a high fluctuation of the bikes the BSSs in Spain have a maximal rental time. The price for the use of the BSS is very low (first 30 min. free) whereas the subscription to the system is comparatively high priced with the option for short and long term subscription. Most of the Spanish systems have a high technical standard and offer RFID Cards to rent the bikes. An increase of BSSs in Spain is expected.

General	
Population (a)	46,951,532
Net income (b)	€ 18,835/person*year (in PPS)
Area	504,030 km²
Number of cities per category	>500,000 = 6 >100,000 = 52 >20,000 = 623
Internet access (c)	53 % of households
Mobile Phone access (c)	111/100 inhabitants
Traffic Framework	
Car ownership (d)	464 cars/1,000 inhabitants
Bike ownership (e)	60.3 % of interviewees have a bike at their disposal
Modal Split	NA
Bike Framework	
Bike Policy Guideline	NA
1st Bike Sharing System	Castellbisbal, 2002
Number of BSSs working in the Country (f)	74
Number of BSS Companies working in the Country (f)	8
(a) Instituto Nacional de Estadística (2010) **(b)** Eurostat (2011); 2008 **(c)** Eurostat (2011); 2009 **(d)** Eurostat (2011); 2006 **(e)** Fundación Movilidad (2009), p. 25 **(f)** 2010	

Table 25: Facts and Figures Spain

5.9 Sweden

Sweden is a long, sparsely populated country in the north of Europe with 9.3 million inhabitants and an area of 450,000 km^2. The biggest metropolitan areas are Stockholm and Gothenburg, with Gothenburg having the more temperate, rainy and windy climate all year around, while Stockholm in general is warmer in summer and colder in winter. The average net income per capita (in PPS) is € 26,700.

Cycling is a popular means of transport in Sweden, especially among young people. It has a 9 % modal share of the number of all journeys[19]. Looking only at work, business and school trips cycle journeys are 12 %. Many cities and towns promote cycling in different ways, notably by constructing cycle lanes and paths, safer crossings, information campaigns, safe cycle storage, municipal cycle services (for example Lundahoj in Lund) and bike hire and sharing systems. However, the car is the dominant transport mode. Almost all city centres were transformed in the 60s and 70s, according to a planning norm that separated car traffic from slower modes like walking and cycling. The old city centres had to give way to superstores and car parks, further promoting car use, resulting in what has been called a 'car society'[20]. This development has also been spurred on by the domestic car industry (Volvo and Saab).

There are two major BSSs in Sweden: the largest, Stockholm City Bikes (SCB), with about 80 stations and 850 bikes, and Styr & Ställ in Gothenburg – a new full-scale scheme that started in August 2010 and might replace the pilot in Lundby. It had 33 stations and about 300 bikes when closed for winter in October 2010, and by 2013, 70–80 stations with about 1,000 bikes are planned. The schemes are run by different operators: Clear Channel runs SCB and JCDecaux Styr & Ställ. Greenstreet is a smaller station-free system, operated by an independent association, and in Örebro there has been a large-scale municipal cycle hire since 1978; the oldest in Sweden and OBIS. The schemes in Stockholm, Gothenburg and Örebro were studied in OBIS.

The Stockholm City Bikes suffers from sluggish expansion – only half of the planned 160 stations are in place after 4 years – because of limited urban space, a slow and complicated planning process, political unwillingness to put street parking at its disposal, and other infrastructure projects[21]. The Stockholm City Traffic and Waste Management Administration has listed 13 requirements that must be fulfilled to install a station. The contract has recently been prolonged three years to 2017, which was a requirement from the operator for continued investments in more stations.

At present, the main investments in bike sharing are made in Stockholm and Gothenburg. In Örebro, there is an ongoing development project of a new low-cost self-service system. Greenstreet is growing 'organically' at a rather slow pace.

[19] A journey is defined as the travel between residence, weekend cottage, work, school, or other temporary accommodation. A journey can consist of several trips with different purposes, e.g. shopping, dropping or fetching people etc.

[20] Lundin, P. (2008)

[21] In 2009–2010, the construction of an underground railway, Citybanan, required bus stops for replacement traffic in the PT, and tram lines were extended.

General	
Population (a)	9,340,682 inhabitants
Net income (b)	€ 26,967/person*year (in PPS)
Area (c)	449,964 km²
Number of cities per category	>500,000 = 2 >100,000 = 11 >20,000 = 108
Internet access (d)	94 % of households
Mobile Phone access (d)	126/100 inhabitants
Traffic Framework	
Car ownership (e)	461 cars/1000 inhabitants
Bike ownership (f)	670 bikes/1,000 inhabitants
Modal Split (g)	53 % Car, 11 % PT, 23 % Pedestrian, 9 % Bike
Bike Framework	
Bike Policy Guideline	Nationell strategi för ökad och säker cykeltrafik, 2000 Main Objective 1: More bike traffic; Main Objective 2: Safer bike traffic; Main Objective 3: Sustainable traffic.
1st Bike Sharing System	Örebro cykelstaden, 1978
Number of BSSs working in the Country (h)	4
Number of BSS Companies working in the Country (h)	2 (Clear Channel and JCDecaux)

(a) Statistiska centralbyrån (2010) **(b)** Eurostat (2011); 2008 **(c)** Lantmäteriet (2011) **(d)** Eurostat (2011); 2009 **(e)** Eurostat (2011); 2006 **(f)** Fietsberaad, in Spolander, K. (2010), p. 60 **(g)** Swedish Institute for Transport and Communications Analysis (2007) **(h)** 2010

Table 26: Facts and Figures Sweden

5.10 United Kingdom

The UK has a total population of 61.8 million inhabitants. It is the world's sixth largest economy with an average net income per capita (in PPS) of € 23,400. The UK is a unitary state consisting of four countries: England, Northern Ireland, Scotland and Wales. While the UK Government is located in London, the capital, there are three devolved administrations in Belfast, Cardiff and Edinburgh, the capitals of Northern Ireland, Wales and Scotland respectively.

Each of the devolved administrations (as well as London) has control over transport policies on all matters with the exception of standards, such as traffic laws, vehicle regulations and signs. The Department for Transport at Westminster also retains overall control over some matters of national and international transport. Cycling is considered a local transport issue, so policy is also set at a local level by highway authorities in England (of which there are 129) and by the devolved administrations.

Established in 2005, Cycling England was the non departmental public body set up by the Department for Transport to promote the use of cycling as a mode of transport; however, as part of the Comprehensive Spending Review, Cycling England was abolished in March 2011. The Government in Westminster is currently exploring ways of marshalling expert input on cycling issues to support a new Local Sustainable Travel Fund. A helmet is not obligatory for cycling in the UK.

The BSSs the OBIS study considered are all in England. Up to 2009 there have been two operators of small BSSs in the UK: OYBike and HourBike. Six of them were studied by OBIS: OYBike in Reading, Farnborough, Cheltenham, Cambridge and various London boroughs and HourBike in Bristol.

In 2010, another important bike sharing operator was established: Transport for London (TfL), created in 2000, is the integrated strategic body responsible for the Capital's transport system. TfL introduced Barclays Cycle Hire in summer 2010 with 315 docking stations and 5,000 bikes operational across central London. Launched on 30 July, by the end of October the scheme had over 100,000 registered members and over 1.5 million cycle hire trips had been made in that time. When fully implemented in spring 2011, the scheme will have 6,000 bikes in operation and TfL expects around 30,000 cycle hire journeys every day. In November 2010, Phase 2 was announced confirming that the scheme would expand by a further 2,000 bikes extending into east London and increasing docking stations in the central zone.

TfL undertook a number of measures to promote cycle safety awareness to Barclays Cycle Hire users. These included the launch of a Code of Conduct to help users enjoy their ride safely in London; funding additional cycle training with partner boroughs to enable members of the public to receive cycle training on Barclays Cycle Hire bikes; and providing new scheme members with discount vouchers that can be redeemed against cycling safety equipment at local retailers. These activities were supported by TfL's ongoing cycle awareness programme for all road users.

Before Barclays Cycle Hire was introduced in London, the different OYBike systems have been the most important BSSs in the UK. The implementation of London's BSS has been the biggest in Europe since 2007 and might influence further developments in bike sharing in the UK and Europe. Sponsorship on such a large scale, for example, is a new phenomenon for BSSs.

General	
Population (a)	61,792,100 inhabitants
Net income (b)	€ 23,362/person*year (in PPS)
Area	243,610 km² (94,060 sq miles)
Number of cities per category	>500,000 = 9 >100,000 = 56 >20,000 = NA
Internet access (c)	75 % of households
Mobile Phone access (c)	130/100 inhabitants
Traffic Framework	
Car ownership (d)	471 cars/1,000 inhabitants
Bike ownership (e)	380 bikes/1,000 inhabitants
Modal Split (f)	64 % Car (and Van, Taxi), 0.3 % Motorcycle 2.6 % Rail, 7 % Bus/Coach, 23.4 % Pedestrian, 1.6 % Bike,
Bike Framework	
Bike Policy Guideline	No National Policy Some guidance available: Department for Transport (2011)
1st Bike Sharing System	OYBike, 2004 An earlier automated scheme was first 3rd Generation system, opened 1996 at Portsmouth University with 2 hire locations - Bikeabout.
Number of BSSs working in the Country (g)	8
Number of BSS Companies working in the Country (g)	3 suppliers with active systems (1 supplier in 5 locations), 2 other suppliers with demonstration systems, 1 with 1 location.
(a) Office for National Statistics (2010a) **(b)** Eurostat (2011); 2008 **(c)** Eurostat (2011); 2009 **(d)** Eurostat (2011); 2006 **(e)** 2005 **(f)** Office for National Statistics (2010a); 2009 **(g)** 2010	

Table 27: Facts and Figures United Kingdom

References

OBIS Documents

Castro Fernández, A. et al. (2009a):
Common Country Study and Market Potential Data File.

Castro Fernández, A. et al. (2009b):
Bike sharing in ten European countries report.

Castro Fernández, A., Emberger, G. (2010):
European Transferability fact sheet.

Hayes, S., Frühauf Martin, C. (2010):
Optimising Bike Sharing fact sheet.

Petersen, T. (2010a):
Identification of key attributes of bike sharing.

Petersen, T. (2010b):
Key attributes of bike sharing - Practical implications.

Bibliography

Lundin, P. (2008): Bilsamhället - ideologi, expertis och regelskapande i efterkrigstidens Sverige, Stockholm, Stockholmia förlag

Internet Sources

BYPAD Project (2003): Bicycle Policy Audit BYPAD. http://www.bypad.org (accessed 31.03.2011)

České dráhy (2011): Booking Platform. http://cz.pujcovnykol.cz (accessed 31.03.2011)

Český statistický úřad (2002): Population and Housing Census 2001. http://www.czso.cz/eng/census/f_census.htm (accessed 31.03.2011)

Český statistický úřad (2010): Population statistics Czech Republic 2010. http://www.czso.cz/csu/redakce.nsf/i/obyvatelstvo_lide (accessed 30.09.2010)

City of Copenhagen (2009): Copenhagen bike-share international design competition 2009 – Winners. http://www.cphbikeshare.com/winners.aspx (accessed 31.03.2011)

Dector-Vega, G.; Snead, C.; Phillips, A. (2008): Feasibility study for a central London cycle hire scheme 2008, London, TfL. http://www.tfl.gov.uk/assets/downloads/businessandpartners/cycle-hire-scheme-feasibility-full-report-nov2008.pdf (accessed 31.03.2011)

Department for Transport (2011): Policy, guidance and research – Cycling. http://www.dft.gov.uk/pgr/sustainable/cycling (accessed 31.03.2011)

DLR, infas (2010): Mobilität in Deutschland 2008 (MiD 2008) - Ergebnisbericht Struktur – Aufkommen – Emissionen - Trends, Bonn, Berlin, BMVBS. http://www.mobilitaet-in-deutschland.de/pdf/MiD2008_Abschlussbericht_I.pdf (accessed 31.03.2011)

Eurostat (2011): European statistics. http://ec.europa.eu/eurostat (accessed 31.03.2011)

Fundación Movilidad (2009): Barómetro anual de la bicicleta 2009. http://www.fundacionmovilidad.es:8080/_archivos/_upload/_archivos/Barometro_bici_2009.pdf (accessed 31.03.2011)

Główny Urząd Statystyczny (2010): Population statistics Poland 2010. http://www.stat.gov.pl/gus (accessed 30.06.2010)

Institut national de la statistique et des études économiques (2010): Population statistics France 2009. http:// www.insee.fr/ fr/ themes/ theme.asp?theme=2 (accessed 01.01.2010)

Instituto Nacional de Estadística (2010): Population statistics 2009. http://www.ine.es/en/ prensa/np595_en.pdf (accessed 01.01.2010)

Istituto Nazionale di Statistica (2010): Population statistics Italy 2009. http://demo.istat.it/bilmens2009gen/index.html (accessed 01.01.2010)

Koordination bikesharing Schweiz (2011): http://www.bikesharing.ch (accessed 31.03.2011)

La Direction générale Statistique et Information économique (2009): Population statistics Belgium 2008. http://statbel.fgov.be (accessed 01.01.2009)

Lantmäteriet (2011): http://www.lantmateriet.se (accessed 31.03.2011)

Office for National Statistics (2010a): Population estimates United Kingdom 2009. http://www.statistics.gov.uk/cci/nugget.asp?id=6 (accessed 30.06.2010)

Office for National Statistics (2010b): Average number of trips by main mode Great Britain 1995/97 to 2009. http://www.dft.gov.uk/pgr/statistics/datatablespublications/nts/how-mode/nts0303.xls (accessed 31.03.2011)

Spolander, K. (2010): 2010:047 Cykelorganisationer och myndigheter i samverkan för ökat cyklande, Borlänge, Trafikverket. http://publikationswebbutik.vv.se/upload/5583/2010_047_cykelorganisationer_och_myndigheter_i_samverkan_for_okat_cyklande.pdf (accessed 31.03.2011)

Statistik Austria (2010): Population statistics Austria 2009. http://www.stat.at/web_de/presse/045362 (accessed 01.01.2010)

Statistische Ämter des Bundes und der Länder (2010): Population statistics Germany 2010. http://www.statistikportal.de/Statistik-Portal/de_zs01_bund.asp (accessed 30.06.2010)

Statistiska centralbyrån (2010): Population statistics Sweden 2009. http://www.scb.se (accessed 01.01.2010)

Swedish Institute for Transport and Communications Analysis (2007): 2007:19 The National Travel Survey 2005-2006, Östersund. http://www.sika-institute.se/Doclib/2007/SikaStatistik/ss_2007_19_eng.pdf (accessed 31.03.2011)

The OBIS Partners

Choice GmbH is the coordinator of the OBIS project. The company was founded in 1998 by the Social Science Research Centre Berlin (WZB) amongst others. Choice is an independent research, consulting and development company with a focus on bike sharing, E-Mobility and intermodal concepts.

Altran is a multinational company, providing global business solutions, strategy, engineering and development of technology applications focused on innovation. Created in 1982, it is today the European leader in Innovation Consulting. Altran Group is present in over 26 countries and has a team of more than 17000 consultants covering all fields of engineering and consulting. Altran has been present in Spain since 1993, specialising in Innovation Consulting, Engineering and Technology, Organization and Information Systems, and Strategy and Business.

Barcelona Municipality acts as the traffic authority for the urban area and published its first Cycling Master Plan in 2006. The Mobility Department coordinates and executes mobility projects defined within the Municipal Action Plan, covering all modes of transport. Since 2007, it has promoted an innovative Bike Sharing System called Bicing.

The Berlin Senate Department for Urban Development (SenStadt) is part of the administration of the Federal State and City of Berlin, responsible for an integrated urban transport policy. SenStadt has started an update of the Berlin Urban Transportation Plan which will extend the horizon from 2015 to 2025. The update has a strong focus on developing a comprehensive strategy to improve energy efficiency in transport and the protection of the urban environment.

Car Sharing Italia (CSI) manages different car sharing services in Italy. CSI parking areas are strategically located near PT hubs to encourage commuters to use the existing PT infrastructure, and thus reduce pollution. CSI was replaced by FLI in September 2010.

CETE de Lyon (CETE) is an agency of the French Ministry of Ecology, Sustainable Development, Transport and Housing. CETE works for central government offices, local authorities, semi-public and private companies. The main activities are engineering studies, inspections and tests, research and methodology and consultancy and assistance.

CTC – the UK's national cyclists' organisation, has 70,000 members and supporters and is the oldest and largest cycling body in the UK, established in 1878. CTC provides a comprehensive range of services, advice, events, and protection for members and works to promote cycling by raising public and political awareness of cycling's health, social and environmental benefits.

The Czech Transport Research Centre (CDV) has more than fifty years tradition of research and development. The institute is under the responsibility of the Ministry of Transport. Its missions are to provide: expert service for the Ministry and the transfer of foreign experiences and knowledge as well as the adaptation of EU legislation to the Czech Republic.

DB Rent GmbH as the mobility service provider of German Railways (German Railways) has been offering its know-how since 2001. DB Rent creates customised mobility from door to door by cleverly linking rail transportation offers and intermodal mobility offers making intelligent, environmentally friendly mobility concepts available to consumers as well as innovative strategies to interlink traffic systems.

Ecoistituto Alto Adige (ÖKI) was founded in Italy in 1989 as a not for profit organisation. Its projects and activities are focused on the promotion of and applied research into ecological innovation. ÖKI acts as a consultant for public administrations and private companies, conducts research projects financed by public administrations and implements cultural and educational initiatives.

Fondazione Legambiente Innovazione (FLI) is a part of Legambiente, the most widespread environmental association in Italy, with 20 regional branches, about 1,000 local groups and more than 115,000 members and supporters. FLI promotes innovation in the environmental field and the distribution of environmentally friendly goods, services and technologies.

MTI Conseil is specialised in engineering and intermodal management assistance work in areas related to issues of local transport. This structure employs forty full-time consultants. The entire staff consists of engineers, economists, transport experts, urban development specialists, sociologists and marketing experts. transport experts, geographers trained in territorial analysis, cartographers and computer specialists form a multidisciplinary team.

The Pomeranian Association Common Europe (PSWE) is a process and project oriented non-governmental organization having as its primary aim the development of Pomerania, Poland, based on the use of new technologies in connection with promotion of active mobility, healthy life style and protection of the natural environment. The organization is involved in activities of a number of international networks, such as: the European Cyclists' Federation (ECF) and the 'Cities for Mobility' (CfM).

The Royal Institute of Technology (KTH) was founded in 1827 in Stockholm. The university has extensive international research and educational exchange programmes with universities and colleges, mainly in Europe, the USA and Australia, but also increasingly in Asia. KTH participates actively in various EU research programmes and also cooperates with Swedish and international development agencies.

Transport for London (TfL) was created in 2000 as the integrated strategic body responsible for London's transport system. The primary role of TfL, which is a functional body of the Greater London Authority, is to implement the Mayor's Transport Strategy and manage transport services across the Capital. TfL is, among others, responsible for London's buses, the Underground and also for the new BSS Barclays Cycle Hire.

The Vienna University of Technology (TUW) was founded in 1815 and currently it has eight faculties and around 70 Institutes. The Research Center of Transport Planning and Traffic Engineering has particularly wide ranging experience in the field of modelling, methodology development and assessment of transport policies. Several integrated planning and management measures have been applied or studied in pre- and post analyses for many cities.