ID 1743 | POLICIES AND MEASURES TO PROMOTE BICYCLE USAGE IN STARTER CYCLING CITIES: THE CASE OF LISBON

João Marrana[1]; Francisco Serdoura[1]
[1]CIAUD - Centro de Investigação em Arquitetura, Urbanismo e Design
jcdmarrana@fa-ulisboa.pt ; fs@fa.ulisboa.pt

ABSTRACT: The role of policies and strategies in the promotion of bicycle usage in urban transportation is a key subject regarding the future of sustainable mobility in developed cities. This paper's intent is to contribute with a critical review on the meanings and particularities of cycling policies and measures, focusing on their nature, implementation procedure and levels of operability, while exploring their role in the 'future' of urban mobility in cycling starter cities. Hence, a general review of published studies on existent procedures, which directly and indirectly influence bicycle usage, is presented recurring to contemporary peer-reviewed and 'grey' literature. To illustrate the paper's findings and argument, a case study is also presented, focusing on Lisbon's cycling network. Preliminary findings suggest that cycling policies can be described as a set of programs developed with the intent of establishing direct and indirect rules and actions, envisioning the increase of cycling. They vary in both nature (physical, soft, complementary and knowledge measures) and implementation (short-run and long-run procedures), and are particularly effective when developed and executed at a local level. Thus, it can be argued that cycling policies and strategies can play a key role in the promotion of cycling as urban transportation and that the importance of such measures and actions differ per city's cycling development stage. This paper also supports that the success of bicycle usage in cities is strongly dependent on both political will and resolve and on a comprehensive approach, one that provides a coordinated and integrated package of cross-cutting multi-level policies and measures.

KEYWORDS: Cycling, Policy, Measure, Mobility, Urban, Lisbon.

1 INTRODUCTION

The role of policies and strategies in the promotion of bicycle usage in urban transportation systems is a key subject regarding the future of sustainable mobility in developed cities. This paper's intent is to contribute with a critical review on the meanings and particularities of cycling policies and strategies, focusing on both their nature, implementation procedure and levels of operability, while exploring their role in the 'future' of urban transportation, particularly in starter cycling cities. A systematic review of contemporary peer-reviewed and 'grey' literature regarding bicycle usage is presented. To illustrate the paper's findings and argument a case study is also presented focusing on Lisbon's cycling network. Considering the PRESTO Project, which establishes different stages of cycling development per effort and achievement considering existent cycling conditions and rate, Lisbon is presently at its starting point. In result of its car-oriented design and insufficient and disconnected cycling infrastructure the city's daily trips are currently well under a 5% share. To reverse this scenario, the Municipality has been implementing several policies and measures, focusing mostly on 'physical' efforts, overlooking important soft and complementary programs and actions. Our findings suggest that 'cycling policies' can be defined as a package of programmes and measures, used both by public authorities and private stakeholder's, establishing direct and indirect strategies, actions and rules of procedure to increase and encourage cycling as a secure, comfortable and attractive mobility solution, regardless of its purpose. Results also suggest that cycling policies and strategies diversify in nature (physical, soft, complementary and knowledge measures) and implementation (short-run and long-run procedures) being particularly effective when executed at local levels, especially if spatial dimension and territorial dispersion of urban areas is not overlooked in the process. According to Rietveld & Daniel (2004), there is a positive correlation between the development and implementation of cycling measures by local authorities and the increase of bicycle usage. At higher levels, such measures focus mostly on establishing general goals, providing dedicated funding and continued cooperation with lower levels of government. Thus, it can be argued that cycling policies and strategies play a key role in the promotion of cycling as urban transportation and that although there are many ways to increase cycling each city's situation is unique and requires a tailored mix of

policies and measures. This paper also supports that the success of bicycle usage is dependent on both political will and resolve and on a comprehensive, integrated and long range approach where the involvement and commitment of people, public and private actors is of extreme importance.

2 LITERATURE REVIEW: CYCLING POLICIES AND MEASURES

According to Healy (2006), the term 'policies' can be understood as an explicit governmental statement, mostly used as guidelines, with the intent of describing the vision and goals that authorities intend to implement. For Portas, et al (2003) such planning instruments should be sufficiently revealing and adaptive in order to provide signs of fresh dynamics, investment opportunities and new dimension requirements, while also establishing coherence at different spatial dimensions and with different authorities and stakeholders.

These should also be consistent with the established rights and responsibilities of both citizens and administrative authorities. Such policies are often designed to respond to a particular purpose or need, during a particular period of time (CROW, 2016). The chapter intends to clarify the role and importance that policies and measures have in the development of bicycle networks, by providing a clear description or their significance by studying their adequate levels of governmental and spatial intervention, and by characterizing both their nature and implementation procedure. In addition, a description of key policies and actions influencing bicycle provision in starter cities is also presented. Discussion will make a critical review on the accuracies and meanings of such policies and actions, as well as a reflection regarding their importance in the development of bicycle infrastructure and promotional programmes. Therefore, a systematic review of contemporary[1] peer-reviewed literature was conducted, regarding policies, strategies and measures influencing bicycle provision in cities which are presently at a starting point of their cycling network development. An analysis of non-peer-reviewed 'grey' literature was also conducted, focusing on data published by independent agencies and multi-level government authorities in Europe. To access such information, in addition to public libraries, on-line scientific libraries, such as Science Direct, Web of Science, Google Scholar and Transport Research International Documentation (TRID), were consulted. Website analysis of organisations such as European Cyclist's Federation (ECF), European Commission (EC) and European Travel Safety council (ETSC) was also conducted. Searches included the following terms combined with bicycle, cycling, bicycling and/or bike: policies, strategies, planning, measures, actions, infrastructures, programmes, communication and training.

2.1 DEFINITION

Although several definitions are provided by experts and academics, they all possess as common feature the fact that 'cycling policies' represent a package of strategies and actions which are specifically devised to increase bicycle commuting (Buehler & Dill, 2016; Heinen et al, 2010; Noland & Kunreuther, 1995). For Pucher, et al (2011, 2010) such definition should also highlight the importance of safety conditions when commuting. Additional variations were also verified, focusing either on travel distances (shorter trips), cycling uses (utilitarian and / or recreational), provision of cycling facilities (bikeways and parking), and car restrictive measures (Tsenkova & Mahalek, 2014; Tin Tin et al, 2010; Santos et al, 2010). Furthermore, in order to provide a deeper analysis, both words naming the concept of 'cycling policies', were studied separately by accessing respected online dictionaries. The Merriam-Webster dictionary provides several descriptions for the word 'policy', namely: "prudence or wisdom in the management of affairs; and a high-level overall plan embracing the general goals and acceptable procedures, especially of a governmental body". Oxford dictionary defines the same word as "a course or principle of action adopted or proposed by an organization or individual". Cambridge dictionary refers that 'policy' means a set of ideas or a plan of what to do in particular situations officially agreed to by a group of people, a business organization, a government, or a political party. The Encyclopaedia Britannica defines 'policy' as "a set of measures or actions (plans, regulations and behaviours) used by a government, a corporation or other organizations, both public and private". Regarding 'cycling' (cycle/bicycling), the Merriam-Webster dictionary describes it as the act of 'riding a bicycle' and the Oxford dictionary as "the sport or activity of riding a bicycle".

[1] Published between 2000 and 2016.

Cambridge dictionary considers it to be the act of “riding a bicycle or related to riding bicycles”, while Encyclopaedia Britannica, defines ‘cycling’ as the “use of a bicycle for sport, recreation or transportation”. Cross referencing all prior descriptions one verifies that although different in content they are in fact relatively similar in concept.

2.2 LEVELS OF INTERVENTION

According to Graham & Marvin (2001), the majority of cities across the world display spaces that are interconnected to other areas within the urban landscape and across national and international distances, forcing us to consider that space and scale are being refashioned in ways that change the configuration of existent infrastructure networks, thus reshaping physical and social environments of cities. Different scales of intervention, jurisdiction and representation hold a key part in the debate concerning the role that public authorities have, or should have, in spatial planning, particularly regarding bicycle network development. For the European Commission (2011) there is considerable potential for increasing the number of travellers using bicycles instead of motorized vehicles in their daily commutes within urban areas. But to achieve such intent, planning practice will necessarily have to consider integrated multi-level policies, strategies, rules and measures, which should preferably be provided by different policy sectors and levels of government (Stead, 2010). There are several concepts regarding spatial or territorial ‘levels or scales’. For Johnston, et al (cited in Marston, 2000, p. 220) ‘scale’ can be defined simply as a ‘level of representation’. Castells (cited in Brenner, 2000, p. 363) believes that ‘scales’ are representative of the different spatial unit’s[1] that constitute the capitalist system, in an attempt to define territorial levels as spatial expressions of social functions. Howitt (cited in Marston, 2000, p. 220), considers that the concept of ‘scale’ holds other distinct aspects namely size, level and relation, claiming that scale should be assumed nor as dimension (urban, metropolitan, continental) or level (local, regional, national), but as a relational element, one that is part of a complex mix that also includes the notions of space and place. Such multiplicity of accumulated and enclosed spaces, actively and interactively produce the territories which we inhabit, which we observe and, one may add, which we (re)shape. Therefore, it is intended to comprehend which ‘dimensions’ and ‘levels’ are most suitable considering the development of cycling networks. The concept of ‘level or scale’ was addressed from a governmental and organizational perspective (public and private), considering the following levels of political power: Community[2]; Central; Regional; and Municipal. The concept of ‘dimension or size’ was analysed from a territorial perspective, considering the following dimensions: European, National, Metropolitan and Urban[3]. For the past years, several policies and guidelines have been developed at a Community level, with the intent of actively and positively contribute to territorial cohesion and sustainable mobility of member states. In the European Union, there are particular examples such as the Territorial Agenda 2020 (2011), which revises the Leipzig Charter (2007) on sustainable European Cities; the European Transport Safety Council Report (2012) regarding security policies and strategies for bicycle commuting within the European Union; the European Commission Report (2013) regarding the development of sustainable urban mobility plans; and the Declaration of Paris "City in motion: People first" (2015), which defines strategic priorities for future projects regarding transport, health and the environment, underlining the importance of promoting people-centred policies with the intent of facilitating access to inclusive, sustainable and healthy mobility systems. The European Commission is also supportive of the concept that cycling actively contributes to the improvement of urban quality of life and has been increasingly supporting the development of cycling projects (European Commission, 2013, 2011; Van den Noort, 2007). Overall, the European Union has been setting the general framework, providing funding and establishing standards regarding good cycling practices and continued cooperation with member state regions and municipalities (Mircea, 2012; Dufour & Ligtermoet, 2010; Banister et al, 2007). Central governments influence cycling through national policies intended to increase bicycle usage and safety, dedicated funding to regional and municipal governments, traffic regulations, roadway and bikeway design standards, in addition to mass dissemination of cycling knowledge and benefits. However, most policies that increase cycling and make it safer are developed at regional and, in particular, municipal levels, since in addition to having the ultimate responsibility for adopting and implementing specific bicycle infrastructures and programs, they frequently reveal courageous political will and leadership to support and finance cycling for transportation, by pursuing challenging and difficult measures, since, in most cases, people still favour commuting by car (Buehler &

[1] Neighbourhoods, urban cores, metropolitan regions, national urban systems.
[2] Community’ level refers to supranational organizations, in reflexion to the present European system.
[3] European’ dimension refers explicitly to the European Union, while ‘Urban’ represents the city dimension.

Pucher, 2012; Urbanczyk & Laubenheimer, 2011; Blackledge et al, 2007; Rietveld et al, 2004). Despite its relevance and importance, the association between the urban dimension and the municipal level may not produce effective legislation, since regulations that identify and specify the necessary standards may already exist at higher levels (regional or central). Therefore, when necessary, bicycle projects can be developed with the intent of enabling and implementing particular policies by recurring to urban projects which otherwise could not be considered since they had no apparent legal framework (Portas et al, 2003). Moreover, beside these spatial dimensions and governmental levels, the spatial size of cities should also be considered when developing cycling plans. According to Pucher and Buehler (2012), promoting bicycle commuting in large cities[1] is considerably more challenging than in small cities[2], since in addition to their greater land area, longer trip distances, more extensive transportation systems, heavier traffic, and more noise and pollution, larger cities often comprise more local governmental jurisdictions and thus, additional bureaucratic layers. On the other hand, cycling development in small cities is less challenging for all the opposite reasons. Spatial variation in bicycle use within cities is also an important subject. Cycling rates tend to be significantly higher near centre and historic urban areas, since they are in close distance of important amenities (transport interfaces, university centres and cultural facilities) and social, commercial and service areas, in opposing to outer neighbourhoods (Buehler & Pucher, 2012).

2.3 NATURE AND IMPLEMENTATION

Sadik-Khan & Solomonow (2016) consider that "(…) streets are the social, political and commercial arteries of cities (…)" (p. 3). However, current levels of motorized traffic commuting in such 'arteries' are as undesirable as they are unsustainable (Van den Noort, 2007). Public policies and measures on sustainable transport that until recently had been mostly directed at motorized vehicles are now being 'redirected' to other modes of transportation, namely bicycle commuting. The importance of policies and measures to promote cycling has been steadily rising and is now well recognised by the European Union in addition to local, regional and national authorities. Therefore, the following subchapter will address physical, soft, complementary and knowledge cycling policies and measures, focusing on their nature (push and pull) and implementation procedure (short and long-run). A general framework of programs and actions that positively influence bicycle usage, particularly in starter cycling cities[3] will also be presented. According to Santos, et al (2010) physical policies focus on measures of infrastructural nature, and are an indispensable first step in encouraging cycling in starter cities by providing cycle friendly facilities and developing cycle routes and networks (Riley, 2001). In addition to increasing travel safety and comfort, such physical measures signal commitment from local authorities and also send the message that cycling is a respectable and 'usual' way to commute within cities (Dufour & Ligtermoet, 2010). However, no single measure suffices and it is now clear that focusing on cycling infrastructure provision, although important, will not by itself lead to an increase in bicycle mode share (Pucher & Buehler, 2012; Urbanczyk & Laubenheimer, 2011; Van den Noort, 2007). Getting people to commute by bicycle requires a sustained campaign that makes people aware of new choices in result of new infrastructure developments. Coordinated with physical policies, soft policies (Santos et al, 2010; Riley, 2001) have proven effective in stimulating people to commute by bicycle (Pucher & Buehler, 2012; Urbanczyk & Laubenheimer, 2011; Pucher, Dill & Handy, 2010). These are intangible measures intended to bring about behavioural change by publicizing infrastructure improvements and availability, promoting travel awareness, information, special events, training and education programmes. Communication should start as soon as there is a clear commitment to cycling improvement programs, thus providing the opportunity to put cycling on the map, focusing on particular groups, such as students, millennials, recreational users and eco-friendly clusters, among others (Urbanczyk & Laubenheimer, 2011). Furthermore, complementary policies and measures should also be considered, namely those intended to restrict or hamper car use and circulation, discourage car purchase, adopt cycle friendly regulations, design mixed-use communities and transit oriented projects that facilitate the proximity of residential areas to transport hubs, local amenities, commercial and service centres (Pucher & Buehler, 2012; Pucher, Dill & Handy, 2010). Also, the adoption of bicycle use by certain visible professions, such as postal carriers and the police, may contribute to increase cycling visibility and credibility (Urbanczyk & Laubenheimer, 2011). Knowledge policies which emphasize the role of investment in research and development towards sustainable mobility should also

[1] According to Buehler & Pucher (2012), large cities have over 500.000 residents in their metropolitan area.
[2] According to Handy, et al (2012), small cities are defined as having fewer than 300.000 residents.
[3] Cities with insufficient users (mode share under 5%), scarce cycling infrastructure, car oriented road design and absent cycling culture (Urbanczyk & Laubenheimer, 2011; Dufour & Ligtermoet, 2010).

be considered (Santos et al, 2010). Considering the diversity of policies and actions designed to increase bicycle usage, a general framework is presented including some important measures, particularly used in starter cycling cities with the intent to make cycling possible, safe and respectable (see table 1). Regarding the nature of cycling policies and measures, one can consider two distinct yet complementary solutions to achieve a modal shift from commuting by car to bicycle usage (Riley, 2001). Push measures[1], or 'sticks', developed with the intent to persuade people away from car usage by making driving less attractive (allowing to improve cycling competitiveness regarding car travel), and pull measures[2], or 'carrots', aimed at improving and creating alternative mobility solutions, such as bicycle commuting, enhancing safety, convenience and comfort of bicycle users (Eriksson et al cited in Santos et al, 2010; Kalter, 2007; Riley, 2001). According to Rietveld & Daniel (2004), such policies, commonly used in transportation research, appear to adequately apply to bicycle usage as well. Push and pull measures need to be combined in a mutually supportive package of policies restricting car commuting while improving and promoting the availability and attractiveness of alternatives, focusing on public transport, car sharing, cycling and walking (Buehler & Pucher, 2012; Banister, 2008). Policy combination theory considers that the effects of policies increasingly reinforce each other, so that the total effect of a policy package is larger than the sum of their effects if applied separately (Lautso & Wegener, 2007). Nonetheless, push measures appear to also have stronger impacts than pull measures in bicycle development (Blackledge et al, 2007; Kalter, 2007). The implementation of policies and measures affecting the provision of bicycle commuting and its integration with public transit is a complex process that is being increasingly established (Tsenkova & Mahalek, 2014). For any starter city to adequately promote cycling policies, key factors have to be secured, namely: garner necessary public and political support, commitment and encouragement; determine an appropriate package of policies and actions; ensure a good policy development process[3]; and devise a tailored mix of short-run and long-run implementation procedures (Pucher & Buehler, 2012; CROW, 2009). For Noland and Kunreuther (1995), long-run procedures are frequently used when employing 'push' policies and measures. Given their sensitive and challenging nature they require careful planning and promotion resulting in a more time-consuming development. On the other hand, short-run procedures, which are usually associated to the implementation of pro-bicycle actions (pull measures), provide a swifter process due to their more direct and less challenging character (Noland & Kunreuther, 1995). The successful implementation of such policies and measures often depends on strong leadership and adequate capability of authorities to integrate the necessary elements for overcoming existent 'traditional barriers' and 'cultural attitudes' on cycling (Pucher, Buehler & Seinen, 2011; Blackledge et al, 2007; Van den Noort, 2007; Rietveld & Daniel, 2004). Implementation also requires complementary efforts from other individuals and interest groups, such as cycling advocacy organizations[4], in addition to local authorities (Pucher, Buehler & Seinen, 2011).

		Measure	Push	Pull	Long-run	Short-run
Physical policies (infrastructure)	Routes & links	Bicycle tracks		●		●
		Bicycle lanes		●		●
		Contra-flow bicycle lanes		●		●
		Bicycle streets		●		●
		Shared lanes (with traffic, buses and pedestrians)		●		●
		Bicycle trails		●		●
		Bicycle advanced stop lines and turn boxes		●		●
	Intersections	Right-of-way		●		●
		Roundabouts		●		●
		Traffic-light		●		●
		Crossings (street level and elevated)		●		●
	Parking	Sheltered/Unsheltered		●		●
		Guarded		●		●
		Lockers		●		●
		Private (workplaces, residences, malls ...)		●		●

[1] Expand paid parking areas, fewer parking places and higher rates in urban centre areas, congestion charging, car free streets, traffic calming measures, among others (Kalter, 2007).

[2] Construction of cycling routes and networks, improve cycling parking facilities, reduce waiting time at intersections and crossings, tax benefits for bicycle users, among others (Kalter, 2007).

[3] Hoogerwerf & Herweijer (cited in CROW, 2016, p. 21) identify six phases in policies development process: Agenda; Policies Preparation; Decision; Implementation; Compliance and enforcement; and Assessment.

[4] Such organizations have played a key role in cycling promotion by helping to organize and publicize cycling events, while providing useful information and conducting bicycle training programs.

	Public transport	Bicycle facilities at transport stops and interchanges		●		●
		Bicycle racks on buses		●		●
		Bicycle racks on trams and subway		●		●
		Bicycle racks on trains		●		●
		Bicycle racks on boats		●		●
Soft policies (promotion)	Promotion	Promotional campaigns		●		●
		Events and festivals		●		●
		Travel awareness programs		●		●
		Specific programs (bike to work and school days …)		●		●
	Information	Wayfinding signage		●		●
		Information centres		●		●
		Bicycle routes map distribution		●		●
		Trip reduction programs		●		●
		Safe routes to school		●		●
	Education	Child learning and safety programs		●		●
		Adult learning and safety programs		●		●
		Bicycle testing events		●		●
		Motorist training and education		●	●	●
Complementary policies	Diverse	Bicycle Sharing		●		●
		Restrict car use (congestion charging reduce parking availability)	●		●	
		Increase car parking cost	●		●	
		Cycle friendly traffic regulations	●		●	
		Traffic calming		●		●
		Car free zones		●		●
		Mixed streets		●		●
		Improve public transportation	●		●	
		Design mixed-use communities	●		●	
		Transit oriented development projects	●		●	
Knowledge policies	Diverse	Research and development		●		●
		Bicycle counters		●		●
		Bicycle traffic analysis (loop detectors or direct observation)		●		●
		Bikeability assessment		●		●

Table 1 – General framework of programs and measures[1]

The integrated and coordinated implementation of incentive and restrictive measures, in association with comprehensive bicycle plans, is crucial in increasing bicycle commuting, and has been associated to the on-going expansion of cycling share, especially in European Countries (Buehler & Pucher, 2012; Pucher & Buehler cited in Tin Tin et al, 2010, p. 61; Noland & Kunreuther, 1995).

2.4 DISCUSSION

The importance of a right set of policies and adequate development and implementation process in cycling promotion is now well recognised, particularly in cities that intend to increase their bicycle share (Pucher & Buehler, 2012; Van Den Noort, 2007). Our findings suggest that such 'cycling policies' can be defined as a package of programmes and measures, used both by public authorities and private stakeholder's, establishing direct and indirect strategies, actions and rules of procedure to increase and encourage cycling as a secure, comfortable and attractive mobility solution, regardless of its purpose (utilitarian or recreational). Such policies are most effective when developed and executed at a local level, particularly if spatial dimension and territorial dispersion of urban areas is not overlooked in the process. At higher levels, such measures focus mostly on establishing general goals, providing dedicated funding and continued cooperation with lower levels of government. The development of policies and measures should be cross-referenced with different government levels and spatial dimensions by ensuring that considered planning systems achieve both vertical and horizontal integration, namely, governmental cooperation and spatial consistency and coherence (Buehler & Pucher, 2012; Banister et al, 2007). In addition, results also suggest that cycling policies and measures may possess distinct, yet complementary, forms and natures, devised with the intent to implement 'encouraging and discouraging actions' to promote bicycle commuting, during a particular period of time, preferably including a tailored mix of short and long-run

[1] This table is based on the European Commission Presto Project - Promoting cycling for everyone as daily transport mode, and work developed by Pucher and Buehler (2012) and Pucher, Dill & Handy (2010).

procedures. Such an effective and integrated implementation requires interactive and participatory processes, where the involvement and commitment of people, public and private actors is of great importance in raising society's awareness regarding sustainable urban mobility, namely bicycle commuting.

3 CASE STUDY: THE CASE OF LISBON

Lisbon has a land area with nearly 100 km2 and is home to approximately 547.773 citizens. Such extensive territory is characterized by a large plateau and 15 km of riverfront as well as numerous routes along valleys and ridges (CML, 2013). The City is currently expanding and improving its bicycle network, with the intent of making cycling possible, safe and more respectable. The main goal of such investment is the improvement of both security and comfort conditions during circulation in addition to the reduction of energy consumption, pollutant emissions and noise level. Also, the promotion of cycling as a valid alternative in urban mobility will contribute to elevate the city's quality of life and improve its accessibility, making it more attractive and inclusive. This chapter describes and explains Lisbon's cycling network focusing on its evolution and considered policies and measures. The research method focused on qualitative data, namely literature review of policies, strategies and measures influencing bicycle provision in starter cities and content analysis of reports, public presentations, infrastructural solutions and promotional programs concerning bicycle commuting development in Lisbon, including the city's bicycle network layout. Also, exploratory interviews were conducted with Municipality's advisor and technical staff, responsible for the network development and overseeing. Most used information was provided directly by the Municipality of Lisbon, although additional data was also retrieved from specific websites (Municipality and bicycle friendly association's)[1].

The authenticity of such information as well as the credibility of its source was determinant criterion regarding its assortment and use. Regarding techniques and tools, in addition to observation of documental information, a spatial analysis of the city's cycling network allowed to understand its evolution, hierarchy and bicycle route types. Such analysis provided a better understanding of the intent and level of commitment the Municipality has regarding bicycle commuting. It also allowed to group and study the incidence of the network's bicycle routes typology, thus enabling to understand the level of effort regarding the construction of safe and comfortable routes. These analyses were developed recurring to CAD and GIS software, in addition to Google earth satellite images[2].

3.1 NETWORK DESCRIPTION AND EVOLUTION

The development of the city's cycling network was analysed considering two distinct moments. The first moment, which began during the year 2000, was a lengthy and complex process. In seven years merely 14 km of routes were built, namely in Monsanto Park, to the west of the city, in the Campo Grande urban park, located in Lisbon's central area, in Telheiras located to the north, and in the Parque das Nações area, located northeast of the city. In 2007, Lisbon was a city without cyclists despite all created paths, making it difficult to justify a continued commitment in this type of infrastructure (CML, 2013). Nonetheless, the municipality resiliently continued to focus on its network continuity and evolution, reinforcing its development dynamic. Between 2008 and 2009 Lisbon expanded the network in approximately 24 km, an increase of approximately 170% regarding the first seven years. Between 2010 and 2014, 26,2 km of new routes were added to the city, namely the river link between the area of Parque das Nações and the downtown historical area. Also, a cycling route was implemented in Avenida Duque de Ávila and Avenida da Liberdade, one of Lisbon's most emblematic and important boulevards. Overall, in the course of 14 years, little over 63 km of cycling network were developed. During this first phase, the focus was in establishing connections between existing green areas and important amenities and infrastructures such as public transport interfaces and university areas (CML, 2013). Of the developed network, implemented between 2000 and 2012, merely 28% were deployed in road areas (roads and parking spaces), with the remaining 72% constructed in green spaces and pedestrian areas (sidewalks). Although not being the

[1] MUBi – Bicycle friendly association for urban mobility; FPCUB – Portuguese federation of cycling tourism and bicycle users; FPC – Cycling Portuguese Federation.
[2] Images captured between July 2001 and February 2016.

most convenient solution such option was considered valid since during this first phase, which according to the Municipality can be considered as an experimenting phase, the network was developed using a more conservative approach focused on users unaccustomed to travel by bicycle, especially in a system dominated by motorized vehicles. However, in 2013 a different approach began to be introduced (second phase)[1]. In addition to the devise of the city's cycling network, the development of bicycle routes gained a fresh momentum and started displaying a different concept, with 63% of all new bicycle routes sharing the road with motorized vehicles, 24% in parks and green areas and merely 13% in sidewalks. Whenever possible, segregated routes were created, particularly in areas with higher traffic volume, intensity and speed (CML 2013). Despite the absence of quantitative data, by 2014, particularly during spring and summer, it was noticeable that more people where already commuting by bicycle (CML 2013). During this second phase, the Municipality intends to create approximately 90 km of new bicycle routes across 142 streets, and approximately 70% of such routes will be completed until 2019 (CML, 2017). Considering this new strategic framework, one that envisions the bicycle as a mobility solution supportive of the public transportation system and focused on utilitarian cycling, a new network layout was designed with the clear intent of increasing bicycle share in Lisbon. This moment, which one could say corresponds to an assertion and expansion phase, is also characterized by an enhanced focus in user's requirements, regardless of their age, gender or experience, and a new hierarchical organisation system. Three levels were considered: Fundamental; Complementary; and Local. The fundamental network intent is to enable daily commutes between the city's different 'core areas' and neighbouring municipalities such as Amadora, Odivelas, Oeiras, Loures and Almada. Considering such agenda, the bicycle routes need to ensure safe, comfortable and functional travels to its users so that they can commute quickly and efficiently. The complementary network has the key purpose of establishing connections between the fundamental and the local network and to important amenities (public transport interfaces, university centres and cultural facilities, among others.) in addition to social, commercial and service areas. The local network intent is to ensure home to work connections, while also enabling easier access to local commercial and service activities. This hierarchical system has a key role since it contributes to the creation of safe, fast and comfortable commutes throughout the city. In addition, the existent network will also be rehabilitated, 250 new bicycle parking areas will be constructed, and a shared bicycle system will be implemented with an estimated offer of 1.410 bicycles, most of them electric, distributed by 140 stations.

3.2 CONSIDERED POLICIES AND MEASURES

The information included in the following subchapter was provided by the Municipality, namely reports and public presentations, but most importantly, it was retrieved from interviews conducted with Municipality's advisor and technical staff responsible for the development, implementation and management of Lisbon's cycling network. Focusing on programs and actions associated with the network´s current development phase, these interviews were structured in order to understand the following: Intended agenda (political and technical), allowing to verify if it addresses societal needs and requirements; Policy preparation, focusing on steps taken during the plan's development; Policy decision, namely what type of support and agreements were necessary and secured; Policies implementation process, considering the network's current focus and its envisioned evolution; Compliance tools and procedures to enforce the selected policies and measures; and Evaluation of achieved results, allowing to understand if the considered goals were accomplished[2]. According to the Municipality, Lisbon's cycling network was developed considering a medium to long term political agenda, sustained by both its governmental and technical staff, with the intent of promoting bicycle commuting as a 'new' solution in urban mobility, one that needs to be carefully integrated with the city´s present and future transport system, as part of its sustainable mobility and environmental strategies. Its main goal is to increase cycling[3], and provide users, regardless of age, gender, travel purpose and experience, with a secure, direct and comprehensive bicycle system. In order to develop its network, in addition to information gathering, different spatial and social analysis were developed by the Municipality[4], in addition to the development and assessment of different solutions prior to the conclusion of the 'final' network layout. However, during the design phase of considered bicycle

[1] The local authority's government programme regarding sustainable mobility clearly stated the intent to include cycling in its agenda (2013-2017).
[2] Based on Hoogerwerf & Herweijer policies development and implementation stages (CROW, 2016).
[3] The current share is under 1% according to provided information. Regarding intended cycling share objectives, a specific value was not established by the Municipality.
[4] Traffic network; Land use and constraints; Amenities, commercial and service areas; Public transportation system; Urban morphology; Public space; Terrain model; Master plan and regulations, among others.

routes it became clear that necessary adjustments to the network layout were needed[1]. Also, a formal strategic report of the cycling network was not developed, although a draft version was completed by the Municipality's technical staff, a fact that some of the interviewed were unaware. This was a complex process, made of forward and backward movements, which involved substantial negotiation, mostly at a governmental and political level (between deputy mayors offices and local parishes), regarding the concept, route typology and implementation procedures. Regarding the network layout, quorum was definitely achieved, namely regarding the fundamental and complementary network levels. Nonetheless, not all urban projects currently being developed seem to be aligned with the envisioned strategy, presenting questionable solutions regarding cycling routes and intersection design, possibly affecting users safety, directness and comfort, and in the long run, the increase in bicycle usage. Presently the network's development focus is almost exclusively in physical measures overlooking soft measures in particular. Considering both political and technical conditions and momentum, it is conceivable that by 2018/2019 the additional 90 km's of cycling routes will be added to the current cycling network, focusing on its fundamental and complementary levels. In order to ensure the compliance and enforcement of the network's designated objectives, programs and actions, in addition to Lisbon's Master plan, the Municipality possesses as additional tools local regulations and design recommendations and guidelines included in the city´s public space design manual. However, additional tools such as communication and information events are not being considered, making it more challenging to campaign for cycling. It is expected that the launch of Lisbon's bike share system may reverse such scenario. Nevertheless, the key question centres on the extent to which the envisioned goals are being fulfilled, and in that regard the results do not disappoint. Although obtained by direct observation analysis, it remains clear even to cycling sceptics that more and more people are now commuting by bicycle. Such finding is also supported by results presented by Lisbon's existent bicycle counter located in one of the city's centres. Data analysis allows us to conclude that regarding a three-month period[2], this year's values reveal a 60% increase in cycling journeys when compared to those retrieved in 2016. Regarding developed policies and measures, they focus frequently on physical policies (infrastructure), namely: Routes and links design, including several elevated connections; Intersection design, focusing on safety and reducing stop periods for users; Parking solutions, although additional focus is needed regarding the creation of sheltered and guarded parking solutions; and Public transportation, such as allowing users to travel with their bicycles on trains, subways and buses in addition to creating parking facilities at stops and interchanges. Concerning complementary measures, present attention is clearly in the implementation of the city's bike share system. Additional actions such as traffic calming, mixed streets, improving public transportation frequency, and creating parking areas near city's entrances are also being considered. The creation of management policies and measures regarding urban logistics and tourism shuttle transportation is also being assessed. Knowledge policies, namely installation of additional bicycle counters throughout the city, focusing on its centre areas, and the creation of partnerships with local universities with the intent of analysing cycling's evolution and performance are also being deployed. However, as previously stated, soft measures development and implementation is considered to be overlooked, either regarding the number or frequency of promotion, information and education actions and events. Nevertheless, soft actions have already been executed, namely learning and safety programs, events and festivals, safe routes to school, bike to work days, mostly driven by private cycling advocacy organizations working in collaboration or with the endorsement of the Municipality, corroborating the important and active role that such groups have in campaigning for cycling.

4 CONCLUSION

The importance of Policies and measures in promoting bicycle usage in cities is widely recognised by providing positive impacts in cities environment, road safety, health issues, social equity, improved mobility and accessibility, among others. According to Van den Noort (2007), such programs and actions are targeted to correct misperceptions that people may have about cycling and to highlight its positive aspects and benefits in order to increase usage. Lessons learned also suggest that in addition to being most effective at a Municipal level, such policies and measures should be developed and implemented considering a comprehensive and integrated approach, cross-referenced to higher governmental levels and different spatial dimensions, ensuring the involvement and commitment of people, public and private stakeholders. However, no two cities are alike. Although distant from realities of other cycling cities such

[1] Such network layout inconsistencies are in fact a natural part of the spatial planning process (systemic theory).
[2] From February to April.

as Amsterdam or Copenhagen, Lisbon may shortly increase its current share to values close to cycling cities such as London, Seville and even Paris. Upon its completion, Lisbon's cycling network will have approximately 160 km of routes, representing an increase of nearly 140% in a short period of time. This is a clear demonstration of the Municipality's intent and determination in promoting bicycle usage as a valid and viable solution considering the city's intended mobility system and environmental sustainable agenda. According to the PRESTO Project[1], starter cities such as Lisbon, should have as main goal making cycling possible, safe and respectable, and focus on infrastructure efforts (physical policies) with the intent of developing safe, direct, and coherent routes. Promotional efforts, namely soft, policies, should also be considered, focusing on measures and programs that encourage, convince and reward cycling, in addition to publicizing infrastructure improvements thus providing the opportunity to put cycling on the map and hopefully stimulating people to start riding. Regarding implementation procedures, these should focus on a neighbourhood scale progressing to a city wide network as cycling increases. By cross referencing Lisbon's deployed policies and measures with the PRESTO project guidelines, it becomes clear that in overall the city's network is being developed and implemented in accordance with such recommendations. However, the network's infrastructural efforts started being developed at a city-wide dimension instead of focusing on local neighbourhoods. In addition, important features are being overlooked, namely soft policies and measures focused on promotion, education and information efforts. It is important to increase the understanding of both the public, politicians and the media regarding planning concepts and issues to provide a more clear and tangible knowledge regarding the Municipality's intentions and objectives for its cycle network (Banister et al, 2007). Also, additional and more specific objectives should have been presented instead of a single general goal such as 'increase cycling'. Establishing a bicycle share value to be achieved during a timeframe would allow to more accurately assessing if the intended objectives were being met and why. The inexistence of a strategic report that sets overall goals, details policies and actions to be achieved during a specific timeframe and provides for a comprehensive, coordinated and integrated approach, in addition to the identified inconsistencies in the network layout, makes it difficult to recognize Lisbon's cycling network as an effective planning and compliance tool. Preliminary results regarding the increase in cycling usage are encouraging and future expectations are high. To continue with its cycling progress, Lisbon will have to achieve an adequate balance between physical, soft, complementary and knowledge based policies and measures, set out a vision and a clear strategy and monitor results along the way. It can be argued that real change can only be attained by changing priorities and actions of individuals and by promoting debates regarding what type of cities people want to live in (Banister, 2008). Therefore, two fundamental questions must be placed by Lisbon's public authorities: Are we serious about promoting cycling as urban transportation and what are we willing to continue changing to get there?

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[1] The PRESTO Project provides a sequence of cycling development efforts, defining broad objectives and packages of policies and measures adjusted according to a city's cycling level, focusing on cycling conditions and rates. Three levels are considered: Starter, Climber and Champion. (Dufour & Ligtermoet, 2010).

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ID 1751 | SOCIO-SPATIAL DIMENSIONS OF HOW TO MAKE A CITY BICYCLE-FRIENDLY: THE CASE OF KAYSERI, TURKEY

Muhammed Ziya Paköz[1]; Asım Mustafa Ayten[1]; Özlem Kevseroğlu Durmuş[1]
[1]Abdullah Gül University
muhammedziya@hotmail.com ; muhammed.pakoz@agu.edu.tr

1 INTRODUCTION

Traditional transport policies based on automobile usage are regarded as no longer sustainable all over the world and governments are seeking new methods to encourage other modes of transportation such as walking, cycling and public transport. In Turkey, there is a big increase in the awareness of importance of the sustainable and integrated urban transport in the last ten years. Cycling in Turkish cities has also increasing importance both in national and local level. Parallel to this interest, the Ministry of Environment and Urbanism released a new regulation about the design and construction of bicycle paths, bike stations and tracks within the city in 2015. In addition to this, governmental bodies have been carried out a number of projects that aimed to encourage bicycle usage. This willpower has also influenced local authorities to make cities more bicycle-friendly.

Kayseri is a middle-sized Central Anatolian city with approximately one million population. The city has been doubled its population in the last 20 years and it is still growing rapidly. The local government has been built 34 km tramlines and 35 bike-sharing stations within the city and tried to integrate bike stations with tram stops. However, the overall development of the city is still automobile-oriented and the modal share of bicycles in daily commuting is almost zero. There are also safety problems for cyclists in the city.

Within this study, we aimed to examine the bicycle experience of the city from socio-spatial perspective and evaluate it according to the Copenhagenize Index criteria. Within this scope we will firstly reveal the existing condition in terms of bicycle infrastructure and bicycle usage in Kayseri. Secondly we will evaluate the experiences of cyclists in the city. For this, we conducted a survey with 125 active cyclists that cycle in daily base. We asked them both the physical conditions in the city and their experiences of cycling. Finally, we will propose a framework to be able to become bicycle friendly city.

2 BACKGROUND

Cycling transportation in cities is very common today. Bicycle sharing schemes offer a valid alternative cycling mobility in urban areas combined with public transport for longer distances. A lot of research (Pucher, et al., 1999; Pucher & Buehler, 2008; Forward, 2003; McClintock, 2003; Jacobsen, 2003; Pikora, et al., 2003) has extensively examined the role of cycling for transport. These researchers have listed the advantages and disadvantages of biking, and found how it influences the transportation pattern in cities.