

A CRITICAL EXAMINATION OF CYCLING POLICIES IN BUENOS AIRES, COPENHAGEN AND AUCKLAND

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ABSTRACT

This dissertation examines the cycling-friendly policies and infrastructure of Auckland, Buenos Aires, and Copenhagen as well as additional transport policies that might influence cycling. The final goal of this examination is to extract some lessons from the capital cities of Argentina and Denmark in order to make suggestions on how Auckland can become a more bicycle-friendly city. The literature has found that these 3 cities find themselves in 3 different stages of development in regard to their cycling policies. Auckland's cycling policies are more rudimentary than its counterparts, Buenos Aires cycling policies are developing and have made remarkable improvements, and Copenhagen's are highly proficient and regarded as world leaders. The keys to achieving high rates of cycling in Buenos Aires and Copenhagen seem to be the provision of separated cycle tracks, retrofitting of intersections to increase safety, efficient bike share schemes, sufficient secure parking, and campaigns to encourage cycling. The most effective way of introducing similar pro-bike policies and infrastructure in Auckland would be to consider Buenos Aires as a medium term model and Copenhagen as a long term model. In consequence, Auckland should try to adopt Buenos Aires' policies first and once they have produced positive results, move on to replicate Copenhagen's more developed policies. Finally, a variable that was out of the scope of this research but is determinant to produce these desired changes is strong political willingness. Buenos Aires' and Copenhagen's authorities have shown sound political determination in supporting transport policies that usually sparked opposition and backlash. Without a clear determination, pro-bike policies will not produce the expected results, no matter how well developed they are.

CHAPTER 1: INTRODUCTION AND METHODOLOGY

INTRODUCTION

The way transportation is shaped around the automobile as the dominant mode of mobility today is very problematic in terms of sustainability because it erodes the stock of non-renewable resources (Nijkamp, 1994). Motorised transportation plays a conflicting role between contributing to the development of the economy and at the same time challenging the sustainability of the environment, society and that same economy (Cox, 2010; Nijkamp, 1994). Mobility through motorised transport can lead to significant increases in productivity. But its energy expenditure is substantial and has the tendency to grow faster than the rest of the economy, therefore taking a growing share of the global energy consumption of those non-renewable resources (Rietveld & Stough, 2007). This poses a significant threat to the environment. A dramatic restructuring of mobility practices is crucial in which alternative transportation and mobility policies play a major role (Cox, 2010).

Sustainable, alternative transport options have come to be considered more readily by politicians, policy makers and advocates in recent years. Non-motorised forms of transportation such as cycling have received some consideration. Cycling has come to be recognised as an important alternative for commuter transport especially in high density urban areas. However, the degree to which cycling has been embraced as a viable option and choice for commuters is variable in cities across the world.

According to much of the literature on transport mode choice, policies and infrastructure are recognised as the main determinants on people's choices (Pucher & Buehler, 2007). This has provided the main reason for focusing on policies towards cycling in this dissertation. Through policies, the urban environment and attitudes of people can be modified and influenced in order to produce the desired change; like moving towards a more sustainable transport system, and to making cycling a viable transport option. Cities have features that cannot be modified like climate or topography, but those features tend to play a marginal role when people choose their preferred mode of transport (Pucher & Buehler, 2008). There are countless numbers of examples of cities with harsh winters or very warm summers that have high cycling shares. For example, one third of the people in Copenhagen commute by bike and 80 percent of those people keep commuting by bicycle during the cold Nordic winter (City of Copenhagen, 2011b). It seems that having policies which provide for a conducive cycling culture, as Copenhagen does, is more important.

In this research I will be examining the policies and strategies implemented by Buenos Aires, which has seen high increases in cycling rates in the last few years, and Copenhagen, one of the world leaders in urban cycling, and will compare them to Auckland's current urban cycling policies. The main goal is to build an evidence base that could inform future cycling policy development in Auckland. In order to achieve this goal, this research seeks to answer the following research questions:

- 1) What are the current and future urban cycling policies of each city?
- 2) What other transport policies can be found in each city that might influence cycling?
- 3) How have Buenos Aires and Copenhagen achieved success in urban cycling?
- 4) What components of success in Copenhagen and Buenos Aires might be applied to Auckland?

The motivation for this research came first and foremost from my own experience and interest in cycling. I have been living in Auckland for the past two years and have realized that its transport system leaves a lot to be desired. It has been one of the most pressing issues for the city in the last few years and it is constantly present in newspapers and their editorials as well as in politicians' speeches (Weekes, 2015; Dearnaley, 2013). While in Auckland I have come to realize that the city's cycling policies, facilities and infrastructure are below the standards of other cities internationally, and that the cycling share is very low. This dissertation has provided the opportunity to combine my studies on public policies with my interest in cycling as an urban transport mode and to analyse the cycling policies implemented by the Auckland Council. To do this, I will compare them with two other cities' policies; cities that are renowned for improving their transport conditions by promoting cycling. My ultimate goal for this research is to make some proposals on how to improve the Auckland's transport system by improving its cycling facilities and increasing its cycling share.

The cities chosen are Copenhagen and Buenos Aires, the capital cities of Denmark and Argentina respectively. Citizens of Copenhagen are renowned for riding their bicycles for their daily activities. There is a long tradition amongst them of using the bicycle as a mean of transportation. When there was a decline in cycling with the rise of the car during the 1960s and 1970s (City of Copenhagen, 2002), traffic congestion, accidents and pollution grew. This motivated Copenhagen politicians to go back to considering the bicycle as a viable transport mode. Nowadays, the city is considered one of the best cities in the world to cycle and its

progressive and innovative policies are praised by and followed by specialists all over the world. Currently, more than 35 percent of Copenhagen people commute by bicycle and the city aims to increase that figure to 50 percent by 2025 (City of Copenhagen, 2011b).

In contrast to the situation in Copenhagen, urban cycling traditionally enjoyed only a marginal and recreational role in Buenos Aires with a cycling share of only 0.4 percent (Dietrich, 2013c). It was not until a few years ago that, following some aggressive bike-friendly policies by the Government of the City of Buenos Aires, cycling took off among “Porteños” (people from Buenos Aires). Since the election of M. Macri as the Chief of GCBA and his later appointment of G. Dietrich as Undersecretary of Transport in August 2009, Buenos Aires has gone through profound changes in its transport system in a short period of time. Some of the most important ones include a network of protected cycleways and a free bike share system. There was a dramatic increase of the bicycle share for commuting going from 0.4 percent to 3.5 percent in the five years from 2010 to 2015 (Gobierno de la Ciudad de Buenos Aires, 2015b).

I believe Auckland can learn a lot from these two cities. On the one hand, there is Copenhagen, a rich city and one of the most liveable in the world, which is also a world leader in urban cycling and efficient transport policies. Even though it has one of the highest percentages of cycling commuters in the world, political leaders still seek to increase the share of cycling commuting in the city even more, and for it to become known as “(T)he City of Cyclists” (City of Copenhagen, 2011b). On the other hand, Buenos Aires is a much “poorer” city than Auckland, with serious congestion problems and lower quality infrastructure. It is a city with an almost negligible history of urban cycling, but a very rich history of public transport. However, this city from a developing country and with a limited budget has managed to increase its cycle share spectacularly in a few years by creating a cycleways network from scratch, and a successful public bike share scheme. Examining the policies of all three cities comparatively will provide a basis for lessons for future policy development in Auckland.

METHODOLOGY

In researching this dissertation, I have applied a qualitative research method of document analysis to build three separate case studies of Copenhagen, Buenos Aires and Auckland’s cycling policies. Policy documents have been accessed via the internet and public repositories. The documents and literature available in the public domain are vast, and have provided sufficient information for the analysis for this research. Amongst some of the documents that I used for this research are those appropriate for documentary research, including manuals, books, brochures, maps, newspapers, programme proposals, press releases, policy documents and

policy bills (Bowen, 2009). Specialised journals and articles have been used simultaneously to provide some theoretical background and as a form of triangulation method to ensure credibility of the analysis.

Document analysis has been appropriate for this research. It provides a systematic procedure for reviewing and evaluating documents, and enables data to be examined and interpreted in order to elicit meaning, gain understanding, and develop empirical knowledge. The method goes beyond lifting passages from the documents, and seeks to establish the meaning and contribution of a document (Bowen, 2009). It is a method particularly suited to produce a deep description of single phenomena or programmes, as this research seeks to do. The documentary analysis has been based on three main sets of material that inform of the different urban cycling policies implemented, and as an approach has enabled three separate case studies to be developed and then compared.

It must be acknowledged that documents can also have some limitations, and this is something that I had to take into consideration in this research. These include: issues such as insufficient details, when the document's primary use is not for research; blocked access to some official documents; and biased selectivity, when documents are aligned with the agenda of the institutions' principles that emphasise specific aspects, but forget some other ones considered important for the research. Unfortunately, some of these issues did arise during my research, especially in the case of Buenos Aires. The unavailability of public information was somewhat expected for this city. To combat this challenge, I accessed third party sources such as newspapers and public interviews to provide evidence and to triangulate the data. In some cases I needed to use several types of sources in order to get reliable and valid information.

The research method involves skimming (superficial examination), reading (thorough examination) and interpretation, combined with content and thematic analysis. Content analysis consists of organising information into categories related to the central questions of the research but without the quantification used in mass media content analysis. It implies a first-pass document review where relevant parts of texts and different data are identified and separated from irrelevant ones.

In the next stage, thematic analysis was conducted which involved a more careful and focused re-reading of the material. In this step patterns or codes within the relevant data were identified, and then clustered into substantive categories and documents to be re-analysed and compared to determine the presence of the main categories (Bowen, 2009). Through the analysis I compared common categories across the three cities, then compared the cycling policies of each

city within those categories. The final step in the analysis was to assess what components of success from Copenhagen and Buenos Aires could be applied to Auckland.

A similar structure is followed for each of the case studies in this dissertation. Each city is introduced in general terms in order to provide some general knowledge and contextual information. The transport system is more thoroughly described and is divided into sections dedicated to public transport, automobiles and cycling. The different cities have shown that they have elements that are stronger in particular areas of transportation modes or policies, and this will show in the emphasis placed in relation to the different modes. For example, Auckland is a city with a history of pro-automobile policies. In fact, some researchers state that after World War Two, Auckland engaged in some of the most automobile-friendly policies in the world (Mees & Dodson, 2006). By contrast, Buenos Aires has a long history of public transport use. The first underground metro in the Spanish speaking world opened in Buenos Aires, even before Madrid in Spain. Buses are almost a tradition in Buenos Aires and the whole city can be connected through them. Finally, the bicycle has always been a part of Copenhagen city, even after World War Two when cycling declined with the rise of the automobile. It is a city with one of the highest rates of bicycle use in the world.

Following the case studies, the discussion chapter will provide a presentation and analysis of the transport strategy of each city in order to understand the current policies being implemented and how the future looks like for them in terms of transportation. The focus is on the main elements of the cities' cycling policies, comparing how the different cities have produced and fared with promotion and infrastructure policies as well as the design guidelines of that infrastructure. However, the cycling policies are not applied in isolation and other transport policies can have a major influence on the results delivered by the former. Therefore, there is also some focus on other transportation policies that are considered as having an influence on cycling behaviour and rates, to help assess how the future looks like for each city in terms of urban cycling and transportation in general. Finally, I draw conclusions from my analysis to determine what can be learned from Copenhagen and Buenos Aires and applied to Auckland for the future of cycling there.

Even though I am fully aware that financial and economic instruments are widely used in policy analysis, I decided not to follow that path in this research for a number of reasons. First of all, given the problems with the disclosure of public information in Argentina, it was not possible to find the necessary figures for Buenos Aires to develop a valid data set that could be compared with the other two cities. Second, it is common practice to compare economic indicators of

public policies between different cities or regions, but I believe those comparisons are risky and can produce misleading results. In order for these indicators to be properly comparable, it is necessary to adjust them in several ways. For example, they need to be adjusted by purchasing power parity since currencies have different values; they need to be contrasted in per capita terms; and/or as a share of the total funding, to name just a few. Finally, my interest in this research was first and foremost on the content of the policies and similarities and differences in the policy approaches, which could be best informed through documentary sources.

CHAPTER 2: LITERATURE REVIEW

This chapter will present a review of literature that relates to sustainable transport and cycling policies. This will provide a basis for analysing how Copenhagen, Buenos Aires and Auckland policies are framed and developed.

A sustainable transport system is defined as one that “allows the basic access, needs and development of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between generations” (Hull, 2008, p. 95). It should also be able to produce emissions and waste at or below the rate of absorption of the planet, use renewable resources at or below their rates of generation, and to minimize the use of land and production of noise (Hull, 2008). Further, it should be socially sustainable by promoting equity within and between generations, and economically sustainable on the grounds that allows that basic needs are met while supporting a vibrant economy and promoting growth (Hull, 2008; Rabinovitch, 1996; Han, 2010).

The use of fossil fuels for transportation emits a considerable amount of greenhouse gases (GHG) which are responsible for global warming. According to Massink, Zuidgeest, Rijnsburger, Sarmiento, and Maarseveen (2011), the necessary reductions in carbon dioxide (CO₂) emissions of the transportation sector could be achieved by three different strategies, named as ‘Avoid’, ‘Shift’, and ‘Improve’. In terms of ‘Avoid’, this relates to ‘avoiding’ the need for mobility. ‘Shifting’ relates to introducing and promoting sustainable modes of transport, such as cycling, walking or public transport. Finally, ‘Improving’ argues for increasing the sustainability of current modes. It is acknowledged that most current transportation policy efforts tend to focus on “Improve” strategies, such as increasing vehicle and fuel economy efficiency (Huizenga & Bakker, 2009; Leather, 2009).

The majority of the current sustainable transport policies and regulations are biased in favour of ‘improve’ strategies such as promoting non-fossil fuels, taxation of polluting activities and internalisation of externalities (Massink et al., 2011). This stance is not as efficient as ‘shifting’ or ‘avoiding’ strategies. Even highly fuel-efficient vehicles still produce GHG, use a lot of resources to be manufactured and to be discarded or recycled. Therefore, the progress towards a sustainable transport system that can be achieved with ‘improve’ strategies is negligible in contrast with a ‘shift’ strategy towards cycling (Massink et al., 2011)

'Shifting' strategies are most easily applied in relation to cycling policies. These are those policies in which, in order to achieve a reduction in CO₂ emissions, a polluting form of transport is replaced by a more environmentally friendly one. Public transport development is often prominent in shifting strategies. However even though shifting to public transport reduces considerably the amount of GHG emissions per passenger kilometre compared to car transportation (Santos, Behrendt, & Teytelboym, 2010), in most cases it still needs heavy subsidies to remain operational (Rabinovitch, 1996). Besides, fossil fuelled public transport still emits GHG while electric batteries are potentially polluting if they are not discarded properly.

Non-Motorised Transport (NMT) forms like walking and cycling have not tended to be considered as a viable option by most of the literature on transport sustainability (Gqaji, 2010). A shift from motorised forms of transport to NMT would not require subsidies, and would produce the largest reductions on emissions and no contamination risks from batteries. Unfortunately, cycling has not received enough attention in the sustainability literature compared to public transport (Heinen, Wee, & Maat, 2010; Gqaji, 2010). Not many authors have devoted sufficient time to the substantial environmental benefits that could be achieved from a transportation system in which cycling were the dominant mode. However, as an NMT option cycling has a lot to offer to the sustainability discussion (Heinen et al., 2010; Gqaji, 2010). Only walking is more environmentally friendly, but it has received even less consideration by researchers. Cycling causes no noise pollution (Gqaji, 2010) and possesses an intrinsic zero-emission value because GHG are only emitted during the manufacturing of bikes (Massink et al., 2011).

Increasing the levels of bicycle commuting is one of the most effective ways of decreasing dependency on fossil fuels, and to reduce automobile commuting and congestion - problems suffered by most modern urban transportation systems (Noland, 1995). Cycling can also be used for the complementary legs of inter-modal journeys if cyclists are able to link bicycle and public transport trips through proper facilities and arrangements. These include having good accessibility to public transport stations and vehicles, and having safe bicycle parking available (European Conference of Ministers of Transport, 2004). Further, since bicycles can be purchased and maintained for a modest price, therefore being able to be afforded even by poor people, cycling is one of the most socially equitable transport modes (Pucher & Buehler, 2008; Massink et al., 2011). Heinen et al. (2010) emphasise that bicycles also require less roadway and parking spaces, which is also more equitable and sustainable in terms of use of public space.

For society and for the individual cycling presents several advantages over other modes of transport, and these advantages are especially obvious when compared with the automobile. For society, the advantages of cycling include no direct emissions of pollutants, CO₂ and noises, inexpensive and less space-consuming riding and parking infrastructure, minimal use of non-renewable resources and improvements in public health (Heinen et al., 2010; Pucher & Buehler, 2008). Contrary to the widespread misperception that cycling is dangerous, the health benefits that cycling provides to society more than compensate the costs caused by potential traffic injuries. Additionally, as cycling traffic shares increase, it has been found that injury rates fall, a phenomenon referred to as “safety in numbers”. This supports the perceptions that bicycling is safer, and provides larger health benefits (Pucher, Dill, & Handy, 2010).

For the individual, the advantages of cycling are also many. The only energy required is provided directly by the cyclist, which provides valuable cardiovascular exercise for him or her. It is economical since cycling costs far less than a private car and public transport, and could potentially avoid the costs associated with attending a gym, practicing a sport and receiving health care (Pucher & Buehler, 2008; European Conference of Ministers of Transport, 2004). In dense urban areas the bicycle can be as, or even more, time-effective than motorized traffic. This provides economic benefits for the individual in the form of opportunity costs avoided by not idling in traffic (Massink et al., 2011; Heinen et al., 2010).

Despite the benefits of cycling, most people tend to choose to use other forms of transport. There are both real and perceived barriers to cycling for transportation that can help explain, at least in part, why this happens (European Conference of Ministers of Transport, 2004). Safety is one of the most common deterrents mentioned by non-cyclists. If no physically separated infrastructure is provided and vehicle speeds are high, cyclists become vulnerable to motor vehicle traffic, especially when travelling at night. Similarly, if bicycle parking facilities are inadequate, there are fears of theft or damage. In most modern western societies cycling for transport tends to be considered a fairly low social status activity and one that is perceived as more of a leisure activity, or an activity for children. It is also often viewed as inappropriate for those who can afford a car, having lost its past attractiveness to the automobile (European Conference of Ministers of Transport, 2004).

The characteristics of the urban environment and its climate can be counter-productive for cycling as well. For example, a hilly topography and the long distances that must be travelled in sprawled urban areas can heavily discourage cycling because of the higher physical effort and longer commuting times required (Heinen et al., 2010). Being at the mercy of the weather,

especially particularly high or low temperatures and frequent rainfall can have a negative impact in the rates of cycling. Some people even cite health considerations as their main reason not to cycle, stating that being on the road exposes them to vehicle exhaust emissions (European Conference of Ministers of Transport, 2004). Finally, the difficulty of carrying heavy loads while cycling, and family and household responsibilities, such as having children, can also put people off cycling (Pooley, et al., 2013). It is worth adding that the way most cities have been designed is for making use of the car for short trips in urban areas something convenient, normal and time saving. At the same time, designs in relation to NMT tend to be quite the contrary (Pooley, et al., 2013). Especially outside urban areas, travelling by bike can be more time consuming than using motorised transport.

Even though most of the deterrents of cycling are outweighed by the many benefits it provides, the majority of commuters in modern urban areas do not cycle even when it would be the most rational choice (Heinen et al., 2010). Therefore, there must be some additional impediments to cycling that have not been addressed by conventional mode choice studies and models. This suggests that “predicting and influencing bicycle use needs to be grounded in other kinds of knowledge than those currently available for motorized forms of transport” (Heinen et al., 2010, p. 59). Cities with low shares of cycling like Auckland assume that behavioural change will be the logical next step once people are persuaded that active travel benefits them. Therefore, they devote efforts and resources to promote active transport forms based on their entailed health benefits (Pooley, et al., 2013). Nevertheless, the contingencies that most people encounter in everyday life often make such behavioural change difficult, making these efforts not especially successful. The promotion strategies advanced by these cities have rendered poor results and walking and cycling remain only as marginal modes (Pooley, et al., 2013).

As has been highlighted, the determinants of cycling are different from the ones that define other forms of transport. These need to be properly understood by policy makers, however, if they aim to achieve transport sustainability. This understanding is crucial for knowing how to inform and shape cycling-friendly policies. Researchers have highlighted that in order to produce substantial shifts in favour of cycling, integrated packages of many different, complementary public policies are crucial. Such measures need to take into consideration the improvement of separated infrastructure, safety measures at intersections and coordination with public transport (Pucher & Buehler, 2007). As well, there needs to be supportive land use planning that promotes mixed use and discourages suburban sprawl, restrictions on car use, new traffic laws that give special consideration to cyclists, traffic education and pro-bicycle campaigns (Pucher, Dill, & Handy, 2010; Pucher & Buehler, 2008).

Often, local and regional governments only adopt the politically 'easy' measures (Pucher & Buehler, 2005) such as trying to persuade people of the health benefits of cycling and walking (Pooley, et al., 2013). At the same time they tend to have been reluctant to advance the politically hard ones (Pucher & Buehler, 2005) like restrictions on car use or changes in urban structure and land use (Pucher et al., 2010; Pooley, et al., 2013). When the 'easy' interventions are imposed in isolation, they tend to induce cycling increases, but these are usually not large. The impact of a particular measure will be enhanced by the synergies with the complementary ones and the whole package will be greater than the sum of the parts (Pucher et al., 2010).

Even though there are few exceptions, most of the literature found on bike-friendly policies fails to address directly the relationship between a transportation system based on cycling and its sustainability. When the literature makes reference to the environmental benefits of cycling, it mentions them as just one part of a much larger collection of advantages. Research on cycling policies seems to be at a stage in which it is considered more important to understand the determinants of cycling for transportation, how to encourage people to cycle, and how to convince policy-makers and researchers of the potential benefits of supporting bike-friendly policies. Maybe the reason for this lower stage of development and understanding is due to the fact that since the 1950s, most parts of the western world focused on developing transport systems focused on the automobile and displaced cycling to a recreational activity. That has created a situation where urban environments are unthinkable and non-functional without cars, where cycling transportation only plays a marginal role, and where policy-makers do not quite understand what cycling needs to work as a proper form of urban transportation.

Unfortunately, there is no single and consistent method to determine how successful cycling policies are. There are some variables used to measure the success of pro-cycling policies such as measuring: the percentage of commuting trips or total trips taken by bike; the increase in the percentage of cycling trips; the annual amount of kilometre travelled in the region; casualties per kilometre travelled; total kilometres of cycle tracks or the increase in them; or trips done by public bikes, among others. Liveability, meaning citizens have a good quality of life, is the most sought-after feature for modern cities and can be directly associated with urban cycling. It is believed the most liveable cities are the ones that attract the most talented workforce and the most thriving in the medium and long run. Every city or region that wants to become more liveable uses different cycling policies benchmarks. In the majority of the cases, the variables chosen to be published are those that have improved the most since the application of the policies. However, comparisons between cycling policies of different cities is still possible and quite straightforward.

Finally, it should be mentioned that when it comes to bicycle infrastructure and the promotion of bicycling there are two schools of thought. On the one hand is 'segregated cycling' (also called the 'facilitating approach') and on the other hand is 'vehicular cycling'. The former is promoted in those countries with high cycling rates like the Netherlands and Denmark, while the latter is promoted by those with low cycling share like the U.S., Australia and New Zealand (Angell, 2014).

'Vehicular-cycling' considers that bikes should obey the same laws as cars, occupy full road lanes, and cyclists should be treated as drivers of vehicles. 'Vehicularists' often oppose separated infrastructure, arguing that they make cycling slower and more dangerous at intersections because drivers cannot see them (Pucher & Komano, 1999). They also tend to favour training and education such as riding classes (Beam, 2009). By contrast, the 'segregated approach' recognises the innate differences between bicycles and faster and more deadly vehicles like cars and creates special facilities for cyclists, such as separated cycle tracks and special traffic lights (Stromberg, 2014; Angell, 2014). Intersections tend to receive special attention because it at those sites that most accidents take place (City of Copenhagen, 2002).

CHAPTER 3: CASE STUDY COPENHAGEN

Copenhagen is the capital and most populated city of Denmark, with an urban population of 1.3 million and a metropolitan population of almost 2 million people (StatBank Denmark, 2015). It is also the cultural, economic and financial centre of Denmark and one of the major financial centres of Northern Europe. In 2012 it was ranked as the third richest city in the world in terms of gross earnings (it was the first in 2009) (City Mayors, 2012). It is home to various international corporations and has successful business clusters in innovative sectors as information and communication technology, biotechnology and clean tech (Copenhagen Capacity, n.d.b).

The weather in Copenhagen tends to be unstable and changeable during the whole year but the temperature is about five degrees Celsius higher than average for its latitude worldwide. Snowfall occurs mainly in winter and rain during those months is as common as snow. Average temperatures for winter is close to the freezing point (World Weather & Climate Information, n.d.). As part of a Nordic country near the North Pole, Copenhagen has fewer hours of sunshine and daylight compared to Buenos Aires and Auckland and the variability of hours between summer and winter is considerable. On the summer solstice, Copenhagen has more than 17 hours of daylight while only 7 hours on the winter solstice (Almanak, n.d.).

After World War Two, Copenhagen engaged in an innovative urban development project known as the 'Finger Plan'. This was a strategy to encourage the creation of housing and businesses interspersed with green areas along the five urban railway routes of the S-train, Copenhagen's urban rail network that stretched out from the city centre (Cervero, 1998; OECD, 2010). In between the fingers, green areas provide land for agriculture and recreation. In that respect, it is official municipal policy that by 2015, 90% of the citizens must be able to walk to a park, a beach, a natural area, or sea swimming pool in less than 15 min (Danish Architecture Centre, 2014).

In 2007 Copenhagen was defined as the environmental capital of Europe (City of Copenhagen, 2007) and the OECD named it as a world leader in green growth (City of Copenhagen, n.d.b). In 2009 the municipality decided that one of the city's main goals was to reduce CO₂ emissions by 20 percent by 2015 (a target that was reached in 2011), and to become carbon-neutral by 2025 (City of Copenhagen, 2012b). Therefore, it has been working in several types of strategic areas. One of these strategic areas is green mobility, defined as transport modes that produce very low or neutral levels of greenhouse emissions and it requires an increase in walking, cycling, and use of public transport (City of Copenhagen, 2012b).

TRANSPORT

The greater Copenhagen area has a very well established transportation infrastructure, making it a hub in Northern Europe. The airport is the largest in Scandinavia and offers by far the greatest number of direct flights in Northern Europe (Copenhagen Capacity, n.d.a). The metro and the urban rail network are part of the well-developed public transport system. The city is also connected by ferry to Oslo in Norway, and by a road and a rail link to Malmo in Sweden. Finally, thanks to its cycle tracks and infrastructure, and progressive pro-cycling policies, Copenhagen is considered to be a very bicycle-friendly city. In 2007 the Union Cycliste Internationale, the world governing body for cycling, awarded Copenhagen the UCI Bike City label. This award is given to cities wanting to get involved in cycling as an environmentally-friendly leisure sport and an active means of transport and it is given on the criteria of the international standing of the city and its active commitment to cycling (Union Cycliste Internationale, 2007).

Automobile

In a similar way to most cities of the western world, automobile traffic in Copenhagen started growing significantly in the 1950s. Even though Denmark is one of the most expensive countries to buy and drive a car in due to taxes and registration fees, the car is still the most popular mode of transport in Greater Copenhagen (City of Copenhagen, n.d.a). Two-thirds of all kilometres travelled in the urban area are made by car as well as 30 percent of commuting trips and just over 50 percent of all journeys. This can lead to serious congestion in rush hour traffic (The Copenhagen Post, 2013).

As early as the 1960s, thanks to a progressive-thinking local architect, Jan Gehl, the city started reducing car parking in the city centre, closing streets off to cars and transforming them into pedestrian streets as well as installing cycle tracks in them (The Copenhagen Post, 2012). According to Gehl's book *Cities for People*, Copenhagen's traditional main street, Stroget, was converted to a pedestrian promenade by 1962 (Gehl, 2013).

Public transport

Copenhagen's public transport facilities are well-developed, efficient and reliable. Around 30 percent of the total commuters come to the city by public transport (City of Copenhagen, 2011b). People can travel by bus or by any of the different types of trains that forms the rail transport system. The S-train is an urban rapid transit network that serves the Greater

Copenhagen area, including the urban area and outlying suburbs. It is the main rail transport in the city, runs frequently and has stops at many stations (City of Copenhagen, n.d.d). The underground metro system opened between 2002 and 2007 and is a rapid transit system that complements the larger S-train. It has two lines and only serves central Copenhagen. The city administration is building new metro lines and stations that will open in 2018.

Within the national rail system are the regional trains that run in and outside Copenhagen's metropolitan area and connect to the southern islands of Falster and Lolland. There are also local trains, only available in distant suburbs, with no access to the central city and running on old un-electrified tracks. Most local train lines complement the S-trains or regional trains by beginning at stations where they end. However, almost half of public transport passengers do not use the train system, but rely on the bus services. A-buses are the primary buses in central Copenhagen, which run frequently and have many stops. S-buses are faster because they have fewer stops but run less frequently. There are also three harbour busses that sail in the harbour (VisitCopenhagen, n.d.; City of Copenhagen, n.d.c).

Cycling

Copenhagen aims to be the most bicycle-friendly city in the world, a goal unanimously approved by the City Council (City of Copenhagen, 2013b). In contrast to many other western major cities, Copenhagen has a longstanding cycling tradition and the explanation is partly historical (Fietsberaad, 2006). Bikes were introduced in Denmark by the end of the nineteenth century and were expensive, so only afforded by the upper classes (Santos Canal, Pinaud, & Janneau, 2006). However, mass production brought costs down and the popularity of the bicycle increased dramatically. In the ten-year period between 1890 and 1900 the number of cyclists increased tenfold, going from 3,000 to 30,000, and bikes started dominating the streets (Santos Canal et al., 2006). The number of people also increased dramatically at the beginning of the twentieth century, transforming the compact city of Copenhagen. The population increased from 225,000 people in 1920 to more than 770,000 in 1950. This intense growth, while bicycles were available to all citizens, is a main element in explaining this high degree of bicycle use (Fietsberaad, 2006).

By 1934, there were 130 kilometres of cycle paths in the city and bicycle facilities were already built, consisting mainly of recreational cycle paths along arterial roads (Fietsberaad, 2006). During World War Two the government started experiencing a shortage of funds, so it attempted to reduce unemployment by constructing routes and recreational bikes tracks and

emphasised the segregation of traffic types on the busiest main roads (Santos et al., 2006). The cycleway network was partially completed in the 1970s, but there were many links missing compared to the current situation. Over the past four decades it has been almost completed, and now covers more than 300 kilometres (Fietsberaad, 2006).

In Copenhagen cycling is integrated into all levels of policy planning, including mainstream traffic planning (Fietsberaad, 2006). Cycling infrastructure investments are the basis of Copenhagen cycling and the reason that the citizens can enjoy its benefits (Mandag Morgen, 2011). Even with the rise of automobile transportation and the decline in cycling after World War Two, the bicycle continued to be an important mean of transportation for Copenhageners. Cycling was, and still is, socially acceptable and cyclists came from all walks of life and income brackets. It is quite common to see Danish politicians riding their bicycles to work (City of Copenhagen, 2002).

In Copenhagen there are more bicycles than people and five times as many bicycles as cars (Otzen, 2014). Copenhageners cycle because it is a fast, easy and affordable mode of transportation, and environmental considerations are one of their least priorities when choosing bicycles (Lindholm, n.d.; Santos Canal et al., 2006). In 2012, 37 percent of people commuting to Copenhagen did so by bike while that figure grew to 55 percent for people living in the city. 80 percent of cyclists still choose bikes in the coldest winter months (Lindholm, n.d.). It was found that 1.27 million kilometres were covered daily by cyclists in 2012, probably the highest level measured in the last 50 years (City of Copenhagen, 2013a).

COPENHAGEN TRANSPORT STRATEGY

Denmark is determined to continuously reduce the impact of the transport sector on the environment and in 2009 the Danish Parliament agreed on a number of principles and initiatives as part of a new green transport policy applicable until 2020 (Ministry of Transport of Denmark, 2012a). The strategy was followed by accords in the subsequent years and includes investments in ports, new roads, infrastructure for bicycles and traffic safety initiatives. Part of the transport strategy's funds were earmarked to improving the infrastructure for cyclists in order to make the bicycle an attractive, widespread and secure way of transport (Ministry of Transport of Denmark, 2012b). Building paths and tunnels for bicycles are among the planned expansions of cycling infrastructure for cyclists (Ministry of Transport of Denmark, 2012a).

Copenhagen pursues the strategy of sustainable urban development by aiming to become a global leader of green cities and one of the most liveable cities in the world. To achieve this, it

came up with a vision called “Eco Metropolis 2015”. The goals were to reduce carbon emissions by 20 percent until 2015 and eventually make the city CO₂-neutral by 2025 (City of Copenhagen, 2007). Given the good results achieved - 21 percent reduction of CO₂ emissions between 2005 and 2011 - Copenhagen City Council came with a renewed plan called the CPH 2025 Climate Plan (City of Copenhagen, 2012b).

The CPH 2025 Climate Plan is divided in sections ‘Energy Consumption’, ‘Energy Production’, ‘City Administration Initiatives’, ‘New Initiatives’, and ‘Green Mobility’. These sections include activities such as constructing additional wind turbines, energy retrofitting of buildings and public investment in solar energy, purchasing electric and biogas operated buses, and increasing the use of bicycles for transportation (City of Copenhagen, 2012b). Transport is recognised as accounting for 22 percent of the city’s carbon emissions and Green Mobility is the second category in emissions reduction after Energy Production. Green Mobility’s goals are to achieve a 75 percent of all journeys in Copenhagen to be made on foot, bicycle or public transport, for 50 percent of commuting trips to be by bicycle (from around 35 percent today) and for there to be a 20 percent increase in public transport passengers compared to 2009 (City of Copenhagen, 2012b).

Within Green Mobility, cycling promotion and infrastructure are expected to contribute to 30 percent of the reduction of carbon emissions from the transport sector (City of Copenhagen, 2012b). Green mobility also aims to achieve carbon neutrality on public transport; and use electricity, hydrogen, biogas or bioethanol to power 20-30 percent of light vehicles and 30-40 percent of heavy vehicles. Some other initiatives are being proposed within these strategies, and intelligent traffic control such as the optimisation of signalling facilities, eco-driving and traffic management, and mobility planning such as real-time information about the journey and campaigns to influence road users (City of Copenhagen, 2012b).

The first cycling strategy developed by City of Copenhagen via its Roads and Parks Department was the “Cycle Policy 2002-2012”. Its goals were to increase the proportion of the workforce who cycle to work, to improve safety and a sense of security among cyclists and to increase travelling speed and comfort (City of Copenhagen, 2002). These goals were developed into targets such as increasing the cycling commuters from 34 percent to 40 percent, decrease the risk of serious injuries and deaths by 50 percent, and increase travelling speed by 10 percent on trips of over five kilometres, amongst others (City of Copenhagen, 2002).

Even though not all of the targets were achieved, there was a 30 percent rise in the number of kilometres cycled compared to 1998, which encouraged the approval of ‘Good, Better, Best -

The City of Copenhagen's bicycle strategy 2011-2025'. This strategy's mission is to turn Copenhagen into the world's best bicycle city by 2025; not as an end in itself but as a tool to create a more liveable city (City of Copenhagen, 2011b). More cycling is recognised as not only making the city more liveable but producing less congestion, fewer sick days, longer life expectancy, and making infrastructure less beset (Mandag Morgen, 2011). It was calculated that if all the social costs were accounted for, cycling was the cheapest mode and the city saved money for every kilometre travelled by bicycle instead of car (Mandag Morgen, 2011). Cycling infrastructure initiatives are also comparatively inexpensive for Copenhagen. The whole 300 kilometre network of bicycle superhighways was estimated to cost almost half of a motorway expansion, and nearly the same as one kilometre of metro in the city (City of Copenhagen, 2011b).

The cycling strategy is sustained by the principles of prioritising and innovation. In rush hour, several cycle tracks are congested. Cyclists need to be prioritised by allocating more space to them which can be achieved by widening cycle tracks in some places and creating alternative routes in others. Prioritisation also means making travel times faster compared to other transport forms. It requires new shortcuts, allowing contraflow cycling on one-way streets and cycling across squares, and more green waves for cyclists. Innovation is needed in every aspect of the cycling policies, regardless of whether it is in infrastructure or other types of solutions. For example, infrastructure like footrests, air pumps and new types of parking, and external partnerships with companies and communication campaigns (City of Copenhagen, 2011b).

SPECIFIC CYCLING POLICIES: INFRASTRUCTURE

Cycle tracks

By 2001 there were 307 kilometres of cycle tracks and 9 kilometres of cycle lanes, with approximately 65 kilometres missing from the network (Nelson, 2007). The target set by Cycle Track Priority Plan 2001 - 2016, a fixed framework for the completion of the cycle track network, was to lay out 51 kilometres of cycle track and 'reinforced cycle lanes', a combination of road-marked cycle lanes, sections of cycle track and traffic islands to physically separate cyclists from motor traffic (City of Copenhagen, 2002). In order to improve cycling conditions in the city centre, painted cycle lanes, most of them temporary, were laid on six major streets, followed by the removal of most of the one-way restrictions for cyclists and the establishment of slow speed zones (City of Copenhagen, 2002; Nelson, 2007).

A plan of 100 kilometres of green cycle routes was proposed as a new answer for people who live outside the Copenhagen boundaries and who have a long way to travel (City of Copenhagen, 2002; Santos Canal et al., 2006). Green cycle routes are formed by greenways, minor roads and bridges. They are completely separated from traffic and provide an alternative to cycling along the roads. Their purpose is recreational as well as for transport (City of Copenhagen, 2013b). Where possible, green cycle routes run in their own separate area through green surroundings and are designed to favour a more fluent traffic with a minimal amount of stops for cyclists. They feature a wide cycle path and separate pedestrian walkways, and are intended to serve as direct home-work routes (City of Copenhagen, 2002).

Since the Bicycle Account 2010 showed that commuting by bicycle was a significantly lower activity for suburbanites compared to people living in the city centre, the council began targeting commuters entering the city from other municipalities and who travel between 5 and 20 kilometres (City of Copenhagen, 2011a). In the new strategy within Good, Better, Best 2011-2025 (2011b) the concept of 'Bicycle Superhighways' was proposed as cycle tracks targeted at commuters' needs, having the same high standards across municipal boundaries. Bicycle Superhighways are routes planned to connect strategic nodes such as residential zones, educational facilities and work areas. They are designed to be fast, that is as direct as possible, with few stops and with green waves. Additionally, they are designed to provide a high level of comfort through having a smooth pavement, high maintenance, and some extra facilities like bicycle pumps, and footrests and countdown signals in intersections (Supercykelstier, n.d.). The planned network when completed will comprise 26 Superhighways, covering a total of 300 kilometres (The official website of Denmark, n.d.).

The new cycling strategy states that by 2025, the most congested cycle routes along with the Green Cycle Routes and the Bicycle Superhighways will form the PLUSnet, a high-quality section of network. The PLUSnet will ensure a high level of quality for space, intersections and maintenance to increase security and comfort and faster travel times (City of Copenhagen, 2012a). The target of the PLUSnet is to have three lanes in each direction on 80 percent of the network, and two lanes each way on bidirectional stretches. One of the aims is to promote 'conversational cycling' where people can cycle two abreast while leaving an additional lane for faster cyclists to overtake (City of Copenhagen, 2011b).

Parking

In 2002 a survey was carried out to establish an understanding of the demand for bicycle parking in Copenhagen (City of Copenhagen, 2002). More than 65 percent of cyclists were found to be dissatisfied with parking conditions, and parking was deemed to be the worst item in the city's cycle infrastructure (Santos Canal et al., 2006; City of Copenhagen, 2002). The Cycle Policy 2002-2011 strategy stated that an effective system was needed that included constant supervision (similarly to car parking systems) and the removal of disused bicycles that take up limited space. Shops in shopping streets were allowed to set up cycle racks on the pavement where room was available, and in residential areas the council permitted to discontinue parking spaces for cars in order to establish bicycle parking (City of Copenhagen, 2002).

According to the Danish Cyclists' Federation, a lobby organisation that fights for the rights of Denmark's cyclists, there were no good bicycle parking guidelines and the quality of the solutions realised was not impressive (Celis & Bølling-Ladegaard, 2008). In 2007 the Copenhagen council and the Danish Cyclists' Federation co-authored and published a Bicycle Parking Manual (Celis & Bølling-Ladegaard, 2008). This defines a series of principles for good bicycle parking planning like making parking attractive, having the right location and enough availability of spaces, efficient racks and stands, and operation and maintenance, among others (City of Copenhagen, 2013b). Based on this, some new parking standards were set in the 'Action Plan for Green Mobility', a policy document that stems from CPH 2025 Climate Plan (City of Copenhagen, 2012a). Some of these standards are that half of the cycle parking spaces should be roofed, former minimum car parking spaces have to be replaced by maximum limits, and housing-only areas should have a minimum of parking spaces for bicycles but a minimum and maximum for cars (City of Copenhagen, 2012a).

Following these measures, 'flex parking' was recently developed. It is an innovative way to optimise the use of space and resources in selected spots, mostly outside schools. Bicycles and cars share the same on-road rack less parking in a designated parking space at different times of the day. Bicycles park on their own kickstand from during school hours 7am to 5pm. After 5pm, the space is used by automobiles (City of Copenhagen, 2012a). In Copenhagen it is fairly common for bicycles to have a stout lock welded to the frame that locks the rear wheel and prevents it from being stolen.

Cargo bikes are fairly common in Copenhagen and 17 percent of families are known to own one. Cargo bikes are used for transporting children and shopping and 25 percent of all cargo bike

owners say that they use it as a direct replacement for a car (City of Copenhagen, 2011b). However, because of their larger dimensions and different frames, they usually cannot be locked to regular bike racks. In 2009 a prototype was launched called the Cargo Bike Car. It was a bright pink fibreglass “car” that took the same street space than an actual car but could hold four cargo bikes in their respective individual lockable compartments (FGM-AMOR, Outspoken, ECF, & CTC). It was discontinued, but an urban cycling consulting company joined efforts with a bike rack designer to develop new parking solutions that are currently being trialled by the city (FGM-AMOR et al; City of Copenhagen, 2013b). In 2011, the Copenhagen’s city council plan introduced requirements for cargo bike parking for new buildings (City of Copenhagen, 2011b).

Bike share scheme

The bike share scheme of Copenhagen, originally called City Bike, has a long and irregular history. In 1989, a private initiative set a system of public-use bicycles. It was a commercially based project and bikes and maintenance was paid for by advertisements on the bikes and racks. Due to insufficient funds by private investors, the city decided to invest a significant amount of public money and practical support to sustain it. However, the funding was not enough and in 1991 the project was bankrupted (Santos Canal et al., 2006). In 1995 the scheme emerged again as a public-private partnership to provide free bicycles for tourists and residents. It started with 700 bicycle in 10 racks (Nelson, 2007) and grew to 2,000 available at 110 locations in the city centre, the area in which they could be used freely and for free (Pucher & Buehler, 2007).

The bike hire scheme was eventually found to suffer the same challenges as many similar projects in other parts of the world. These included technical shortcomings as well as massive bicycle theft and vandalism, which almost forced the city to stop it (Fietsberaad, 2006). The scheme was also a victim of its own popularity. It was meant to be used by commuters, who could get off a train and ride to work, depositing the bicycle at a rack near the office, and then do the same to get back to the station. Unfortunately, the demand for these bikes was larger than the bikes available. The programme was not very effective for commuters and was mostly used by casual users and tourists (Nelson, 2007).

In 2011 Copenhagen started the process of inviting bids for a new bike share system that was rolled out in 2013 (City of Copenhagen, 2011b). It is called Bycyklen and bikes are ultra-modern. They count with GPS assistance, a touch screen so users can plan their journeys, electric motor, a digital lock to avoid theft and LED lights, among other premium features (Gobike, 2014). The service is run by the company that operates the S-train since it is intended specifically for

commuters even though it can be used by tourists as well (Bycyklen, 2014). There is some anecdotal evidence that the system could not be working as intended, i.e. mostly by commuters, and in lower numbers than expected (Colville-Andersen, 2015). Besides, some problems coming from the company that supplies the bikes might jeopardize the system in the near future (Werber, 2015).

Integration with public transport

In 1998, The Copenhagen Public Transport Plan favoured the combination of cycling and public transport, and targeted cyclists as potential customers. This resulted in the removal of most restrictions applying to bicycles on commuter trains. Bicycles started to be allowed on the train at all hours as more commuter trains were acquired. Great importance was also given to improving bicycle parking facilities at stations (City of Copenhagen, 2002).

The Danish State Railways set a goal of having 25 percent of lockable parking spaces at stations and 50 percent covered for the suburban train system (City of Copenhagen, 2002). Østerport Station and Copenhagen Central Station housed the first initiatives in improving cycling facilities with covered and locked bicycle parking and affiliated cycle shops to provide repair service. Bicycle parking was improved at several stations like the Copenhagen Transport bus terminal, Vesterport, Central Station in connection with a new bus terminal, Bernstorffsgade and Nørrebro stations (City of Copenhagen, 2002).

Bicycle parking at Svanemøllen Station was improved in 2011. The redesigned Nørreport Station, with easier access and more bicycle parking, was finished in 2014. To increase the use of the bike racks available in public transport stations, a 'Bicycle Butler' project was developed. Through this project if bicycles are parked "illegally", for example leaned up against lamp posts or other street furniture, then they are moved to the proper bike racks and serviced. Then a note is left on the bike asking the cyclist to park it appropriately (Schiøtt Stenbæk Madsen, 2010). This service has been a success and has been expanded. The efforts to clean up abandoned bicycles have been intensified since 2011 as well (City of Copenhagen, 2011b).

Improved intersections

The majority of all Copenhagen traffic accidents occur in intersections and they are recognised as sites where cyclists often feel insecure (City of Copenhagen, 2013b). From 2003, public funds were earmarked to reduce cyclists' casualties. Infrastructure changes were implemented such as set-back stop lines for cars and marked crossings for cyclists (City of Copenhagen, 2002). Set-

back stop lines for cars eventually became standard and other policies were developed to improve security such as reducing traffic lanes width to give more space to cyclists, pre-green for cyclists, roundabouts (which are safer than intersections) and pavement crossings (City of Copenhagen, 2013b).

Green waves

On streets with heavy cyclist flows, planners have installed a 'green wave' which coordinates the traffic lights based on a 20 km/h travel speed. A green wave occurs when several consecutive traffic lights are coordinated to allow continuous traffic flow in one direction. Current green wave sections today are synchronized based on fixed programmes. The city is evaluating a new generation system that will improve and integrate cyclists and buses' passability (City of Copenhagen, 2013b). If a green wave is properly placed and adjusted, it can contribute with more than 10 percent increase in the cyclists' speed in the selected area (Jensen, 2009).

A coordinated effort with the police allows cyclists to ride contraflow on most of the city's one-way streets. That makes it possible to set a green wave on one direction in the morning, e.g. towards city, and on the opposite direction in the afternoon, e.g. from city to suburbs (City of Copenhagen, 2013b; Jensen N. , 2015). Additionally, "your-speed counters" help cyclists maintain the necessary speed to stay on the green wave (City of Copenhagen, 2013b).

Cycle track maintenance and cleaning

In 2000 cyclists were dissatisfied with cycle track maintenance and a complete survey of the standards was conducted in 2001. The city committed to an unsatisfactory cycle track rate goal of no more than five percent (City of Copenhagen, 2002). In order to achieve that target, snow clearance and measures to prevent slippery road surfaces are now initiated at the onset of the first snow or as soon as the roads get slippery. The city committed to clear virtually all cycle tracks before the onset of the morning rush hour (City of Copenhagen, 2002).

In the 2011-2025 strategy, there is also a clear goal of a markedly better level of comfort for cyclists. Funding for maintenance and snow clearance have been substantially increased from the 2011 levels (City of Copenhagen, 2011b).

Design guidelines

In 2013, the city of Copenhagen published 'Focus on cycling: Copenhagen guidelines for the design of road projects', which has a goal to ensure that bicycle traffic is factored into all road projects to the greatest extent possible (City of Copenhagen, 2013b). The design of Copenhagen's cycle route network is based upon the principles of accessibility, coherence, directness, safety, self-explanatory design and comfort. Accessibility is deemed important because routes should be no more than 500 metres apart and should try to occur on main streets. Directness is important because cyclists most often prefer to take the most direct route to a location (Nelson, 2007). The separation of bicycle traffic from motor traffic is recognised as expensive to build, but it greatly increases safety and comfort. Safety and comfort can also be improved through good cycle track maintenance. Finally, it is easiest for cyclists to form a mental map of the cycling network if its design is uniform and follows main roads (Nelson, 2007).

With the recognition that intersections are where the majority of traffic accidents in Copenhagen occur, there is a special focus on designing intersections that are safe, easily passable for cyclists, and where they feel secure (City of Copenhagen, 2013b). Cyclists are recognised as needing to be made clearly visible in intersections, and motor vehicles are not allowed to park closer than 10 metres to intersections. In mixed traffic, the design guidelines deem that junctions should be designed with speed reducing measures such as continuing the pedestrian sidewalk across the side road (Nelson, 2007).

Copenhagen cycle tracks are designed to have a kerb between the cycle track and the pavement and between the cycle track and the traffic lane, thereby giving cyclists their own completely separate area (City of Copenhagen, 2013b). The standard cycle track width has been increased in Copenhagen in recent years and the superior cycling network, the PLUSnet, will have a high capacity of three lanes per track. New and retrofitted cycle tracks are designed based on calculations that depend on current bicycle traffic and an estimate of a 50 percent increase in future bicycle traffic in accordance with the goals set forth in the 2011-2025 strategy (City of Copenhagen, 2013b). Cycle lanes are often installed with the same width as future cycle tracks so they can easily be upgraded to cycle tracks in the near future.

SPECIFIC CYCLING POLICIES: PROMOTION

Campaigns and information

From 1995 several cycling promotion campaigns have been carried out by the Copenhagen City Council, including a winter cycling campaign, and a company bike scheme. Firms were seen to be feeling increasingly responsible for how their employees transport themselves to work and several took an interest in transport schemes. Following this, the “We bike to work” campaign was introduced in 1996, in which the city chose a “Cycle Company of the Year”. In 2000 and 2001 the council organised an Environmental Transportation Week where citizens’ proposals were tried out (City of Copenhagen, 2002). The latter campaign concluded with a “car free” weekend, during which very few private cars were allowed into the city centre (Fietsberaad, 2006).

Infrastructure expansion has been accompanied with campaigns focused on more considerate behaviour in traffic (City of Copenhagen, 2011b). Other campaigns aim to establish cycle track etiquette and for the citizens to share a common understanding of what considerate cycling behaviour is. An important goal underlying some campaigns is that both young and old feel safe on bicycles (City of Copenhagen, 2011b). Finally, Copenhagen city is developing programmes targeted at promoting cycling to specific groups who are known to cycle less frequently, such as immigrant citizens, the elderly and people who use the car for short trips (Fietsberaad, 2006).

Danish Cyclists’ Federation and Cycling Embassy of Denmark

The Danish Cyclists’ Federation is a non-political interest organisation that fights for the rights of Denmark’s 4.5 million cyclists through activities and political lobbyism. They conduct successful annual campaigns like Bike to School, Bike to Work, and Lights On, to name just a few. They also focus on increasing safety by working in collaboration with the Danish Road Safety Council, the transport sector, and the Danish Road Directorate (Cyklistforbundet, n.d.).

The Cycling Embassy of Denmark is a network of professionals from private organisations, government institutions and NGOs that promote cycling and communicate solutions, know-how and expertise in cycling in Denmark and overseas (Cyklistforbundet, n.d.).

The DCF is a private NGO not financed by the Danish government or the Copenhagen municipality. Nevertheless, they have permanent contact and influence on the policies adopted by them and are indirectly supported by government organisations (Cyklistforbundet, n.d.). The Bicycle Parking Manual was developed between the 3 institutions, among others, and published

by the DCF (Celis & Bølling-Ladegaard, 2008). The Cycling Embassy of Denmark is mostly focused on the exporting cycling knowledge but it has direct influence on the policies proposed by the Copenhagen authorities (Cycling Embassy of Denmark, 2015).

ASSOCIATED TRANSPORT PROJECTS

Public transport

In order for Copenhagen to be carbon-neutral by 2025, the city needs a fast, high-class underground metro in the dense city districts, linked with high-priority bus solutions and modern light rails for the outlying areas (City of Copenhagen, 2012b). This network between buses, light rails, metro and trains needs to be efficient and flexible in order to create better alternatives to cars, especially for longer journeys. Some of the targets are a 20 percent increase in transit passengers by 2025 compared to 2011; a 10 percent reduction of travel times; and carbon-neutrality of public transport by 2025 (City of Copenhagen, 2012a).

International experiences show that it is technologically and economically possible to convert transit vehicles to biofuels and electric and hybrid buses. Environmental requirements will be imposed on public transport. The Metro and S-trains are already running on electricity and they will become carbon neutral as the whole energy supply is converted to renewable energy (City of Copenhagen, 2012b).

Pedestrians

Following its final goal of becoming the most liveable city in the world, Copenhagen is very keen on focusing on pedestrians. The Municipality Plan of 2009 designated 12 main commercial streets in the different Copenhagen districts. These streets were improved by prioritising pedestrians, cyclists and public transport, low vehicle speed limits, better pavements and free of obstacles, and more toilets, water fountains and benches (City of Copenhagen, 2011c).

The current pedestrian strategy “More People to Walk More”, published in 2011, contains a number of proposals as to how the city can improve pedestrians’ amenities. The focus areas of this strategy are the development of a walking culture, the creation and enhancement of pedestrian routes and meeting places, pedestrian priority in main shopping streets, and better connections and accessibility to traffic nodal points (City of Copenhagen, 2011c).

Developing a walking culture has been supported by campaigns and events encouraging new forms of activity and changes of habit, e.g. replacing short car trips for healthy walks, 'walking buses' to encourage children to walk to school and behavioural campaigns to avoid conflicts between pedestrian and cyclists as well as between bus passengers and cyclists. Pedestrian routes have been improved by retrofitting several traffic nodal points with pedestrian friendly surfacing and safer street crossing, benches and covered relaxation areas with good lighting. Signage of walking distances with time indication to local destinations by S-train and Metro stations have also been included (City of Copenhagen, 2011c).

CHAPTER 4: CASE STUDY BUENOS AIRES

Buenos Aires (BA) is the capital and largest city of Argentina, and the second-largest metropolitan area in South America, after Greater São Paulo. It is the political, financial, industrial, commercial, and cultural hub of Argentina. In the census of 2010 there were 2,891,082 people residing in the city (Censo 2010 Argentina, n.d.) and almost 15.5 million in the metropolitan conurbation known as Greater Buenos Aires. BA is a densely populated city with almost 14,000 inhabitants per km² but only about 2,400/km² in the suburbs. Two-thirds of the city's residents live in apartment buildings and 30 percent in single-family homes (INDEC - Censo Nacional de Población, Hogares y Viviendas 2001). It is by far the densest and most populated city of this comparison. It is also the poorest of the three cities but official income and poverty statistics are not reliable in Argentina. The Statistics and Census Office was reformed by former president Kirchner for political purposes and their figures are highly discredited (C., 2013). The data provided by private agencies estimate that four million people live in poverty and 1.2 million are considered indigent in the metropolitan Buenos Aires area, which represent a 31.2 percent and 9.7 percent of the total population respectively (MercoPress, 2009)

The city comprises an area of 203km², a metropolitan area of 4,758 km² and has a flat topography with an elevation of 25 metres (Censo 2010 Argentina, n.d.). There is an evident lack of green spaces. It has below two square metres of green space per person, way below the average of nine square metres recommended by the World Health Organization (WHO). In comparison, New York has ten times that amount, Madrid seven and Paris five (Defensoría del Pueblo de la Ciudad Autónoma de Buenos Aires, 2008; World Development book case study: sustainable urban development in Curitiba, n.d.). Its climate is humid subtropical with humid summers and temperate winters. In summer temperatures can range between 28 °C to 31 °C and in winter the average temperature is 10.9 °C. Spring and autumn are generally mild and volatile, with averages temperatures of around 17 °C (Servicio Meteorológico Nacional, n.d.).

Almost every neighbourhood in the city is based on a square or rectangular grid pattern inherited from the Spanish colonial period. Each square block's side has a length of roughly 110 metres. The city centre has many pedestrian zones in the city centre which are partially car-free and always bustling and the current mayor has created several additional ones (Buenos Aires Ciudad, n.d.a).

TRANSPORT

Automobile

Encouraged by pro-automaker policies pursued towards 1950s and the beginnings of 1960s, auto sales nationally grew from an average of 30,000 during the 1920–57 era to around 250,000 in the 1970s and over 963,917 in 2013, a record year. Around one third of the total car sales are registered in the city of Buenos Aires and the Greater Buenos Aires (Asociación de Fábricas de Automotores, 2015). Following the economic prosperity of the 1990s, record numbers of people started commuting by car. During the economic recovery that started in 2004 after the 2001 economic crisis, car production and imports increased dramatically and congestion increased (Asociación de Fábricas de Automotores, 2015).

Public transport

Buenos Aires has a substantial public transport system through bus, rail and subway modes. A feature that sets Buenos Aires apart from the other Latin-American metropolis is its fast, cheap and relatively efficient bus system. All the suburbs are covered by a network of more than 180 bus lines, called “colectivos”. The subway adds to this by connecting several suburbs with the main avenues and trains and bus stations. Payment in all public transport is integrated through the same magnetic card (Buenos Aires Ciudad, n.d.a).

Colectivos attract exceptionally high use with virtually no public financial support. Their high frequency makes them comparable to the underground systems present in other cities, with the advantage that colectivos cover wider areas. Tickets are inexpensive and every suburb is covered so commuters have to walk relatively short distances to get to a bus stop (Martínez, Larocca, & Pratt, 1996).

Buenos Aires also has a system of metropolitan rail which covers 813 kilometres. It is the second most extensive urban rail system in America, after New York. It has the two busiest train stations in Argentina and it daily serves 1.4 million commuters (close to 500 million annually) in the Greater Buenos Aires region (Comisión Nacional de Regulación del Transporte, 2014).

The underground, known as “subte”, opened in 1913 and was the first underground system built in the Southern Hemisphere. It is a high yield system that provides access to various parts of the city. It is currently undergoing renovation and expansion (Schwandl, 2007). The current subte network reaches 59.4 kilometres, and is formed by six different lines and 100 stations. The

underground system is also connected with the Premetro, a 7.4 kilometre-long surface light-rail that serves the outskirts of the city (Buenos Aires Ciudad, n.d.j). Close to one million passengers use the subte system daily.

A Bus Rapid Transit (BRT) system, called MetroBus, was inaugurated in 2011 in Buenos Aires. It combines articulated buses and traditional colectivos on exclusive physically separated lanes. It uses modular median stations that serve both directions of travel and enable passengers to pre-pay. It runs across Juan B. Justo Av., one of the main roads of Buenos Aires, and also 9 de Julio Av., the main avenue of the city and the widest in the world (La Nación, 2011; Buenos Aires Ciudad, n.d.e).

Cycling

The grid pattern layout of Buenos Aires, and its high density, provide favourable conditions for it to be a bicycle-friendly city (Valente, 2012). However, according to Andrés Fingeret, director of the Institute for Transportation & Development Project (ITDP) of Argentina, "traditionally, people who used bicycles to get about were so poor that they couldn't even afford a motorcycle. Today, the bicycle has taken on status and there is a broad segment of society, especially among people under 40, who are actively choosing it," (Valente, 2012). Prior to the current cycling-friendly policies, the bicycle had always been a very marginal means of transportation in Buenos Aires. Before the construction of the separated cycleways and the inauguration of the bike sharing programme, the cycling share in Buenos Aires was a mere 0.4 percent (Valente, 2012).

BUENOS AIRES TRANSPORT STRATEGY

Unfortunately, publicly available information from official sources was harder to obtain in the case of Buenos Aires. It was somewhat easy to access the information on the current projects and programmes but it is not very clear what the transport strategy for BA is.

The Sustainable Mobility Plan ("Plan de Movilidad Sustentable" in Spanish) of the Government of the City of Buenos Aires (GCBA) aims to reorganise traffic in an efficient way so that citizens of Buenos Aires can access different modes of transport that are systematised, well-coordinated and have a low impact in the environment. At the same time, it seeks to enable people to save time and be safe. Its goals are improving people's access to their daily needs, prioritising non-motorised transport and public transport, bringing order to general traffic, decreasing congestion, and reducing traffic accidents and casualties (Krantzer, 2011). The Plan emphasises the use of various tools to achieve these goals such as providing better public transport and

cycling facilities while discouraging automobile use, which will end up benefiting all users, even car drivers (Buenos Aires Ciudad, n.d.f).

The development of the Sustainable Mobility Plan took form during the administration of Mayor M. Macri and his Undersecretary of Transport, Guillermo Dietrich. Mayor Macri was elected Chief of GCBA on December 2007 and designated Dietrich on August 2009. The plan is intertwined with the city's urban development policies and has four different strategic aims. These are to develop: Metrobus, a public transport system that combines regular buses and articulated buses in separated busways; Ecobici, a public shared bicycle and dedicated cycleways; Traffic control and safety, to reduce accidents and organise traffic; and Pedestrians, an improvement in pavements, plazas and pedestrianisation of streets (Buenos Aires Ciudad, n.d.g). The plan's transportation modes in priority order are pedestrians, non-motorised transport, public transport, and private vehicles (Krantzer, 2011).

The plan also comprises some other secondary goals in public transport, cycling and walking, traffic control, and smart traffic technologies. Preferential ways have been arranged to prioritise public transport where buses itineraries are rearranged through avenues and main roads (Buenos Aires Ciudad, n.d.g). The underground system is also being renovated and extended and a new vans station has been created that serves more than 50,000 passengers daily (Buenos Aires Ciudad, n.d.g).

Traffic control has been improved through drink-and-driving controls, which have been increased 50 percent between 2012 and 2014, and drugs controls. These initiatives have achieved a 50 percent reduction in traffic accidents. Other initiatives include new unloading zones for commercial trucks and a new parking system (Buenos Aires Ciudad, n.d.g). Smart technologies have also been developed, through a new traffic management and control centre, green waves and new traffic lights. Also introduced is an app called BA Móvil, which provides real time information on the different transport modes available at a location, and a new real time map of traffic works (Buenos Aires Ciudad, n.d.g).

Before the current administration in Buenos Aires, the cycling share was negligible and there was no public bicycle sharing scheme. Cycleways in Buenos Aires were located only in recreational and sport dedicated areas such as parks and playgrounds. But by the end of 2007, the city legislature passed the "Sistema de Transporte Público de Bicicleta" law ("Public Bicycle Transportation System") that mandated the creation of a bicycle share network along with secure bike infrastructure. After that, the Sustainable Mobility Plan was developed. Within it, the "Bicicletas de Buenos Aires" ("Bicycles of Buenos Aires") strategy identified four main focus

areas: to develop a network of protected cycleways; to provide adequate and sufficient bicycle parking; to implement a bike sharing scheme; and to promote the use of bicycles among commuters (Krantzer, 2011). At first, the GCBA focused on building the separated infrastructure network. By December 2010 it had also started the bicycle sharing pilot programme called “Mejor en Bici” (“Better by Bike”), with bikes free for hire upon registration (Holub, 2010).

These measures were complemented with various bicycle-friendly initiatives like protected bike parking and soft loans for the purchase of a new bicycle. Promotion events and public education campaigns were also initiated. Additionally, the Undersecretary of Transport developed several other transport improvements such as the Metrobus development, the pedestrianisation of more than 33 streets in the downtown area, creation of the new van station and the extension of the underground. All of these measures helped to organise traffic and decrease congestion, and at the same time increasing the cycling commuting share substantially (Gobierno de la Ciudad de Buenos Aires, 2015b).

By the end of 2012, two years after the inauguration of the cycling programme, the share of cycling had increased from 0.4 percent to 2 percent (Valente, 2012; Infobae, 2012). Today, more than 3.5 percent of commute trips in the city of Buenos Aires are completed through cycling. That equates to more than 180,000 people cycling every day for transportation, or combining cycling with other alternatives such as the subway, train or bus (Gobierno de la Ciudad de Buenos Aires, 2015b).

SPECIFIC CYCLING POLICIES: INFRASTRUCTURE

Cycleways (“Bicisendas”)

Construction of a protected cycleway network called “bicisendas” was commenced in 2009. The most up to date data available shows that the network has reached 140 kilometres in length, and is projected to be increased by 15 kilometres to 20 kilometres by the end of 2015. The separated cycleways have followed a consistent plan of construction, with 20 to 30 kilometres being built in each of the past five years (Gobierno de la Ciudad de Buenos Aires, 2015b). The network was developed with the goal of connecting strategic areas of the city like public transport transfer stations, educational centres and hospitals, and to allow commuters to complete single-mode or inter-modal trips (Buenos Aires Ciudad, n.d.h).

The cycleways that are currently being built are aimed to further complete the network and join nodal areas of the city that have yet to be reached. One of these main areas is the University

Campus, and the intention is that all the different faculties will be connected. A second cycleway will link several government facilities including hospitals and ministries. The third one will be linked to one of the main public transport transfer stations in Buenos Aires and enable people to do intermodal journeys. Finally, Sur cycleways will connect some of the poor neighbourhoods of Buenos Aires with the rest of the network, providing a quality alternative to people that cannot afford public transport (Gobierno de la Ciudad de Buenos Aires, 2015b).

Protected cycleways are generally located on the left shoulder of roads (in Argentina, people must drive on the right-hand side) and most of them are two-way, even though some are only one-way. In order to create a physical separation between cyclists and vehicular traffic, several signposts and markers are installed as well as raised yellow concrete kerbs and/or concrete barriers (Romig, 2012). According to the specialists from the Undersecretary of Transport, international experiences were studied and it was found that automobile drivers tend not to respect cycle lanes or bus and cycle shared lanes and put cyclists in danger (Valente, 2012; Krantzer, 2011). This knowledge provided the rationale for the approach that has been taken.

Parking

Appropriate bicycle parking is considered a fundamental measure to promote the use of the bicycle as a viable transportation mode. Without proper parking, bicycles are prone to damage and theft, pavements get cluttered and it gives cycling a bad image (Celis & Bølling-Ladegaard, 2008). Prior to the implementation of the “Mejor en Bici” programme in Buenos Aires, there were not many bike racks available in the city. With the success of the policy and increase in cycling, pavements started to become full of bicycles and cyclists did not have proper spaces available to park them. To solve these issues, in 2011 the GCBA started installing dedicated bike racks and parking spaces around the city. By October 2012 there were almost 1,000 already in place, more than 4,000 by 2013 and by August 2014 they reached 8,700 (Gobierno de la Ciudad de Buenos Aires, 2015a). These dedicated parking spaces were strategically placed considering criteria like higher cycling traffic and proximity to educational centres, workplaces and retail areas (Gobierno de la Ciudad de Buenos Aires, 2015b).

In order to help cut down on bicycle theft and provide additional and secure parking spaces to cyclists at no expense to the GCBA, the Buenos Aires Legislature passed a bill during 2010 that forces parking garages to accept bicycles. Private garages are expected to have dedicated spaces for bicycles and charge a price proportional to the space they occupy, that is 10 percent of a car’s space. As well, eight spaces for bicycles are required to be provided for every 50 spaces for

cars (Romig, 2012). Additionally, the maximum full day tariff cannot exceed the price of two bus tickets (Gobierno de la Ciudad de Buenos Aires, 2015b). The majority of garages have obliged, and it has become relatively easy to find a safe spot for bike parking in downtown Buenos Aires (Romig, 2012). To help cyclists, a webpage was developed that shows where to find bike parking spaces and which garages obey the new law (Buenos Aires Ciudad, n.d.h).

To increase the popularity of the cycling programme, guarded bike parking facilities are set up during public and private events that are expected to draw 2,000 or more people, such as concerts or open-air conferences (Valente, 2012). Organisers are required to provide temporary free parking spaces as well as surveillance and security. Spaces must be open and available at least three hours before the beginning of the event, and close three hours after its end (Gobierno de la Ciudad de Buenos Aires, 2015b).

Bike share scheme

In December 2010 a bike sharing scheme was established by the GCBA. It is a publicly funded project with free bike hiring. This was commenced with 100 free bicycles in three stations, and led to an average of 100 daily trips. Less than two months after the opening, three additional stations were established (Dietrich, 2011). The system only worked Mondays to Fridays from 8am to 8pm and Saturdays from 9am to 3pm via their man-guarded stations, and there was a time limit of one hour per user per bicycle (Dietrich, 2013b). By July 2013, the system was enjoying a good degree of acceptance and had grown to 750 bicycles, with 76,000 registered users and an average of 5,400 journeys per day (an average of more than 7 journeys per bicycle). This had led to a total of 1,500,000 journeys taking place with the shared bikes since the system first rolled out (Dietrich, 2011).

The bike share system has continued to grow. At present, more than 3,500,000 trips have been made since its opening, it has almost 150,000 registered users and it has reached peaks of 6,700 daily trips (Gobierno de la Ciudad de Buenos Aires, 2015b). Given the success of the programme, in 2014 the system was upgraded and its name changed to "Ecobici" so people can link more directly the concept of ecology and the Sustainable Mobility Plan. The number of bicycles was increased from 750 to 3,000 while the number of stations was increased from 28 to 200. The system was modernised with automatic stations to allow bikes to be used 24 hours a day, seven days a week, via a magnetic card given to the user (Dietrich, 2013c). What is not clear about the new system is if it is going to be fully automatic or hybrid. For now both manual and automatic stations will coexist (Gartner & Ochoa, 2013). Use has remained free of charge but with a limit

of one hour per user per bicycle maintained. The renovated system is expected to reach 36,000 daily trips and 11,000,000 annual trips (Dietrich, 2013c).

The system is designed with multiple means of accessing the shared bikes. In order to unlock a bicycle, users have several alternatives; the “Ecobici” magnetic card, making a phone call to a the free number provided by the service, using the BA Ecobici app or, using the PT magnetic card of BA (Buenos Aires Ciudad, n.d.b). The BA Ecobici app also has the advantage of indicating the closest bike share stations to the user and the availability of bikes in each station, a map of the protected cycleways, and it also allows users to report vehicles parked in the cycleways (Gartner & Ochoa, 2013).

The system has always been fully publicly funded and free for users, in contrast with the majority of bike share systems internationally that are sponsored by private companies or charge fees for the use of the bicycles. At the beginning of 2013 the GCBA attempted to privatise the system but there were public protests. A judicial decision based on some irregularities in the privatisation process reversed the attempt (Dietrich, 2013c; Novillo, 2013). The GCBA then proposed to leave part of the investment to be covered by private sponsors but a final decision has not been made yet and sponsors may or may not support the system financially.

SPECIFIC CYCLING POLICIES: PROMOTION

Soft loans to purchase bicycles

Bicycles can be somewhat difficult to purchase in Argentina due to their relatively high cost. Due to import controls, high tariffs and the small scale of the national bike industry, bicycles in Argentina can cost triple the price that they do in the U.S. (Romig, 2012). In recognising this, in September 2012 the GCBA made a policy to make it easier for people to purchase bicycles via soft loans. The innovative measure, consolidated through the state-owned Banco Ciudad de Buenos Aires, consisted of a line of loans to finance bicycle purchases, payable in 50 instalments and with zero percent interest rates (Valente, 2012; Creditos.com.ar, 2012; Buenos Aires Ciudad, n.d.c).

By the end of January 2013, the Banco Ciudad de Buenos Aires had granted more than 3,300 loans to purchase bicycles for a total amount of AR\$8.815.011. That is an average of almost AR\$ 2,700 per loan, close to the maximum limit of AR\$3,000, and a sufficient amount at that time to buy a bicycle of sound quality. It was remarkable that 200 of the loans were given to pensioners,

and 30 to public aid beneficiaries. Unfortunately, the figures for the programme were not published in the subsequent years (Ahora Educación, 2013).

Road safety education – The Cyclist’s Manual

In April 2013 the GCBA launched *The Cyclist’s Manual* (“El Manual del Ciclista”) which is not only directed to cyclists but also to other road users such as pedestrians and drivers (Buenos Aires Ciudad, n.d.d). The Manual seeks to promote knowledge that will improve cycling safety and experiences. It includes all the current road signage and laws and makes a series of suggestions to urban cyclists on how to behave on the roads in order to improve their daily street interactions. It also includes advice on bike maintenance, traffic laws applicable to cyclists, a map of the cycleways network and parking spaces (Buenos Aires Ciudad, n.d.d).

Partnerships with companies, universities and NGOs

Given that the majority of daily trips in Buenos Aires are conducted for commuting, the GCBA decided to run a programme with private companies with the objective of increasing the use of the bicycles amongst their staff (Gobierno de la Ciudad de Buenos Aires, 2015a). Almost 200 companies are already part of the programme, as well as several NGOs, shops that offer discounts to cyclists, universities and one embassy (Gobierno de la Ciudad de Buenos Aires, 2015a). Some of the practices recommended through the programme are secure and covered bike parking, lockers and showers, discounts to purchase bicycles, corporate bike rides, acquisition of a company’s bike fleet, and sponsorship of government-organised bike rides. Some of the main companies of Buenos Aires are involved in total or partially, and they have received sustainability awards for decreasing the amount of carbon emissions as a result (Dietrich, 2010). Smaller participant companies like shops and stores that do not have the size to justify the most expensive measures can still participate by providing dedicated parking spaces to cycling customers and giving them special discounts (Gobierno de la Ciudad de Buenos Aires, 2015a)

Related with this is the contest #Altrabajoenbici (#Icommutebybike). Participants are asked to upload a picture to the GCBA web platform showing their bike commute and explaining why they choose the bike as their mode of transport. Whoever gets more votes in a single month wins a new folding bike (Gobierno de la Ciudad de Buenos Aires, 2015a).

International cooperation

The programme "I bike ABC" (ABC is the acronym for Amsterdam-Buenos Aires-Copenhagen) is a cooperation agreement between the three cities through the GCBA and the embassies of Denmark and the Netherlands (Gobierno de la Ciudad de Buenos Aires, 2015a). It is a bicycle event to promote cultural interchange between the cities, with the goal of promoting the use of the bicycle as a mode of transport (Apts Buenos Aires, 2014). The agreement has led to the holding of three workshops given by specialists from both cities. It covered subjects such as bicycle parking, cycling urban infrastructure, the ultimate city bike, how to design and implement cycling public policies, and working with NGOs (Buenos Aires Ciudad, n.d.h).

ASSOCIATED TRANSPORT PROJECTS

The Undersecretary of Transport of the GCBA also took other measures to upgrade Buenos Aires' transport system, discourage car use, improve public transport and make the city more liveable. These policies have an indirect positive effect on cycling because if streets are less clogged with automobiles, there is more space for cyclists. These are expected to decrease the chances of accidents, make less air pollution and in general a more liveable city for all.

Public transport

The GCBA "is trying to build an alternative system to the subway," which turned 100 years old in December (Godoy, 2014). Bus Rapid Transit (BRT) is also known as "surface metro" since it can provide high-quality, metro-like transit service at a fraction of the cost. Some of BRT's main features are segregated busways, rapid boarding and alighting, pre-board fare collection, prioritisation at intersections and modal integration at stations and terminals (Wright, 2003).

The first stage of the Metrobus was inaugurated in 2011 and runs across Juan B. Justo Av., one of the main roads of Buenos Aires. It is 12 kilometres long and has 21 stations. The stations are linked with two rail stations, two subway stations and one bike share station (Buenos Aires Ciudad, n.d.e). The second stage was laid on 9 de Julio Av., the main avenue of Buenos Aires and the widest in the world (La Nación, 2011). In this case, even though the total length of three kilometres is much shorter, the necessary works were more extensive since the whole road was retrofitted. Stations were built on the central lanes of the road and a wide pedestrian corridor was placed in between stations that connects all the bus stops. It also gives pedestrians much more room than just the lateral pavements of the avenue station (Buenos Aires Ciudad, n.d.e).

Metrobus has two exclusive lanes with station platforms in the centre of the road. Opposite-way bus lanes are separated by the pedestrian corridor and a 2.5 metre kerb with trees in it (Moreno, 2012). The other two sections, Metrobus Norte and Sur, are currently being built. They will add 28 kilometres between the two which is expected to benefit almost 500,000 daily users (Buenos Aires Ciudad, n.d.e).

Thanks to the success of the Metrobus, Buenos Aires was selected as the leading city in BRT in 2014 by C40, a network of the world's megacities taking action to reduce greenhouse gas emissions and implementing meaningful and sustainable climate-related actions (C40 Blog, 2012; C40, 2015).

Vans

Vans are used in BA as a complement to public transport. They are used by people that have to commute to distant parts of the Greater Buenos Aires area and are willing to pay a premium for a faster service and with more direct routes than rail or long distance buses. Most vans used to wait for passengers near Obelisco, a very congested area in downtown, either on the side of the road or in informal van stops. This created some transit chaos and pavements got clogged with passengers waiting. In June 2013, the underground Van Terminal Station in Obelisco was opened to benefit the 50,000 daily passengers and, along with the Metrobus 9 de Julio, it helped to organise and alleviate traffic in 9 de Julio Avenue and surrounding areas. The new station has several pedestrian access points, with 3 traffic lanes and 2 platforms for passengers and can hold up to 550 vehicles. It not only clears the streets from passengers and vans but it also provides a safer and more comfortable space for passengers (Dietrich, 2013a).

Pedestrianisation of streets

The GCBA aims to transform the downtown and historical centre of the city into a pedestrian zone. The goal is to make it a place where people choose to live and stay, instead of one where people only come to work or do business (Moreno, 2012).

All the streets comprised between Avenida de Mayo, 9 de Julio, Leandro N. Alem and Santa Fe are in a process of being transformed to pedestrian streets. This is done except on avenues and main roads, to still allow buses to run on them. After all the works are completed, 70 percent of the street space will be pedestrian space and 5.5 kilometres of cycleways will be laid, making the urban space much more comfortable and recovering most of it back from cars (Tomino, 2012; Prioridad Peatón, n.d.).

Additionally, pedestrian-friendly adaptations are being developed in several corners and pavements of the city. Pavements on intersections are widened by taking space from the road and placing bollards. Intersections become more visible and safer, which leads to motorists' behaviour becoming more organised and predictable (Buenos Aires Ciudad, n.d.g). Since interactions with car drivers at intersections are the most dangerous situations in traffic for pedestrians, this is complemented with a strong education and promotion campaign called "Al girar, prioridad peatón" ("When turning, yield to pedestrians") (Dietrich, 2014).

CHAPTER 5: CASE STUDY AUCKLAND

The Auckland urban area is the largest and most populous of New Zealand with a population of a million and a half people, 31 percent of the total population of New Zealand (Statistics New Zealand, 2014; Statistics New Zealand, 2015). Auckland's climate is considered subtropical with warm, humid summers and mild, damp winters. It is the warmest main centre of the country and one of the sunniest. The average daily maximum temperature is 24 °C in summer and 15 °C in winter. High levels of rainfall occur almost year-round (McClure, 2015a).

Auckland is the largest economic and commercial centre of New Zealand and hosts most of the major international corporations in New Zealand. The sub-national gross domestic product (GDP) of the Auckland region was estimated to contribute to 36 percent of New Zealand GDP overall (Statistics New Zealand, 2006). The economic deregulation that took place in New Zealand during the 1980s had a profound effect in Auckland's economy and many companies relocated their head offices from Wellington. The city has also benefited from a surge in tourism. In 2015 70 percent of New Zealand's international visitors travelled through its airport, and Auckland's port handled 31 percent of the country's container trade (McClure, 2015b).

Between 1842 and 1865, Auckland was the capital city of New Zealand but government was moved to the more centrally located Wellington in 1865 (McClure, 2012). Up until 2010 governance through the Auckland region was in the hands of separate city and district councils, but this large number of councils and the lack of strong regional government came to be considered to be hindering the region's economic progress. A Royal Commission on Auckland Governance was set up in 2007 (The New Zealand Press Association, 2007; Burton, 2007) and in 2009 recommended the unification of local councils into one unified local administration. This led to the current Auckland Council structure (Hide, 2009), a so called "super city" formed with a single mayor through New Zealand's local body elections in 2010 (Gay, 2009). Len Brown was elected mayor of the new Auckland Council in October 2010, and re-elected for a second term in October 2013.

In the last few years, Auckland has been consistently ranked as one of the most liveable cities in the world by several international rankings of liveability. The *Quality of Living Survey* published by international human resources firm Mercer in 2014 placed Auckland third in the world (Mercer, 2014). *The Economist*, the famous economics and finance newspaper, ranked Auckland in the 10th place in its 2012 *World's Most Liveable Cities* index (B., 2011). However, infrastructure issues like traffic congestion, substandard public transport and increasing housing

costs contribute to negative aspects of the city, and are some of the most prominent public policy challenges.

TRANSPORT

Currently, transport is one of the most important and urgent issues for Aucklanders. Auckland Council has recognised that “(Y)ears of underinvestment in public transport and existing settlement patterns along with decisions taken over the past half century, mean that Aucklanders rely heavily on private cars as their primary transport mode. Roads and motorways are heavily congested and further expansion is severely constrained” (Auckland Council, 2012, p. 313). Unless radical measures are taken, these problems will be exacerbated in future, especially with the high projected population growth for Auckland.

At present, 85 percent of trips in the city are made by automobile and it is estimated that around 15,000 extra cars join Auckland’s roads every year. Transport accounts for almost 40 percent of the city’s GHG emissions and current emissions from the transport sector are 64 percent higher than 1990 levels. This increase is recognised as predominantly coming from road transport emissions (Auckland Council, 2014). On the other hand, public transport patronage has been steadily increasing in the last decade, for example with patronage increasing from 65 million to 70 million trips between 2011 and 2012 (Auckland Council, 2012). This has brought some relief to the transportation system and some hope for the future (Auckland Council, 2012).

Automobiles

Dramatic changes in Auckland’s urban environment and transport system took place after World War Two and private cars began to dominate. Research at Griffith University shows that since the 1950s, Auckland has sustained some of the most pro-automobile transport policies in the world (Mees & Dodson, 2006). Contributing to the promotional automotive policies was the dismantling of Auckland’s extensive tram system in the 1950s (Lee, 2009). The pro-car policies set in that early period continue to influence transport in the city today (Auckland Regional Transport Authority, 2007).

The 1950s Auckland’s Master Transportation Plan outlined a new motorway network which is now being completed. The network of arterial roads and motorways became defining and geographically dividing features of the urban landscape (Auckland Transport, 2013b). By the end of the 1950s, the new motorways and the Harbour Bridge linked the sub-regions of the North Shore, Waitakere and Manukau City to each other and the CBD, opening them up to

development and allowing further expansion. Suburban sprawl spread all over Auckland along with dispersed workplaces that could only be reached by automobile commuting (Auckland Transport, 2013b; Auckland Regional Transport Authority, 2007). This strong roading focus has resulted today in substantial traffic congestion (Savage, 2007) and peak congestion levels are on par with comparable developed cities with populations over four million (Auckland Transport, 2013b). New Zealand has an average of 700 vehicles per capita and is among the top ten countries in the world in that respect. Auckland is close to that figure with above 650 vehicles per capita, a very high number as well (McClure, 2015b; The World Bank, 2015).

Public transport

Auckland originally grew up as a walking city, centred on the port and bounded by Ponsonby, Grey Lynn and Parnell. Later, trams and railway lines enabled people to live further from their place of work and helped to shape Auckland's rapid expansion in the early decades of the twentieth century (Auckland Regional Transport Authority, 2007). Electric tram services ran from the city centre across to Onehunga making Auckland the only city in the world at that time with a coast to coast tramway system. They were dismantled, however, in the 1950s (Auckland Transport, 2013b). The dismantling coupled with the heavy investments into a motorway system led to a collapse in public transport mode share and total trips (Lee, 2009).

The decline in public transport numbers was sustained for many decades but started reverting a few years ago, and recently reached the highest figures in 60 years (Auckland Transport, 2011). This change was seen as the result of various projects which aimed to increase use of public transport and decrease traffic congestion. Some of these initiatives are small-scale ones, like bus priority lanes. Others are large-scale, such as the construction of Britomart in 2003, the Northern Busway, new rail links to Manukau and Onehunga, and complete electrification of the rail infrastructure which will be finished before August 2015 (Auckland Transport, 2013b). Some further substantial projects are underway and will be completed in the coming years, and are designed with the goal of increasing the efficiency, reliability and use of public transport in the region.

Cycling

Auckland is currently regarded as a pedestrian- and cyclist-unfriendly city with several parts of the city being dominated by cars (Orsman, 2008). The dominance of the car in the city (Mees & Dodson, 2006; Orsman, 2008), the urban design of the city and general changes in transport

patterns have relegated bicycles to recreational purposes and made cycling a marginal transport mode. In 2014, research showed that the cycling mode share had stopped declining compared to previous census results, however from a 0.9 percent share of commuting in 2006 it had only risen to 1.2 percent five years later (Auckland Council, 2014). On average, the share of cycling in the total amount of trips is around 0.6 percent. However, automatic monitoring sites show higher-quality cycling infrastructure has been successful and report annual increases of 10 percent of cycling trips on average in their respective locations (Auckland Council, 2014).

There are some major gaps in the network in Auckland. One important impediment is the inability for pedestrians and cyclists to cross through the Auckland Harbour Bridge. The construction of SkyPath, a shared path that is proposed along the city side of the Auckland Harbour Bridge (Skypath, 2013), is considered a transformational project for the city and is one of the main efforts to close these gaps. It has encountered resistance from councillors and parts of the general public (Sergel, 2015; Keall, 2015). However, recent news indicates that, after many years of lobbying and work from the community, the project has been given resource consent and, if not appealed, might start construction in the near future (Tan, 2015; Partnerships Bulletin, 2015).

Bicycle links between different areas of the wider city are still missing (New Zealand Local Government, 2007). In 1998, the former Auckland City Council and the Auckland Regional Transport Authority (ARTA), later replaced by Auckland Transport, launched a “Walking and Cycling Plan”. This plan was continued in subsequent transport policies such as the Sustainable Transport Plan 2006-2016, the Auckland Cycling Action Plan 2007-2012 and the current Cycling Business Plan (Auckland Regional Transport Authority, 2007; Auckland Transport, 2014). However, these plans have failed to deliver good results since infrastructure is incomplete and the cycling share is still marginal. For example, the target in the Auckland Plan was to complete 70 percent of the Auckland Cycle Network by 2020, but the last estimations are that only 40-50 percent will be complete by that year (Auckland Council, 2014; Auckland Council, 2012). Several segments of the existing network require cyclists to use bus/bike lanes and consist of short sections of unconnected cycle lanes, which are unsafe options for cyclists (Auckland Council, 2014).

AUCKLAND TRANSPORT STRATEGY

In the last decades, Auckland has seen several plans and strategies developed with the goal of improving its transport system. The Auckland Transport Plan (ATP) of 2009 was a long-term

multimodal integrated implementation plan and provided the overall framework to integrate multiple programmes such as the Regional Land Transport Strategy (RLTS) of 2005. The RLTS was meant to set the direction for the region's transport system for the next 30 years (Auckland Transport, 2015o).

By the end of 2010 and with the creation of the new Auckland Council, Auckland Transport (AT), a new council-controlled organisation, was formed combining the transport functions of the previous transport authorities and the ARTA (Auckland Transport, 2015m). This situation brought about substantial changes for the region's transport and planning strategies. However, not all of the transport plans have been updated since AT has decided to keep them operational until finishing their review, a process that is in some areas still ongoing today (Auckland Transport, 2015l).

The programmes and strategies introduced through the ATP have delivered some important transport projects and had a significant impact in Auckland's transport system. These include the Northern Busway in 2009, the four new rail stations, including Britomart, new rail links to Onehunga and Manukau, and the Central Motorway Junction completed in 2006 (Auckland Transport, 2013b). Further substantial projects are underway and are expected to be completed over the next few years. These include the introduction of electric trains, which are due to be completed by the end of July 2015 (Lowrie, 2015); heavy investment in new bus fleets and a comprehensive restructure of services; integrated fares system across all of Auckland's modes of public transport (Auckland Transport, 2015o); and completing the Waterview Connection (Auckland Transport, 2013b). Major initiatives also include the Auckland Manukau Eastern Transport Initiative (AMETI), which includes an urban busway on congestion free lanes, two new stations, a new road and a flyover (Auckland Transport, 2015a). The City Rail Link is also a top transport priority for Auckland that will transform Britomart into a through station with double rail capacity, and will build twin 3.4 kilometres of underground tunnels and two new stations in the city (Auckland Transport, 2015f).

Through the current strategies and programmes Auckland aims to improve the integration of the transport network towards having a single-system approach, encompassing public transport, roads, footpaths and cycleways. It also intends to achieve a transformational shift to double the number of public transport trips from 70 million per year in 2012 to 140 million in 2022 (Auckland Council, 2012). Besides the necessary major projects like CRL, AMETI and the East-West Link, an additional Waitematā Harbour Crossing has been deemed a priority by the New Zealand government (Auckland Council, 2012). However, there are many voices against this and

the chances of it being built are considered to have severely diminished in the last few months (Jones, 2015).

The Sustainable Transport Plan (STP) of 2006 is still current and outlines the strategies that will achieve the Regional Land Transport Strategy's targets (Auckland Regional Transport Authority, 2007). Within the STP, a cycling programme has aimed to increase the number of cycle trips by at least a further one per cent by 2016 by considering cycling in all urban and transport planning and by making cycling safe and natural choice for short journeys (Auckland Regional Transport Authority, 2007). The STP has focused on the idea that the main obstacle to cycling in Auckland is its perceived poor safety record, and accordingly has aimed to work on infrastructure by completing half of the Auckland Cycle Network by 2016. In addition, there are initiatives to monitor through a consistent methodology the number of cyclists and gauge the success of infrastructure improvements, and to promote cycling and intermodal travel and educate people about cycling's benefits (Auckland Regional Transport Authority, 2007).

Stemming from the STP, the Auckland City Council created the Auckland Cycling Action Plan 2007-2012. Unfortunately, it is somewhat vague and does not add value to the discussion. It was also not clear what were some of its targets and their expected grade of achievement (Auckland City Council). Currently, AT's Walking and Cycling Division is working on a Cycling Business Plan that articulates how cycling can be improved over the next three years. This three-year Cycling Business Plan is the first combined programme of action for the Auckland region and is much more specific on the goals, actions and targets that it aspires to achieve. By 2017, AT aims are to increase the cycling mode share to 1.8 percent, build at least 10 kilometres of new cycleways annually, increase commuting trips by bike to three percent, reduce cycling fatalities and serious injuries by 2.5 percent, and provide 10,000 people with bicycle training per year (Auckland Transport, 2014). Further into the future, the Auckland Plan expects to deliver 70 percent of the Auckland Cycle Network by 2020, and to complete it by 2030, eventually achieving 45 percent of morning peak trips to be non-car based (Auckland Council, 2012).

SPECIFIC CYCLING POLICIES: INFRASTRUCTURE

Auckland Cycle Network (ACN)

The Auckland Cycle Network (ACN) serves as Auckland Transport's blueprint towards the objective of developing a well-connected and cycle friendly region. It also is used as a key planning tool and guide for investment. It is a living document that will be updated according to

the users' needs and changes in urban planning. The ACN is currently in the process of being slightly revised. It currently consists of approximately 290 kilometres of cycle routes of different types: around 90 kilometres are segregated from traffic, 62 kilometres are on-road, and 63 kilometres are cycle feeders on quiet roads and through parks and reserves (Auckland Transport, 2014).

The ACN is formed by three different types of cycleways, which are called Cycle Metros, Connectors, and Feeders. Cycle Metros are the backbone of the network, providing the highest level of service, and connecting main destinations like metropolitan centres and public transport interchanges. Many of them are along motorways or rail corridors, and are for example the Waterview shared path, the Albany Highway, Grafton Gully cycleway, as well as the Beach Road walking and cycling project. Cycle Connectors are on-road cycle lanes and other facilities on arterials and collector roads which link to the Cycle Metros, as well as to town centres, residential areas and schools. Examples of these are the Great South Rd cycle lanes and the Te Atatu cycle lanes. Lastly, Cycle Feeders are located on slow speed streets and provide neighbourhood access and links to the Cycle Connectors and Cycle Metros. These include the Waitemata Safe Routes, Mt Roskill Safe Routes and the Dominion Rd parallel cycle routes (Auckland Transport, 2013b; Auckland Transport, 2014).

The Beach Road Walking and Cycling project is considered a flagship cycling project for AT because it is the first and only urban cycleway in the entire Auckland region. It consists of a two-way dedicated on-road cycleway physically separated from automobile traffic. It connects to the Grafton Gully cycleway and cycle routes on Tamaki Drive and Quay Street (Auckland Transport, 2015n). They therefore are designed to form a continuous and safe route for people to access the city centre by bicycle. Currently, the project is in its second stage, with an extension and enhancement between Mahuhu Crescent and Britomart Place being developed (Auckland Transport, 2015c).

Additionally, an old motorway off-ramp is being transformed into a separated cycleway in the city. The Nelson Street cycleway will link the Upper Queen Street Bridge via a cycle path on a disused off-ramp, and Nelson Street to Quay St via a shared path and separated cycleway (Slade, 2015). The Nelson Street projected separated cycleway will have a three metres wide, two-way cycle route on one side of the road, instead of a cycle lane on each side as was originally proposed (Auckland Transport, 2015n). Further, buffered cycleways are being installed in Carlton Gore Road and some parts of them will be protected by raised kerbs (Auckland Transport, 2015n).

Currently there are other cycleway improvements in implementation or consultation phase by AT. Some examples of these are the Don Buck Road cycleway, which will have on-road cycle lanes and off-road shared walking and cycling paths; Northcote safe cycle routes, with off-road shared walking and cycling path on either side and an on-road cycle lane; and Browns Road in Manurewa, that will include installation of an on-road cycle lane and a shared walking and cycling path (Auckland Transport, 2015n).

Bike parking

As part of a programme to provide more bike parking at public transport interchanges, AT is building open bike shelters for people to be able to secure their bikes before taking the train. Papakura and Papatoetoe train stations and the Birkenhead ferry terminal have recently incorporated 70 covered bike parking spaces (Auckland Transport, 2015d). The plan over the next three years is for an increase of another 330 parking spaces at Devonport ferry terminal, and Panmure and Otahuhu rail stations (Auckland Transport, 2014). Besides this, three train stations will have free bike lockers for lease or cycle gear lockers as well as four busway stations (Auckland Transport, 2015d). Additional covered bike parking is being investigated at several public transport interchanges (Auckland Transport, 2014).

Auckland's first and only on-street bike corral is installed on Ponsonby Road and has the capacity for 10 bikes at any one time. On-street bike parking ensures that the pavement is clear for pedestrians and bikes are not chained to street furniture. As well, it increases total parking capacity and is considered to bring potential economic benefits for shops (Auckland Transport, 2015e).

Bike share scheme

Auckland had a bike rental scheme called "Nextbike" from 2008 to 2010, which operated in the CBD and central suburbs. The bike fleet started with 70 bicycles in stations in central Auckland and Takapuna and eventually grew to 170. Use was free for the first 30 minutes of each ride and then a \$4 hourly fee was charged. During summer, bikes were being ridden about three hours a day (Smith, 2009). The scheme was run by a private company but due to insufficient revenues from hiring fees and advertising, and no provision of emergency funding by the Auckland Council, it went bankrupt in 2010. The council looked to establish a replacement during 2011 but it was not successful (Dearnaley, 2011).

Design guidelines

In a similar way to Copenhagen, it appeared reasonably straightforward for Auckland to develop a Code of Practice for the design of bicycle infrastructure for the city (Auckland Transport, 2013a). This is part of the Auckland Transport Code of Practice (ATCOP), AT's own guide to those involved in developing and maintaining transport infrastructure in Auckland. The ATCOP was developed after reviewing the existing transport-related infrastructure standards and it includes the design standards for cycling facilities and guidelines about bike parking design and implementation (Auckland Transport, 2014). AT considers the ATCOP a pioneering section on infrastructure provision for cycling that expands on the NZTA national guidelines (Auckland Transport, 2015b).

In the ATCOP cycling infrastructure, facilities are divided according to the level of provision, which are: no facility, painted facility, and physically separated facility. The Code tends to emphasise the construction of painted facilities, i.e. cycle lanes without physical separation between cars and bicycles, or shared paths without separation from pedestrians. This is contrary to what is emphasised by the Copenhagen and Buenos Aires transport authorities (Auckland Transport, 2013a). Following these design guidelines, the vast majority of the Auckland Cycling Network is comprised by cycle connectors which are on-road cycle routes mainly along arterials to main destinations (Auckland Transport, 2013a). Physical separation like rubber kerbs and plastic rumble strips are suggested only in low visibility conditions or where encroachment by motorists is likely (Auckland Transport, 2013a).

Cycle lanes between traffic lanes, especially at intersections are considered. Safer alternatives, such as kerbside lanes or physically separated facilities are suggested in addition to - but not instead of - the cycle lanes. These are only recommended in 'ideal' situations; for example where there is space available. A kerbside lane is a general traffic lane on the left side of a carriageway, and is designed to be of sufficient width to allow cyclists to travel beside the main traffic stream and to permit motorists to overtake cyclists without having to change lanes (Auckland Transport, 2013a).

When protected cycle lanes cross signal-controlled side streets, the guidelines deem that the separating island should terminate about 15m before intersection and be replaced by a painted buffer if feasible. No or minimal use of signs and markings is recommended to be employed on cycle paths and shared paths. Further, separating cyclists from pedestrians or other path users

by painted line is not preferred, but signs advising of courtesy codes (encouraging sharing of facilities) may be considered if needed (Auckland Transport, 2013a).

The provision of safe and convenient cycle parking is an essential element for promoting cycling and encouraging people to get on a bike and it is one of the cheapest and easiest facilities to support cycling. The minimum criteria defined by the ATCOP for effective bike parking are locations that are well-lit and close to destination; that provide support without damaging the bike or other bikes; provide an ability to lock the frame and both wheels to the same stand; and are located to avoid blocking pedestrians, other bikes and moving vehicles (Auckland Transport, 2013a).

Long term parking should provide an additional layer of security with initial limited entry to the secure parking area, and be situated in public buildings such as car parks and public transport stations, or private ones like workplaces. In public transport stations a lockable cycle cage with a mechanism for selective entry is recommended. Standard cage sizes and personal lockers for gear should be developed to make them easier to implement at major public transport stations. Since car parks are already monitored and secure, lockable cages are not necessary but the same general layout and criteria is recommended (Auckland Transport, 2013a).

SPECIFIC CYCLING POLICIES: PROMOTION

Cycle campaigns

In Auckland engagement with the various cyclists or potential cyclists occurs through workshops, events and surveys throughout the year. Family events are held such as 'Cycling's the go for families' for families with kids or 'Bubs on bikes - #Learn2ride' if parents need help to teach kids how to ride. Current community events that are held are 'E-bikes guided rides' where adults are able to try different models of electric bikes, and 'Brighten your bike' where reflective tape and lighting options are provided to cyclists, and several guided rides around different parts of the city (Auckland Transport, 2015g).

Additional examples of engagement with the community are the 'School travel plans' and 'Improve our cycleways and walkways'. In the former, AT supports schools that promote cycling, sharing best practices and cycling guidelines/policies embedded in the school overall transport guidelines (Auckland Regional Transport Authority, 2007). Through the cycleways improvement plan, AT receives permanent feedback from users that report problems on cycleways, give suggestions or take part in consultations (Auckland Transport, 2015k).

Cycle training and road safety education programme

AT's cycle training programmes are designed to address real and perceived safety concerns that create barriers to cycling (Auckland Transport, 2014). For example, 'Beginner bike training for adults' is a programme aimed at people who have never ridden a bicycle or need to refresh some concepts. The programme 'Cycling on the road - an introduction' is designed for adults who want to learn the basics or be more comfortable riding on quieter roads. Another programme, 'Bike care and maintenance', is held so adults can learn the basics of fixing a bicycle and how to check if it is in safe working order (Auckland Transport, 2015i).

Cycling to work

The 'Cycling to work' programme aims to encourage companies and government staff to cycle to work by providing them with the necessary assistance. Some of the programme's goals are to reduce the need for parking spaces at work sites, lessen traffic congestion and increase productivity thanks to a healthier workforce. The AT's Commute Team can help to introduce cycling to the workforce by giving cycling sessions, bike maintenance and repair workshops, guided rides and trial bike hire schemes (Auckland Transport, 2015j).

Measuring success

AT has the Auckland Bicycle Account (ABA), which is designed for on-going monitoring of cycling in Auckland. Within this, measures include the use of cycleways and other cycle facilities, safety impacts, cycle training and events, cycle counts and perceptions of cycling. These are captured by AT through the ABA, to show the growth and development of cycling in the region (Ipsos & Auckland Transport, 2013). AT also conducts manual automatic cycle monitoring programmes in several strategically located sites across the region and the ACN (Auckland Transport, 2014).

Cycle safety

The cycle safety programme run by AT is somewhat similar to 'Manual del Ciclista' published in Buenos Aires. It is comprised of information shared through the website, which provides users with different tips to be safe on the road, such as riding in a visible position on the road, using lights and reflective materials, communicating with other road users by eye contact and hand signals. Further information provides tips for riding in a predictable way for other road users, and obeying traffic rules (Auckland Transport, 2015h). There is also a more general 'Road code for cyclists' developed by the New Zealand Transport Association that provides a lot of

information regarding cycling related road rules, cycling skills and necessary equipment (New Zealand Transport Agency, 2013).

ASSOCIATED TRANSPORT PROJECTS

City Rail Link

The City Rail Link (CRL) is the main transport priority for Auckland and is the key to delivering the Auckland Plan, the City Centre Master Plan, the Long Term Plan and the Integrated Transport Programme. The CRL is expected to be the foremost transformational project in the next decade. It appears to provide the most significant place-shaping opportunity, as with this system in place the entire city centre would be within 10 minutes' walk of a railway station (Auckland Transport, 2015f; Auckland Council, 2012). The CRL is a proposed 3.5 kilometre underground twin rail link between Britomart and Mt Eden Station, and will provide two new stations in the central city, near Aotea Square and Karangahape Road, and a redeveloped Mt Eden station. It will transform Britomart to a through station and allow to extend the passenger rail system and link it to the current regional rail network at Mt Eden (Auckland Transport, 2015f; Auckland Council, 2012).

During the past decade, rail patronage in Auckland increased from 2.2 million annual trips to 13 million. However, at present the entire network's capacity is for 15,000 passengers an hour, and is constrained by the dead end at Britomart. If the CRL is built, the network capacity will double to 30,000 people an hour and it will double the number of people within 30 minutes of a city centre station (Auckland Transport, 2015f). The CRL will not only benefit Auckland public transport users but all road users in general because it will ease pressure on roads for those who use them. It will help to create more road space for buses for parts of Auckland currently not served by rail, such as the North Shore, and will enable to add new rail lines to the network (Auckland Transport, 2015f; Auckland Council, 2012).

Present estimates of population growth for Auckland are around 700,000 people in the next 30 years. Public transport needs will increase so much that its present conditions will be unable to cater for such growth, potentially hindering economic development. In addition, some bus improvements will be necessary because without the CRL major bus routes are expected to be at or over capacity within five years (Auckland Transport, 2015f).

Auckland Manukau Eastern Transport Initiative (AMETI) and East-West Link

AMETI is a package of transport improvements that aims to provide a strategic transport link between the eastern suburbs of Auckland. Once complete it will be New Zealand's first dedicated urban busway on congestion-free lanes between Panmure, Pakuranga and Botany. As well, it will provide new stations and road improvements at traffic bottlenecks, including a new north-south Panmure road, a flyover in Pakuranga and replacing the Panmure roundabout with traffic lights (Auckland Transport, 2015a).

The region has a high forecast population growth and better transport options will be needed to serve them. Local journeys and public transport will be catered by the Panmure Bridge route while freight and business traffic will transit through Waipuna Bridge and the South-Eastern highway primarily (Auckland Council, 2012). Further, new cycle and pedestrian links between Panmure and Pakuranga will be built and a new busway bridge next to the existing road bridge will include a wide shared path for cyclists and pedestrians (Auckland Transport, 2015a).

The East-West Link is closely related to the AMETI because of their geographic location and interdependencies, particularly in relation to freight and east-west traffic movements. The East-West Link is a "proposed strategic transport corridor that will connect the Western Ring Route (SH20) at Onehunga and the Southern Motorway (SH1), providing improved access to the rail freight hub at Metroport and major employment areas" (Auckland Council, 2012, p. 325) while also enabling improvements for public transport, walking and cycling.

CHAPTER 6: DISCUSSION

In this section I will compare the three cities, identifying the commonalities and differences regarding their cycling policies. I will give a brief reflection on how it was obtaining information from them, what their cycling strategies are and the different pro-cycling policies implemented. My assessment of each area of the strategies will be presented, and analysis of the lessons presented from the experiences of the three cities. Auckland, a city with very low cycling rates compared to Buenos Aires and Copenhagen can learn a lot from the other two. The structure will follow a similar pattern to the case study chapters in terms of the themes found within the policies. Finally, I will present some recommendations to Auckland for its future cycling policies, based on the examples set by the other two cities.

AVAILABILITY OF PUBLIC INFORMATION

The availability, amount and accessibility of information on cycling strategies and policies for each city was found to be quite dissimilar in the process of this research. On the one hand Copenhagen and Auckland had plenty of information readily available and easy to access. On the other hand, Buenos Aires had limited publicly available information, and that from official sources was somewhat difficult to obtain.

The limited availability of public information from the GCBA was somewhat expected. Even though there are laws that require the disclosure of government information, those laws are not consistently followed or enforced by public officials in Argentina. Therefore, most of the data had to be obtained from newspapers and other unofficial sources. These sources were not contradictory, which was an advantage, however they were sometimes also fragmented and repetitive which seems to indicate the limitations of official sources for those writers also. Fortunately, I was able to access some information directly from the department of the Undersecretary of Transport of the GCBA. Even though the data was not publicly available, it was not private data either; they just do not publish it. These differences in information complicated the analysis in developing comparisons of the policies of the three cities.

Auckland and Copenhagen were completely different to Buenos Aires in relation to the availability of information. All the policy information was readily available and access to it was straightforward. Copenhagen's amount of information was even larger than Auckland's but, more importantly, it was more consistent and organised. Information followed a logical order and it was completely translated to English.

Every transportation project in Auckland goes through an extensive process of consultation and development before its implementation, and all the parties have the opportunity to be properly informed, as well as access to extensive detail of every project being implemented. Nevertheless, information on cycling policies and programmes tends to lack relevance. There is a high level of detail but several times it felt like it was there to fill up space, because there was actually not much of substance said. Pieces of data were found to lack cohesiveness, seemed to be somewhat disconnected and did not appear to follow an overall plan. In terms of availability and quality of information, improvements could only be made if there is a well-developed strategy that supports them. Data necessarily needs to stem from that general programme.

CYCLING STRATEGY AND FUTURE PLANS

From the information and evidence engaged with, the cycling policies implemented in Buenos Aires appear to follow a well-developed strategy that is decisively supported by the government. Urban cycling has been situated as an important element of a larger transport strategy that includes multiple public transport and pedestrians initiatives. There is also consistency between them. The cycling strategy seems to trickle down through the different policies and they are aligned towards a common goal. But given that Argentine politics tend to be short-term sighted, unstable and rapidly changing there is some uncertainty regarding the future of Buenos Aires cycling policies. The candidate with the best chances of winning the July elections (BuenosAiresHerald.com, 2015) has been a strong supporter of the cycling policies in the past, so this is a promising sign for the cycling programme (Rodríguez Larreta, 2015; Télam - Agencia Nacional de Noticias, 2015).

Copenhagen developed its first comprehensive cycling strategy by 2002 even though their cycling-friendly policies started many decades before. Following its success, a new cycling strategy was defined for the period 2011-2025 which looks quite explicit, exhaustive and well-developed. It has strong political support and it is firmly grounded in the city's long-term transport and sustainability strategies. Therefore, it is reasonable to expect that this cycling programme will be sustained and be successful in the years to come.

On the other hand, Auckland has not had a comparable document. The references to cycling were mostly sections (sometimes small ones) among the general transportation plans. Therefore, even though the information was completely disclosed, it lacked the order and cohesiveness of Copenhagen's because there was not an appropriate strategy to sustain it. There is also some uncertainty for the future, but for different reasons than Buenos Aires. There

have been substantial changes recently and the future impact of those changes is yet to be determined. A new Walking and Cycling Manager has been recently appointed at Auckland Transport (Fagan, 2015). The Cycling Business Plan that I accessed is still a draft (even though I was guaranteed the final version will have only very minor changes). Further, recently in June 2015 the New Zealand government approved additional funding for the Urban Cycleway Programme (UCP), a national initiative, in Auckland (Auckland Transport, NZ Transport Agency, Auckland Council., 2015). It is hard to assess at this stage whether these changes will have long term success, because in my two years in Auckland I have noticed that several funding announcements for cycling infrastructure have not been fulfilled. Auckland needs a highly elaborate cycling strategy that is grounded on the broader transportation plans. Without this strategy, future policies still look very uncertain.

DESIGN GUIDELINES

It was not possible to get direct access to the whole of the Buenos Aires cycling infrastructure design manual, if there is one, but only to minor parts of it and mostly through indirect sources. Nevertheless, some lessons can be extracted for the fragmented information available. The design guidelines for Buenos Aires state that cycleways should be physically separated from car traffic via raised kerbs and signposts, because studies show that drivers tend not to respect cycle lanes and endanger cyclists. Cycleways are designed generally two-way, even in one-way streets, so cyclists can travel more directly and avoid detours. They are also located in the most direct routes and linking the main areas of the city. Finally, intersections are directed to be retrofitted with dedicated traffic lights for cyclists and cycleways continue all the way through the intersections.

In viewing these design standards it is evident that Buenos Aires has adopted the 'segregated' approach to designing cycling infrastructure. The quality standards used in most parts of the Buenos Aires cycleways would probably not be tolerated in the other two cities in this research. Some safety standards are dubious as well. Even though it was not possible to obtain financial figures for the construction of the Buenos Aires cycle tracks, a simple observation gives the impression that their cost is lower than Auckland's and Copenhagen's. Except for yellow raised kerbs that are made of concrete, materials seem to be of lower quality, there are potholes and water drains in the middle of the cycle tracks, and most of them have not been resurfaced. Nevertheless, no casualties have been reported since the programme started more than five years ago and there is only anecdotal evidence of minor accidents between cyclists and pedestrians.

Copenhagen's design principles for cycling infrastructure are considered to be amongst the best in the world. The city uses the same 'segregated'/'facilitators' approach as Buenos Aires but to a much more advanced degree. Accident rates are low and intersections are especially designed for cyclist and pedestrian safety. Through the Cycling Embassy of Denmark, Copenhagen even exports this cycling-design knowledge to the world. Cycle tracks are physically separated from traffic through kerbs, parked cars, or poles and many of them are being widened to allow for 'conversational cycling'. Eight different types of intersections have been developed. Design guidelines are even applied to parking and in 2008, the city administration helped to create a 'Bicycle Parking Manual' to set the standards of bicycle parking. Through its policies, Copenhagen has moved beyond making cycling possible to make cycling the norm, and has designed the city's facilities accordingly.

In contrast to Buenos Aires and Copenhagen, the evidence indicates that Auckland Transport (AT) cycling infrastructure design principles follow the 'vehicular-cycling' approach. AT's design manual mentions separated infrastructure but does not actively promote it or make a special case for it. Therefore, the majority of the cycle lanes use the same road space as car traffic. There is low emphasis on separated infrastructure but a high provision of several types of cycling lessons. Additionally, the treatment of intersections is extremely poor. Only a couple of paragraphs are devoted to them in the manual. They are quite vague and mostly recommend to adopt ad hoc solutions.

AT's approach is risky if it really wants Auckland to advance to being a successful cycling city. Those cities that have succeeded in promoting urban cycling have adopted the 'facilitating' ideas, separating bicycles from car traffic and redesigning intersections. The high growth rates of cycling in Buenos Aires without any casualties in five years show that, even though the safety standards and quality of the cycle tracks may seem poor, people are still safer using them. This might suggest that people are more interested in the practicality of the cycle tracks than about them being of very high standard. AT should start considering developing lower-cost on-road separated cycle tracks instead of top-quality ones which are expensive and time-consuming to build.

The treatment that AT gives to street intersections is a more serious issue. Copenhagen has extensive literature on the subject and has developed eight different types of intersections considering variables like type of junction, users' needs, type of traffic and their speed. Copenhagen's measures to increase safety at crossings include: advanced stop lines for bikes and priority bicycle traffic lights to give cyclists a head start; profiled strips to reduce cycle tracks

width bringing cyclists and drivers closer and increasing their mutual awareness (Nelson, 2007); and blue marked crossing which have the best effect on safety, among others. AT could learn much from these initiatives, and policies incorporating them could make intersections in Auckland much more conducive to cycling.

BIKE SHARING

Buenos Aires' bike-share system was fully operated by GCBA employees and only recently has evolved to a mixture of person-operated and automatic stations. The shared bicycles look cheap compared to those in Copenhagen. However even with being publicly funded, with minimal private sponsorships and no user fees, the programme has been a success and has been greatly expanded. It recently went from 32 stations with 850 bicycles, to 200 stations and 3,000 bicycles.

Copenhagen's bike share system was a pioneer that started in 1989, more than 20 years before the other two cities. It has an irregular history with the first private entrepreneur going bankrupt. The current system is run by the same public company that runs the urban trains and it was rolled out in 2013 with ultra-modern bikes. They come with a touch-screen tablet and GPS assistance to plan journeys, electric motor, and LED lights, among other premium features. However, the programme has received some criticism. Anecdotal evidence suggests that it is considered too expensive to run while rental fees are high, bikes are heavy and complex and, more importantly, they are not being used by commuters, but rather by tourists.

Auckland's bike share scheme was a failure and was discontinued, but the reasons of that failure are not clear. The use of bikes was also free for the first 30 minutes of each ride and paid afterwards. It was run by a private company but later went out of business due to insufficient revenues and no provision of emergency funding by the Auckland Council. The council looked to establish a replacement the next year but it did not succeed. Apparently, there was not much interest from the Council to re-establish the scheme back then.

Currently, there are no plans now to re-create a bike share scheme in Auckland. However if there were, it should take lessons from both Copenhagen and Buenos Aires. Rental or share bikes do not need to be top-quality and have all the latest features. People prefer them to be practical, which can be translated into easy-to-use bikes, with stations located in strategic nodes. Dependability appears to have the greatest influence on take up and use; this means that is more important to ensure that there are sturdy bikes that always work well, and are supplied in enough quantities to always have one available. Finally, low fees are important as well,

otherwise people would be better off to buy their own bikes or use a car instead, which would defeat the purpose of the policy. Some specialists have suggested that mandatory helmet laws like Auckland's might cause bike share schemes to fail. Evidence is not conclusive but AT should consider it before recreating the bike hire system.

PARKING

Buenos Aires and Copenhagen policies show an understanding that good bicycle parking facilities may be what persuades commuters to travel by bicycle. It appears to have been given far too little attention in urban planning. Parking could be as important as good cycleways. People need to be certain that if they park their bike, it will be safe in the place where they left it. With that in mind, Copenhagen authorities along with the NGO Danish Cyclists Federation and other Danish cities developed an extensive parking manual that covers almost every aspect of cycling parking. Some of the principles for parking include attractiveness, right location, enough availability of spaces, and efficient racks. They also set standards such as advocating that half of the cycle parking spaces should be roofed, that there are maximum car parking limits (instead of the more common minimum), and also minimum bike parking for housing-only areas.

Buenos Aires, by contrast, did not have a similar document available. However, the GCBA have been building bicycle parking racks all over the city at an impressive pace, for example with a 50 percent increase in 2014. An innovative and successful initiative was the passage of a law forcing private car parks to provide bicycle parking. Car parks under this law must provide a minimum amount of bicycle racks. Since 10 bicycles can be parked in one car spot, they can charge cyclists only one tenth of the price charged to drivers. It is also deemed that for a whole-day stay, cyclists cannot be charged more than the price of two bus tickets.

Bicycle parking in Auckland has received very little attention and parking standards seem to be in very early stages of development. More importantly, the amount of parking is clearly insufficient. From my personal experience, I have seen bicycles locked against lamp posts and street furniture all around the city. This is even the case outside public transport stations, which is a good indicator that there is not sufficient covered parking inside. Some vandalised parking racks have taken months to be fixed. Remarkably, there is only one 10-bike on-road bike corral in the whole city.

AT could easily adopt most of the recommendations of the *Danish Bicycle Parking Manual* and adapt them to the specific characteristics of Auckland. The main advantage of the Manual is that

it does not advance one-size-fits-all type of solutions, but is focused on providing the essential principles that should be followed in order to provide effective and safe parking solutions. In the future, Auckland Council could replicate the Buenos Aires bike parking law. Such an initiative would be inexpensive as AT would only need to provide the racks. It would be quite a fast initiative to develop and implement as well, and would likely be very popular with users since it would provide a much higher level of security and protection from the elements at a minimal cost for taxpayers. The negative impact on car parks would be marginal since many bikes can be locked in a few parking spots. Finally, it would be prudent to change minimum car parking regulations for maximum and to introduce minimum bike parking. These measures could be left for the longer term, since they are the more controversial and might face the strongest opposition.

PROMOTION POLICIES

Promotion policies have played a significant role in Buenos Aires since the launch of its cycling strategy. As noted in the Buenos Aires chapter, the bicycle was historically considered a mode of transport for poor people and there were no cycle tracks in the city. Therefore, in building up cycling policies in Buenos Aires it was necessary for local government to raise awareness among the population and make a strong case about the benefits of cycling for transport. On-road cycle tracks were built at a fast rate and it became necessary to educate all roads users on these changes and new regulations. Further, given the majority of cycling trips in Buenos Aires are for commuting, the partnerships with companies to increase cycling among workers was a successful idea. Finally, since bikes tend to be quite expensive in Argentina (they can cost triple the price in the U.S.), the soft loans to purchase bicycles was a quite innovative and successful idea that granted 3,300 loans in its first five months. Even after five years of remarkable growing in urban cycling, Buenos Aires' authorities understand that it is still a minority mode of transportation so they continue with promotion campaigns like closing streets during weekends for bike rides.

Copenhagen's promotion policies are much less relevant compared to Buenos Aires' or Auckland's. Copenhagen has an established cycling culture and almost everybody has access to a bike, so creating interest in cycling is not so necessary. The city created the "We bike to work" and "Cycle company of the year" campaigns as well as "car free" weekends during which only authorised vehicles were allowed in the city, but after a few years they were dropped. Most recent campaigns are focused on improving cycling experiences such as a focus on riding

etiquette, and promotions for increasing cycling tend to target specific groups known to have low rates of cycling, such as immigrants or elderly people.

Auckland can be seen to have actually done quite a lot in terms of promotional cycling campaigns. Campaigns are tailored to age groups, for example the campaign for “Bubs on bikes”, or specific groups like ‘E-bikes guided rides’, “Cycling to work” or the “Cycle training and road safety education programme” and the “Road code for cyclists”, to name just a few. Even though these campaigns have been sustained over time, results appear to have been poor. This indicates support of the proposition that proper infrastructure is the main determinant of high urban cycling rates; however these are more expensive. It would seem that one of the main reasons behind so many promotion campaigns being conducted in Auckland might be the low cost involved compared to building appropriate facilities. They also tend to cause lower levels of controversy. In a city with an ingrained car culture and a very low cycling share, using public space previously dedicated to cars to building cycling amenities tends to be highly controversial. As previously stated, based on the evidence in this research AT’s approach to cycling can be best termed as a ‘vehicular-cycling’ approach. This fits with the emphasis in policy of promotion and training as well as safety classes and enforcement, over separated infrastructure.

POLITICAL WILLINGNESS

There is one variable that has not being studied in this research but that I think is as important, or even more, than policies and infrastructure in order to move towards a sustainable transportation system where the bicycle plays a main role. Unfortunately, within the limits of this research there was no way to objectively measure it and make valid comparisons. But its uttermost importance requires it to be mentioned. That variable is political willingness.

The GCBA has demonstrated clear political willingness to increase the use of the bicycle as a viable form of urban transportation. Before the current administration started with the cycling-friendly policies, the cycling share was almost non-existent. However, the current administration was determined to push cycling forward and took some bold measures to achieve that. Bicycle use increased its share to three and a half percent in only five years, a very impressive result which has brought Buenos Aires to be considered as a cycling-friendly city with lots of potential, when a few years ago it was not even mentioned by specialists. After breaking the initial public resistance, today the bicycle has become a distinctive part of the city’s urban landscape and has gained wide support from the public.

The City of Copenhagen has also demonstrated political eagerness to improve the conditions for cyclists, but it is a very different scenario than Buenos Aires. Even though there was a steep decline in its use after World War Two, the bicycle has always been an important part of Copenhagen's culture. Gaining the necessary political and public support to introduce the last pro-cycling policies must have been much easier than in Buenos Aires. Regardless, the whole city administration adopted the goal of becoming the 'City of Cyclists' and all transport and sustainability policies seem to recognise and aim for that goal.

If Auckland is to become a successful cycling city, it desperately needs a much greater level of political willingness and commitment to improve the conditions for cyclists. For example, the highest priorities in terms of transport in Auckland are the City Rail Link, AMETI and the East-West Link (Auckland Council, 2012). Even though cycling is contemplated in these projects, the amount of consideration given to it is rather marginal. This indicates that, for the moment at least, cycling might not be one of AT's top priorities. The lack of a general cycling strategy comparable to Buenos Aires and Copenhagen is further evidence of insufficient commitment to the cycling cause. The Beach Rd Cycleway is the only urban cycleway in the entire Auckland area, and there is no other one being built at the moment or even in proposed future projects. By comparison, Buenos Aires built 35 km of urban cycleways in its strategy's first year (Gobierno de la Ciudad de Buenos Aires, 2015b).

In Copenhagen, an effective tool to support the policy decisions has been the Cycle Accounts and the Traffic Accounts/Green Accounts, which evaluate initiatives by the city, goal achievement and opinions from city residents. They closely monitor the evolution of cycling initiatives and allow to make periodical comparisons. Auckland implemented similar initiatives a few years ago, but with little effect. With the newly appointed AT's Walking and Cycling Manager and some other recent changes, there is hope that this information will be put to good use and the situation will change for the better for Auckland's cyclists.

CHAPTER 7: CONCLUSIONS

My two years living in Auckland have made me realize that the city's transportation system is inefficient and that cycling plays a marginal role in it. Transport, along with housing, is one of the major issues that the city is currently facing and it is a matter of constant debate for politicians and citizens. Given my interest in urban cycling, I decided that I could make a contribution to the transport discussion in Auckland. I studied the urban cycling policies that Buenos Aires and Copenhagen have been successfully applying in order to understand the reasons for their success and suggest ways to adopt them in Auckland.

The research confirms that Auckland's, Buenos Aires' and Copenhagen's respective cycling policies and facilities are currently in very different stages of development. Denmark's capital is the most developed one by far. It is considered one of the best cities in the world to ride a bicycle and it aims to be the top one by 2025. Its cycling policies and infrastructure are praised by international specialists and it exports and disseminates best cycling practices. Buenos Aires' achievements are more modest and has not accomplished as much as the Danish city. It started its cycling policies only a few years ago from a very low point but has achieved a lot in a short time. It is seen by experts as a novice cycling city with very promising prospects. Finally, Auckland is the least developed in this regard. Since World War Two Auckland engaged in some of the most pro-automobile transport policies in the world and cycling was completely relegated. Currently the transportation system has serious difficulties and it is one of Aucklanders' biggest concerns. Steps have been taken but they are heavily based on public transportation, and cycling policies still play a minor role - however a growing one.

Buenos Aires' and Copenhagen's cycling policies and infrastructure could be regarded as potential role models for Auckland. The Argentine capital could be seen as the aspirational short-to-medium term model while the Danish capital would be the medium-to-long term ideal. Auckland should start by following some of the policies adopted by Buenos Aires. Once some of the expected goals have been reached, a transition to more advanced policies will be more possible. I believe that, at the moment, trying to replicate Copenhagen's policies would not be advisable until certain progress has been achieved in New Zealand's main city.

Buenos Aires has built more than 140 kilometres of on-road physically separated cycle tracks in five years. Even though they do not seem to have the best quality, they are heavily used and there have been no casualties in them, only minor accidents with pedestrians. In comparison, Auckland has only one urban cycleway, Beach Rd, and the majority of the Auckland Cycle

Network consists of on-road cycle lanes and bus/bike lanes. The separated ones are next to highways or on recreational places. For people to be tempted to ride, cycle tracks need to be close to their doorstep and connect with the places they need to go to, in the safest and most direct way possible.

Bike parking is relevant but remains an issue in Auckland. There is only one 10-bike on-street corral in the whole region but it is promoted by AT as quite an achievement. Bikes are constantly locked to street furniture which can be a nuisance for pedestrians. Bike parking needs to be safe and practical; that is, easy to use and close to places where people want to go. Its integration with public transport is essential for people to make multimodal journeys, such as through AT Park and Ride facilities. Once more bike parking is provided, a second step could be adopting a similar law to Buenos Aires which is fast and cost-effective. Later on, maximum car parking and minimum bike parking limits could be introduced.

Once these measures have produced some encouraging results, then it would be appropriate to adopt some more advanced policies. A public bike share scheme could be one of these policies. Without separated facilities the system will surely fail again so they should be built first. Bikes need to be practical, dependable, located in strategic nodes where there is enough demand for them, and in enough quantity to always have one available. Low or zero fees are important to keep the system attractive. Mandatory helmet laws (Auckland has one) might be an additional reason behind the failure of Auckland's public bikes. Evidence in this respect is not conclusive yet but it should be studied in case a bike share scheme is proposed.

Emulating Copenhagen's cycling strategy would be a much more advanced step once a bike commuter culture is definitely installed in Auckland and healthy figures have started to show. For example, that would be a time to update design guidelines to widen the cycle lanes so fast cyclists can overtake slower ones; or retrofit intersections according to the best safety standards. Likewise creating Bicycle Superhighways that connect distant places via direct routes with minimal stops, linking the on-road cycle tracks with the cycle tracks alongside highways would be a next step. Also, integrating cycling seamlessly with public transport via efficient, safe and ample bike parking facilities would also be important measures.

Auckland's interest in cycling policies appears to be slowly growing. There have been recent promising changes in that regard, starting with the appointment of a new Walking and Cycling Manager at AT. Her credentials indicate that she might be able to do a proper job and push cycling forward. Additional funding for cycling initiatives was approved by the national government. Finally, looking at AT's recent documents and the Cycling Business Plan, it seems

that a new cycling strategy might be in the making. These initiatives could potentially have significant positive effects for the city, but it is too early to know what their final impact will be.

There is a main determinant for the success of cycling strategies and policies that was outside the scope of this research but it is worthy to be mentioned. Political determination is as important or even more than policies and infrastructure. Creating the necessary conditions for urban cycling to thrive in Auckland will require going against the privileges of motorists via eliminating some automobile facilities; and removing or narrowing traffic lanes to make space for separated cycle tracks; among some other measures. Public funds will be needed for these initiatives that, all things being equal, will have to be directed from other activities. Strong opposition and backlash from taxpayers and car drivers, the main users of the transport system, are very likely to occur. Without a strong political decision paired with a sound cycling strategy and policies, the transition towards a sustainable transportation system in which the bicycle plays a major role will be unlikely.

REFERENCES

- Ahora Educación. (2013, January 24). *Créditos para bicicletas del Banco Ciudad de Buenos Aires*. Retrieved from Ahora Educación: <http://ahoraeducacion.com/2013/01/24/creditos-para-bicicletas-del-banco-ciudad-de-buenos-aires/>
- Almanak. (n.d.). Retrieved from Torben Hermansen: <http://www.torbenhermansen.dk/almanak/almanak.php>
- Angell, W. (2014, May 6). *Promote Vehicular Cycling. Really?* Retrieved from streets.mn: <http://streets.mn/2014/05/06/promote-vehicular-cycling-really/>
- Apts Buenos Aires. (2014, March 01). *I Bike ABC (Amsterdam, Buenos Aires, Copenhagen)*. Retrieved from Apts Buenos Aires: <http://www.aptsbuenosaires.com/events/i-bike-abc-amsterdam-buenos-aires-copenhagen/>
- Asociación de Fábricas de Automotores. (2015). *Anuario 2014*. Asociación de Fábricas de Automotores.
- Auckland City Council. (n.d.). *Cycling action plan, 2007-2012*. Auckland: Auckland City Council.
- Auckland Council. (2012). *The Auckland plan*. Auckland: Auckland Council.
- Auckland Council. (2014). Infrastructure committee. *Meeting of the infrastructure committee* (pp. 1-94). 2014: Auckland Council.
- Auckland Regional Transport Authority. (2007). *Sustainable transport plan 2006-16*. Auckland: Auckland Regional Transport Authority.
- Auckland Transport. (2011, March 31). *Media release: public transport figures*. Retrieved from Auckland Transport: <https://at.govt.nz/about-us/news-events/media-release-public-transport-figures>
- Auckland Transport. (2013a). *Auckland Transport Code of Practice*. Auckland: Auckland Transport.
- Auckland Transport. (2013b). *Integrated transport programme*. Auckland: Auckland Transport.
- Auckland Transport. (2014). *Cycling Business Plan - Consultation Draft*. Auckland: Auckland Transport.
- Auckland Transport. (2015a, April 16). *AMETI*. Retrieved May 15, 2015, from Auckland Transport: <https://at.govt.nz/projects-roadworks/ameti/>
- Auckland Transport. (2015b). *Auckland Transport Code of Practice*. Retrieved from Auckland Transport: <https://at.govt.nz/about-us/auckland-transport-code-of-practice/>
- Auckland Transport. (2015c, June 10). *Beach Road walking and cycling project*. Retrieved July 10, 2015, from Auckland Transport: <https://at.govt.nz/projects-roadworks/beach-road-walking-and-cycling-project/>
- Auckland Transport. (2015d). *Bike & cycle gear storage*. Retrieved from Auckland Transport: <https://at.govt.nz/bus-train-ferry/bike-cycle-gear-storage/>

- Auckland Transport. (2015e). *Bike parking*. Retrieved from Auckland Transport: <https://at.govt.nz/cycling-walking/bike-parking/>
- Auckland Transport. (2015f). *City Rail Link*. Retrieved July 20, 2015, from Auckland Transport: <https://at.govt.nz/projects-roadworks/city-rail-link/>
- Auckland Transport. (2015g). *Cycle events & activities*. Retrieved from Auckland Transport: <https://at.govt.nz/cycling-walking/cycle-events-activities/>
- Auckland Transport. (2015h). *Cycle safety*. Retrieved from Auckland Transport: <https://at.govt.nz/cycling-walking/cycle-safety/#required>
- Auckland Transport. (2015i). *Cycle training courses*. Retrieved from Auckland Transport: <https://at.govt.nz/cycling-walking/cycle-training-courses/>
- Auckland Transport. (2015j). *Cycling to work*. Retrieved from Auckland Transport: <https://at.govt.nz/driving-parking/commute/cycling-to-work/>
- Auckland Transport. (2015k). *Improve our cycleways & walkways*. Retrieved from Auckland Transport: <https://at.govt.nz/cycling-walking/improve-our-cycleways-walkways/>
- Auckland Transport. (2015l). *Legacy strategies & plans*. Retrieved from Auckland Transport: <https://at.govt.nz/about-us/transport-plans-strategies/legacy-strategies-plans/>
- Auckland Transport. (2015m). *Our role & organisation*. Retrieved from Auckland Transport: <https://at.govt.nz/about-us/our-role-organisation/>
- Auckland Transport. (2015n). *Projects & roadworks*. Retrieved July 20, 2015, from Auckland Transport: <https://at.govt.nz/projects-roadworks/>
- Auckland Transport. (2015o). *Regional Land Transport Strategy*. Retrieved from Auckland Transport: <https://at.govt.nz/about-us/transport-plans-strategies/legacy-strategies-plans/regional-land-transport-strategy/>
- Auckland Transport, NZ Transport Agency, Auckland Council. (2015, June 25). *New funding a major boost for urban cycling in Auckland*. Retrieved from Auckland Transport: <https://at.govt.nz/about-us/news-events/new-funding-a-major-boost-for-urban-cycling-in-auckland/>
- B., A. (2011, February 21). *Liveability ranking: Where the livin' is easiest*. Retrieved from The Economist: http://www.economist.com/blogs/gulliver/2011/02/liveability_ranking
- Beam, C. (2009, October 16). *Stop Means Stop*. Retrieved from Slate: http://www.slate.com/articles/life/transport/2009/10/stop_means_stop.html
- Bowen, G. A. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, 9(2), 27 - 40.
- Buenos Aires Ciudad. (n.d.a). *¿Primera vez en Buenos Aires?* Retrieved from Gobierno de la Ciudad Autónoma de Buenos Aires: <http://www.turismo.buenosaires.gob.ar/es/article/%C2%BFprimera-vez-en-buenos-aires>
- Buenos Aires Ciudad. (n.d.b). *Buenos Aires Ecobici*. Retrieved from Gobierno de la Ciudad Autónoma de Buenos Aires: <http://www.buenosaires.gob.ar/ecobici>

- Buenos Aires Ciudad. (n.d.c). *Créditos del Banco Ciudad*. Retrieved from Gobierno de la Ciudad Autónoma de Buenos Aires: <http://www.buenosaires.gob.ar/noticias/creditos-del-banco-ciudad>
- Buenos Aires Ciudad. (n.d.d). *Manual del ciclista*. Retrieved from Gobierno de la Ciudad Autónoma de Buenos Aires: <http://www.buenosaires.gob.ar/noticias/manual-del-ciclista>
- Buenos Aires Ciudad. (n.d.e). *Metrobus*. Retrieved from Gobierno de la Ciudad Autónoma de Buenos Aires: <http://www.buenosaires.gob.ar/movilidad/metrobus>
- Buenos Aires Ciudad. (n.d.f). *Misión y objetivos*. Retrieved from Gobierno de la Ciudad Autónoma de Buenos Aires: <http://www.buenosaires.gob.ar/movilidad/mision-y-objetivos>
- Buenos Aires Ciudad. (n.d.g). *Movilidad*. Retrieved from Gobierno de la Ciudad Autónoma de Buenos Aires: <http://www.buenosaires.gob.ar/movilidad>
- Buenos Aires Ciudad. (n.d.h). *Pedaleá la Ciudad*. Retrieved from Gobierno de la Ciudad Autónoma de Buenos Aires: <http://www.buenosaires.gob.ar/ecobici/pedalea-la-ciudad>
- Buenos Aires Ciudad. (n.d.i). *Prioridad Peatón*. Retrieved from Gobierno de la Ciudad Autónoma de Buenos Aires: <http://www.buenosaires.gob.ar/desarrollourbano/humanizando-la-ciudad/prioridad-peaton>
- Buenos Aires Ciudad. (n.d.j). *Subte. Nuestra historia*. Retrieved from Gobierno de la Ciudad Autónoma de Buenos Aires: <http://www.buenosaires.gob.ar/subte/nuestra-historia>
- BuenosAiresHerald.com. (2015, July 13). *Larreta closer to beat Lousteu in City runoff*. Retrieved from BuenosAiresHerald.com: <http://www.buenosairesherald.com/article/193834/larreta-closer-to-beat-lousteu-in-city-runoff>
- Burton, M. (2007, October 30). *Royal Commission of Inquiry into Auckland Governance - Terms of Reference and Membership Announced*. Retrieved from infonews.co.nz: <http://www.infonews.co.nz/news.cfm?id=8644>
- Bycyklen. (2014). Retrieved June 15, 2015, from Bycyklen: <http://bycyklen.dk/en/>
- C., H. (2013, September 26). *Argentina's official statistics - Warranting attention*. Retrieved from The Economist: <http://www.economist.com/blogs/americasview/2013/09/argentinas-official-statistics>
- C40. (2015). *About C40*. Retrieved from C40: <http://www.c40.org/about>
- C40 Blog. (2012, January 27). *2012 Sustainable Transport Award honors San Francisco and Buenos Aires*. Retrieved from C40: http://www.c40.org/blog_posts/2012-sustainable-transport-award-honors-san-francisco-and-buenos-aires
- Celis, P., & Bølling-Ladegaard, E. (2008). *Bicycle parking manual*. Copenhagen: The Danish Cyclists Federation.

- Censo 2010 Argentina. (n.d.). *Censo 2010. Resultados provisionales: cuadros y gráficos*. Retrieved from Censo 2010 Argentina: http://www.censo2010.indec.gov.ar/preliminares/cuadro_totalpais.asp
- Cervero, R. (1998). *The transit metropolis: A global enquiry*. Island Press.
- City Mayors. (2012, September 15). *The most expensive and richest cities in the world*. Retrieved from City Mayors Economics 15: <http://www.citymayors.com/economics/usb-purchasing-power.html>
- City of Copenhagen. (2002, February 10). *Cycle Policy 2002-2012*. Copenhagen : City of Copenhagen. Retrieved from Divritenis Veloriga: <http://divritenis.lv/box/files/webpage.pdf>
- City of Copenhagen. (2007). *Eco-Metropolis. Our vision for Copenhagen 2015*. Copenhagen: City of Copenhagen.
- City of Copenhagen. (2011a). *Bicycle account 2010*. Copenhagen: City of Copenhagen.
- City of Copenhagen. (2011b). *Good, better, best. The city of Copenhagen's bicycle strategy 2011-2025*. Copenhagen: City of Copenhagen. Retrieved from http://kk.sites.itera.dk/apps/kk_pub2/pdf/823_Bg65v7UH2t.pdf
- City of Copenhagen. (2011c). *More people to walk more. The pedestrian strategy of Copenhagen*. Copenhagen: City of Copenhagen.
- City of Copenhagen. (2012a). *Action plan for green mobility*. Copenhagen: City of Copenhagen.
- City of Copenhagen. (2012b). *CPH 2025 Climate Plan*. Copenhagen: City of Copenhagen.
- City of Copenhagen. (2013a). *Bicycle account*. Copenhagen: City of Copenhagen.
- City of Copenhagen. (2013b). *Focus on cycling - Copenhagen guidelines for the design of road projects*. Copenhagen: City of Copenhagen.
- City of Copenhagen. (n.d.a). *Can I bring my car from my home country?* Retrieved from The City of Copenhagen website: <http://international.kk.dk/artikel/can-i-bring-my-car-my-home-country>
- City of Copenhagen. (n.d.b). *Copenhagen facts*. Retrieved from The City of Copenhagen website: <http://international.kk.dk/artikel/copenhagen-facts>
- City of Copenhagen. (n.d.c). *How do I get around in Copenhagen with public transport?* Retrieved from The City of Copenhagen website: <http://international.kk.dk/artikel/how-do-i-get-around-copenhagen-public-transport>
- City of Copenhagen. (n.d.d). *Transportation*. Retrieved from The City of Copenhagen website: http://international.kk.dk/artikel/transportation?nm_extag=et%2Clink%2ClinkPane%2C%20Transportation
- Colville-Andersen, M. (2015, February 24). *Watching Copenhagen Bike Share Die*. Retrieved from Copenhagenize.com: <http://www.copenhagenize.com/2015/02/watching-copenhagen-bike-share-die.html>

- Comisión Nacional de Regulación del Transporte. (2014). *Estadísticas del Transporte Ferroviario*. Retrieved from Comisión Nacional de Regulación del Transporte: <http://www.cnrt.gov.ar/content/estadisticas/ferroviario>
- Copenhagen Capacity. (n.d.a). *Denmark and Copenhagen in brief*. Retrieved from Copenhagen Capacity. Danish Capital Region's official inward investment agency: http://www.gladsaxe.copcap.com/content/us/doing_business/facts/denmark_and_copenhagen_in_brief
- Copenhagen Capacity. (n.d.b). *Key Industries*. Retrieved from Copenhagen Capacity. Danish Capital Region's official inward investment agency: http://www.gladsaxe.copcap.com/content/us/doing_business/why_copenhagen/key_industries
- Cox, P. (2010). *Moving people. Sustainable transport development*. London, UK: Zed Books.
- Creditos.com.ar. (2012, October 30). *Crédito para bicicletas Banco Ciudad*. Retrieved from Creditos.com.ar: <http://www.creditos.com.ar/credito-para-bicicletas-banco-ciudad.html>
- Cycling Embassy of Denmark. (2015). *Our services*. Retrieved from Cycling Embassy of Denmark: <http://www.cycling-embassy.dk/our-services/>
- Cyklistforbundet. (n.d.). *Danish Cyclists' Federation: Your entry to Danish cycling*. Retrieved from Cyklistforbundet: <http://www.cyklistforbundet.dk/english>
- Danish Architecture Centre. (2014, January 21). *Copenhagen - Pocket parks, a drop of urban green*. Retrieved from Danish Architecture Centre: <http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/green-city/copenhagen---pocket-parks-a-drop-of-urban-green/>
- Dearnaley, M. (2011, January 19). *Agency seeks substitute for NextBike's shelved hire fleet*. Retrieved from NZ Herald News: http://www.nzherald.co.nz/auckland-region/news/article.cfm?!_id=117&objectid=10700595
- Dearnaley, M. (2013, October 22). *Transport is Auckland's big issue*. Retrieved from New Zealand Herald: http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11143807
- Defensoría del Pueblo de la Ciudad Autónoma de Buenos Aires. (2008). *Los invasores*. Buenos Aires: Defensoría del Pueblo de la Ciudad Autónoma de Buenos Aires.
- Dietrich, G. (2010, June 25). *Las primeras empresas amigas de la movilidad sustentable de la Ciudad de Buenos Aires*. Retrieved from Guillo Dietrich: <http://www.guillodietrich.com/las-primeras-empresas-amigas-de-la-movilidad-sustentable-de-la-ciudad-de-buenos-aires/>
- Dietrich, G. (2011, January 8). *Sistema de Transporte Público en Bicicleta ¡Mejor en bici!* Retrieved from Guillo Dietrich: <http://www.guillodietrich.com/sistema-de-transporte-publico-en-bicicleta-%C2%A1mejor-en-bici/>
- Dietrich, G. (2013a, July 25). *Combis: Terminal Obelisco*. Retrieved from Guillo Dietrich: <http://www.guillodietrich.com/combis-la-nueva-terminal-obelisco/>

- Dietrich, G. (2013b, July 29). *La nueva estación "Plaza Boedo" de Ecobici*. Retrieved from Guillo Dietrich: <http://www.guillodietrich.com/la-nueva-estacion-%E2%80%9Cplaza-boedo%E2%80%9D-de-ecobici/>
- Dietrich, G. (2013c, May 30). *La presentación de EcoBici*. Retrieved from Guillo Dietrich: <http://www.guillodietrich.com/la-presentacion-de-ecobici/>
- Dietrich, G. (2014, December 04). *Al girar, siempre #PrioridadPeaton*. Retrieved from Guillo Dietrich: <http://www.guillodietrich.com/al-girar-siempre-prioridadpeaton/>
- European Conference of Ministers of Transport. (2004). *National policies to promote cycling*. ECMT.
- Fagan, J. (2015, June 02). *Auckland's 'ambitious' \$111m cycleway plan*. Retrieved from Stuff.co.nz: <http://www.stuff.co.nz/auckland/68975636/Aucklands-ambitious-111m-cycleway-plan>
- FGM-AMOR, Outspoken, ECF, & CTC. (n.d.). *Cyclelogistic, moving people forward. Final Public Report*. Austrian Mobility Research, FGM-AMOR.
- Fietsberaad. (2006). *Continuous and integral: The cycling policies of Groningen and other European cycling cities*. Fietsberaad.
- Gartner, A., & Ochoa, M. C. (2013, July 30). *The most "human" bike-sharing system in the world lives in Buenos Aires*. Retrieved from Latin America & Caribbean. Opportunities for all: <http://blogs.worldbank.org/latinamerica/most-human-bike-sharing-system-world-lives-buenos-aires>
- Gay, E. (2009, April 07). *'Super city' to be in place next year, Maori seats axed*. Retrieved from NZ Herald News: http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10565528
- Gehl, J. (2013). *Cities for people*. Island Press.
- Gobierno de la Ciudad de Buenos Aires. (2015a). *Anexo. Promoción y educación vial*. Buenos Aires: Gobierno de la Ciudad de Buenos Aires.
- Gobierno de la Ciudad de Buenos Aires. (2015b). *Buenos Aires - Ecobici*. Buenos Aires: Gobierno de la Ciudad de Buenos Aires.
- Gobike. (2014). *The bike*. Retrieved from Gobike: <http://gobike.com/solution/the-bike/>
- Godoy, E. (2014, January 06). *Transport: A new wave of support for bike paths and public buses in Latin America*. Retrieved from Global Information Network: <http://ezproxy.aut.ac.nz/login?url=http://search.proquest.com/docview/1474382938?accountid=8440>
- Gqaji, A. (2010). Can the bicycle become a sustainable transport mode in South Africa? *Civil Engineering: Magazine of the South African Institution of Civil Engineering*, 18(7), 35-38.
- Han, S. S. (2010). Managing motorization in sustainable transport planning: the Singapore experience. *Journal of Transport Geography*, 18, 314-321.

- Heinen, E., Wee, B. v., & Maat, K. (2010). Commuting by bicycle: an overview of the literature. *Transport Reviews: A Transnational Transdisciplinary Journal*, 30(1), 59-96.
- Hide, R. (2009, March 27). *Minister Releases Report Of Royal Commission*. Retrieved from Scoop News: <http://www.scoop.co.nz/stories/PA0903/S00405.htm>
- Holub, A. (2010). Buenos Aires Bikes! *Sustainable Transport*, pp. 33-35.
- Huizenga, C., & Bakker, S. (2009). *Applicability of post 2012 climate instruments to the transport sector. Interim Synthesis Consultant Report*. Manila: Asian Development Bank, Inter-American Development Bank.
- Hull, A. (2008). Policy integration: What will it take to achieve more sustainable transport solutions in cities? *Transport Policy*, 94–103.
- INDEC - Censo Nacional de Población, Hogares y Viviendas 2001. (n.d.). *Población total por sexo, razón de masculinidad y densidad de población, según provincia. Total del país. Año 2001*. INDEC, Censo Nacional de Población, Hogares y Viviendas 2001, Buenos Aires.
- Infobae. (2012, November 21). *Las bicisendas porteñas ya tienen su app*. Retrieved from Infobae: <http://www.infobae.com/2012/11/21/682424-las-bicisendas-portenas-ya-tienen-su-app>
- Ipsos & Auckland Transport. (2013). *Auckland Transport Cycling Research*. Auckland: Auckland Transport.
- Jensen, N. (2009). Research on cycling infrastructure in Copenhagen. Copenhagen.
- Jones, N. (2015, March 16). *Plan to 'future-proof' second Waitemata Harbour crossing*. Retrieved from NZ Herald News: http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11418140
- Keall, C. (2015, July 04). *Brewer sounds warning over SkyPath*. Retrieved from The National Business Review: <http://www.nbr.co.nz/article/brewer-sounds-warning-over-sky-path-175143>
- Krantzer, G. (2011). *El Plan de Movilidad Sustentable de la Ciudad de Buenos Aires*. Buenos Aires: Gobierno de la Ciudad de Buenos Aires.
- La Nación. (2011, June 01). *El Metrobús ya une Palermo con Liniers*. Retrieved from La Nación: <http://www.lanacion.com.ar/1377920-el-metrobus-ya-une-palermo-con-liniers>
- Leather, J. (2009). *Rethinking transport and climate change*. Manila: ADB Sustainable Development Working Paper Series. Retrieved from Rethinking Transport and Climate Change.
- Lee, M. (2009, June 1). *Michael Lee: Sins of the fathers - legacy of harbour bridge*. Retrieved from NZ Herald News: http://www.nzherald.co.nz/transport/news/article.cfm?c_id=97&objectid=10575671
- Lindholm, L. (n.d.). *Cycling in Copenhagen - The easy way*. Retrieved from The official website of Denmark: <http://denmark.dk/en/green-living/bicycle-culture/cycling-in-copenhagen---the-easy-way/>

- Mandag Morgen. (2011). *Copenhagen – Beyond Green*. Copenhagen: Mandag Morgen.
- Martínez, J., Larocca, J., & Pratt, R. (1996). Buenos Aires colectivo buses and experience with privatization. *Journal of the Transportation Research Board*, 40-47.
- Massink, R., Zuidgeest, M., Rijnsburger, J., Sarmiento, O. L., & Maarseveen, M. V. (2011). The climate value of cycling. *Natural Resources Forum*, 35, 100–111.
- McClure, M. (2012, July 13). *Auckland region - The founding of Auckland: 1840–1869*. Retrieved from Te Ara - the Encyclopedia of New Zealand: <http://www.teara.govt.nz/en/auckland-region/page-7>
- McClure, M. (2015a, June 17). *Auckland region - Climate, plants and animals*. Retrieved from Te Ara - the Encyclopedia of New Zealand: <http://www.teara.govt.nz/en/auckland-region/page-4>
- McClure, M. (2015b, June 17). *Auckland region - Driving the economy: 1980 onwards*. Retrieved from Te Ara - the Encyclopedia of New Zealand: <http://www.teara.govt.nz/en/auckland-region/page-11>
- Mees, P., & Dodson, J. (2006). Backtracking Auckland: Bureaucratic rationality and public preferences in transport planning. *Urban Research Program Issues Papers*.
- Mercer. (2014, June). *Quality of living rankings spotlight emerging cities*. Retrieved from Mercer: <http://www.mercer.com/content/mercer/global/all/en/insights/view/2014/quality-of-living-rankings-spotlight-emerging-cities.html>
- MercoPress. (2009, June 19). *Four million live in poverty in metropolitan Buenos Aires*. Retrieved from MercoPress. South Atlantic News Agency: <http://en.mercopress.com/2009/06/19/four-million-live-in-poverty-in-metropolitan-buenos-aires>
- Ministry of Transport of Denmark. (2012a). *A greener transport system in Denmark*. Copenhagen: Ministry of Transport of Denmark.
- Ministry of Transport of Denmark. (2012b). *Danish infrastructure investments*. Copenhagen: Ministry of Transport.
- Moreno, M. (2012, November 07). *Dietrich: "Vamos a desalentar fuertemente el uso del auto"*. Retrieved from La Nación: <http://www.lanacion.com.ar/1522289-dietrich-vamos-a-desalentar-fuertemente-el-uso-del-auto>
- Nelson, A. (2007). *Livable Copenhagen: The design of a bicycle city*. University of Washington, Department of Landscape Architecture.
- New Internationalist. (n.d.). *World Development book case study: sustainable urban development in Curitiba*. Retrieved from New Internationalist: <http://newint.org/books/reference/world-development/case-studies/sustainable-urban-development-curitiba/>
- New Zealand Local Government. (2007, December). On your bike - Auckland resistant to cycleways. *New Zealand Local Government*, p. 16.

- New Zealand Transport Agency. (2013). *The official New Zealand code for cyclists*. Wellington : New Zealand Transport Agency.
- Nijkamp, P. (1994). Roads toward environmentally sustainable transport. *Transportation Research, 28A(4)*, 261-271.
- Noland, R. B. (1995). Short-run and long-run policies for increasing bicycle transportation for daily commuter trips. *Transport Policy, 67-79*.
- Novillo, P. (2013, May 30). *El bicin seguirá siendo gratis y se podrá usar las 24 horas*. Retrieved from Clarin: http://www.clarin.com/ciudades/bicin-seguira-gratis-podra-horas_0_928707222.html
- OECD. (2010). *Regional Development Policies in OECD Countries*. OECD Publishing.
- Orsman, B. (2008, October 24). *Big steps to change City of Cars*. Retrieved from NZ Herald News: http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10539171
- Otzen, E. (2014, October 14). *BBC News*. Retrieved from Copenhagen's piles of bicycles: <http://www.bbc.com/news/magazine-29601069>
- Partnerships Bulletin. (2015, July 03). *NZ Skypath PPP approved*. Retrieved from Partnerships Bulletin: <http://www.partnershipsbulletin.com/news/view/90301>
- Pooley, C. G., Horton, D., Scheldeman, G., Mullen, C., Jones, T., & Tight, M. (2013). Policies for promoting walking and cycling in England: A view from the street. *Transport Policy, 66-72*.
- Pucher, J., & Buehler, R. (2005). Cycling trends & policies in Canadian cities. *World Transport Policy & Practice, 43-61*.
- Pucher, J., & Buehler, R. (2007). At the frontiers of cycling: Policy innovations in The Netherlands, Denmark, and Germany. *World Transport Policy and Practice*.
- Pucher, J., & Buehler, R. (2008). Making cycling irresistible: Lessons from The Netherlands, Denmark and Germany. *Transport Reviews, 495-528*.
- Pucher, J., & Komano, C. S. (1999). Bicycling renaissance in North America? Recent trends and alternative policies to promote bicycling. *Transportation Research Part, 625-654*.
- Pucher, J., Dill, J., & Handy, S. (2010). Infrastructure, programs, and policies to increase bicycling: An international review. *Preventive Medicine, S106-S125*.
- Rabinovitch, J. (1996). Innovative land use and public transport policy. The case of Curitiba, Brazil. *Land Use Policy, 13(1)*, 51-67.
- Rietveld, P., & Stough, R. R. (2007). *Institutions and sustainable transport. Regulatory reform in advanced economies*. Cheltenham, UK: Edward Elgar.
- Rodríguez Larreta, H. (2015, June 23). *Promesa ► #Subtrenmetroclea (Subte-Tren-Metrobus-Bicicleta)*. Retrieved from Pro Argentina: <https://pro.com.ar/horaciorodriguezlarreta/2015/06/23/promesa-%E2%96%BA-%E2%80%AA%E2%80%8Esubtrenmetroclea-subte-tren-metrobus-bicicleta/>

- Romig, S. (2012, August 09). *Latin America Gears Up as Bike Hub*. Retrieved from The Wall Street Journal:
<http://www.wsj.com/articles/SB10000872396390444900304577577162647237798>
- Santos Canal, M., Pinaud, A., & Janneau, T. (2006). *Copenhagen: How bicycles can become an efficient means of public transportation*. (Master's thesis, Roskilde University, Roskilde, Denmark). Retrieved from <http://hdl.handle.net/1800/2122>
- Santos, G., Behrendt, H., & Teytelboym, A. (2010). Part II: Policy instruments for sustainable road transport. *Research in Transportation Economics*, 28, 46-91.
- Savage, J. (2007, July 29). *Welcome to our traffic nightmare*. Retrieved from NZ Herald News:
http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10454503
- Schiøtt Stenbæk Madsen, J. (2010, November 3). *The bicycle butler – from scolding fingers to oil and a smile*. Retrieved from Cycling Embassy Of Denmark: <http://www.cycling-embassy.dk/2010/11/03/the-bicycle-butler-%E2%80%93-from-scolding-fingers-to-oil-and-a-smile/>
- Schwandl, R. (2007). *Buenos Aires*. Retrieved from UrbanRail.Net:
<http://www.urbanrail.net/am/buen/buenos-aires.htm>
- Sergel, M. (2015, July 7). *Skypath opponents accused of scaremongering*. Retrieved from Yahoo New Zealand: <https://nz.news.yahoo.com/top-stories/a/28689716/skypath-opponents-accused-of-scaremongering/>
- Servicio Meteorológico Nacional. (n.d.). *Informes Mensuales de la Ciudad de Buenos Aires*. Retrieved July 05, 2015, from Servicio Meteorológico Nacional:
<http://www.smn.gov.ar/?mod=clima&id=8>
- Skypath. (2013). *The Skypath*. Retrieved from Skypath: <http://www.skypath.org.nz/the-skypath/>
- Slade, M. (2015, January 30). *Old Auckland offramp transformed into bike path*. Retrieved from Stuff.co.nz: <http://www.stuff.co.nz/national/65578731/old-auckland-offramp-transformed-into-bike-path>
- Smith, J. (2009, November 4). *Take a free ride on Nextbike*. Retrieved from Stuff.co.nz:
<http://www.stuff.co.nz/auckland/local-news/central-leader/3026959/Take-a-free-ride-on-Nextbike>
- StatBank Denmark. (2015, June 20). *Population and elections*. Retrieved from StatBank Denmark: <http://statistikbanken.dk/statbank5a/default.asp?w=1920>
- Statistics New Zealand. (2006). *Research Report on Regional Gross Domestic Product*. Wellington: Statistics New Zealand.
- Statistics New Zealand. (2014, November 19). *Table: Estimated Resident Population for Regional Council Areas, at 30 June*. Retrieved from Statistics New Zealand:
<http://www.stats.govt.nz/infoshare/ViewTable.aspx?pxID=4a6e0259-9806-4e7e-ab64-4274c6ff2925>
- Statistics New Zealand. (2015, May 14). *Estimated Resident Population (Mean Quarter Ended)*. Retrieved from Statistics New Zealand:

<http://www.stats.govt.nz/infoshare/ViewTable.aspx?pxID=a551b722-b835-4954-b44d-b15b76521686>

- Stromberg, J. (2014, September 19). *Should bikes and cars share the same road — and the same rules?* Retrieved from Vox: <http://www.vox.com/2014/9/19/6404829/vehicular-cycling-bike-lanes>
- Supercykelstier. (n.d.). *The concept - Cycle super highways in greater Copenhagen area.* Retrieved from Supercykelstier: <http://www.supercykelstier.dk/concept>
- Tan, L. (2015, July 03). *Saddle up: Auckland Harbour Bridge to change as SkyPath gets go ahead.* Retrieved from NZ Herald News: http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11475190
- Télam - Agencia Nacional de Noticias. (2015, July 02). *Propuestas para la Ciudad de Rodríguez Larreta de cara a los comicios del domingo.* Retrieved from Télam - Agencia Nacional de Noticias: <http://www.telam.com.ar/notas/201507/111248-rodriguez-larreta-elecciones-propuestas.html>
- The Copenhagen Post. (2012, November 10). *'Copenhagenizing' the world, one city at a time.* Retrieved from The Copenhagen Post: <http://cphpost.dk/news14/national-news14/copenhagenizing-the-world-one-city-at-a-time.html>
- The Copenhagen Post. (2013, February 8). *Committee presents ideas for reducing Copenhagen's congestion.* Retrieved from The Copenhagen Post: <http://cphpost.dk/news14/local/committee-presents-ideas-for-reducing-copenhagens-congestion.html>
- The New Zealand Press Association. (2007, July 31). *Auckland governance inquiry welcomed.* Retrieved from Stuff.co.nz: <http://www.stuff.co.nz/national/14579/Auckland-governance-inquiry-welcomed>
- The official website of Denmark. (n.d.). *Cycle super highway.* Retrieved from The official website of Denmark: <http://denmark.dk/en/green-living/bicycle-culture/cycle-super-highway/>
- The World Bank. (2015). *Data - Indicators.* Retrieved from The World Bank: <http://data.worldbank.org/indicator>
- Tomino, P. (2012, February 06). *El centro porteño será todo peatonal.* Retrieved from La Nación: <http://www.lanacion.com.ar/1446286-el-centro-porteno-sera-todo-peatonal>
- Union Cycliste Internationale. (2007, May 1). *The UCI awards the UCI Bike City label to Copenhagen.* Retrieved from UCI - Union Cycliste Internationale: <http://www.uci.ch/news/article/the-uci-awards-the-uci-bike-city-label-copenhagen/>
- Valente, M. (2012, December 30). *Development: Bicycles no longer mere recreation in Argentine capital.* Retrieved from Inter Press Service: <http://www.ipsnews.net/2012/12/bicycles-no-longer-mere-recreation-in-argentine-capital/>
- VisitCopenhagen. (n.d.). *Public transport.* Retrieved from VisitCopenhagen - The official website: <http://www.visitcopenhagen.com/copenhagen/transportation/public-transport>

- Weekes, J. (2015, May 22). *\$500m plan to fix Auckland's transport woes*. Retrieved from Otago Daily Times: <http://www.odt.co.nz/news/national/343081/500m-plan-fix-aucklands-transport-woes>
- Werber, C. (2015, April 17). *Copenhagen's pioneering city bike program is days away from being scrapped*. Retrieved from Quartz: <http://qz.com/385986/copenhagens-pioneering-city-bike-program-is-days-away-from-being-scrapped/>
- World Weather & Climate Information. (n.d.). *Copenhagen, Denmark*. Retrieved from World Weather & Climate Information: <http://www.weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,copenhagen,Denmark>
- Wright, L. (2003). Module 3b: Bus Rapid Transit. In *Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities* (pp. 1-41). GTZ Transport and Mobility Group.