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# Bicycle (Revolution) Thieves

Exploring barriers to modal shift to cycling in  
 Milan

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# Colophon

Title: Bike (revolution) thieves – exploring barriers to modal shift to cycling in Milan

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## Abstract

Sustainable mobility is a crucial element to combat the climate crisis. A readily available and overwhelmingly beneficial tool to start with is cycling. However, only two countries have managed to embrace cycling as a widespread modal choice – The Netherlands and Denmark. This paper aims at discovering what are the barriers that prevent modal shift to cycling, which barriers are prevalent and what are their underlying causes. Next, it aims at exploring possible solutions to overcoming it. The theoretical framework for this study is rooted in transition theory and the fundamental role of policy as a catalyst of transition to sustainable mobility. Moreover, the Banister's classification of barriers to sustainable mobility serves as a roadmap to predict possible barriers. To address set aims, a qualitative research method is designed based on in-depth interviews with eight experts in a study case of Milan, Italy. The results show that the primary barrier to modal shift to cycling is the inability to limit cars, which is caused by a socio-political effect of car dependency. These findings transgress initial framework. To illustrate this relationship, a new model called "socio-political vicious cycle of car-dependency" is created, which, on the example of Milan, illustrates how increased car usage leads to marginalisation of other modes, including cycling, and to a further growth of car dependency. The underlying causes for this process are found to be related to the power disbalance which corresponds to the spatial theory and the dominance of the conventional paradigm of mobility. This paper recommends engaging in creation of new popular local visions of sustainable mobility, involving residents and other stakeholders. This can undermine the dominance of conventional mobility paradigm, allowing for pro-cycling coalition to form and change the power landscape in order to permanently dismantle car-dependency.

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# 1 Introduction

## 1.1 Background

As the urgency to address the ongoing climate crisis increases the transition away from mobility based on high energy consumption becomes more crucial. One of the available solutions is cycling, which next to mitigating climate change is highly beneficial for the individuals and communities. Cycling leads to improvements in accessibility, safety, health, liveability, social trust, equality, resilience, sustainability and a boost of local economy (Buehler & Pucher, 2021, Banister, 2008; Handy et al, 2014). Additionally, bikes, in conjunction with other modes, have the potential to replace currently dominant automobility – a model that was proven to be very harmful to society. Automobility contributes to millions of premature deaths, air and noise pollution, decrease in happiness, loss of public space, and severe harm to environment, and health (Conley, 2016; Nieuwenhuijsen et al., 2022; WHO, 2020). Decreasing the societal dependency on automobility is a fundamental step towards liveability, sustainability and resilience (Buehler & Pucher, 2021; Handy et al, 2014). Altogether, cycling has barely any negative externalities as building and maintaining cycling infrastructure is cheaper than car infrastructure, it uses less space, is far less dangerous, it is more accessible and cheaper to use (Pucher et al, 2010).

Despite these overwhelming benefits, in most of the developed world, cycling is marginalised and automobility is the dominant model (Pucher et al, 2010). There are only a few examples of successful transition to cycling, mainly in the Netherlands and Denmark (Pucher & Buehler 2008). Therefore, in the context of environmental and social urgency to transform mobility, it is relevant to investigate why other places do not embrace cycling. Or, in other words, what is preventing other places from achieving modal shift to cycling?

There are two possible answers, the first one suggests that cities try and fail to transition their mobility and the second one that they do not attempt to do it at all. Changing the mobility system is a complex and difficult task with legal, institutional, social and political barriers to overcome (Buehler & Pucher, 2021, Banister, 2008). Therefore, not trying to change mobility can be a result of lack of political will, public support and the dominance of conventional vision of mobility (Spinney, 2021; Buehler & Pucher, 2021, Banister, 2008). In both cases a systematic scrutiny of these barriers is crucial to understand the complex position of mobility in society, economy and politics, to pave the path that must be taken to enable the transition.

The main goal of this paper is to investigate and scrutinise barriers to the sustainable mobility, especially to the modal shift to cycling. The choice of cycling is a deliberate one, as it embodies many prominent aspects of sustainable mobility. It is technologically simple, local-oriented, accessible, it is readily available, and it characterised by minimal consumption and minimal externalities. As such, the transition to cycling, in comparison to other modes, does not require significant investments nor technology transfers. Therefore, researching cycling can

focus on exploring the barriers rooted in social, political, or institutional causes rather than technological or economical ones. Next, after identifying main barriers, this paper aims to critically explore the underlying roots of those barriers by connecting them to broader discussions about mobility paradigms and power. The final objective of this paper is to contribute to a discussion on overcoming barriers to transition in order to further contribute to the greatest challenge facing mobility – permanently dismantling the system of car-oil hegemony.

This research is based on a study case of an Italian city of Milan. This was a purposeful decision based on a possibility to study transition to cycling following a recent commitment to a deep mobility overhaul in favour of sustainable modes (municipality of Milan, 2020). The city of Milan has declared an ambitious goal of 20% modal split of cycling by 2035, which was announced in Cambio Bicipian policy published in 2022 (Municipality of Milan, 2022). If this goal is achieved, Milan will reach a level of cycling similar to Rotterdam in the Netherlands, undergoing a deep transition. This paper critically analyses this early stage of transition, focusing on challenges and linking them to the theoretical classification of barriers to sustainable mobility created by Banister (2018). Using in-depth interviews with experts that are familiar with that process allows to gain insider's view with multiple perspectives, and using a critical outsider view of a researcher allows to reflect on found data and link it back to the ongoing academic debate.

## 1.2 Research Question

Based on these aims, this research is zooming in into the process of mobility transition to cycling in Milan. In the context of the research aims and the study case, following main research question is formulated:

*What are the barriers to modal shift to cycling in Milan?*

To achieve secondary research aims following secondary research questions are formulated:

*What are the underlying causes of the barriers?*

*How to overcome the barriers?*

To be able to comprehensively answer these questions and to structure this research in a transparent and coherent way the following theoretical and empirical sub-questions are formulated:

Theoretical sub-questions:

- + How is transition to sustainable mobility conceptualised?
- + How is cycling policy and modal shift conceptualised?

- + What are the barriers to sustainable mobility?

Empirical sub-questions:

- + What is the background and current stage of transition to cycling in Milan?
- + What are the barriers to transition to cycling in Milan?
- + Which barrier is prevalent and what are the underlying causes of this barrier?
- + What is needed to overcome this barrier?

## 1.3 Relevance

### 1.3.1 Academic relevance

Uncovering the underlying causes of barriers supports discussion on deep and long-lasting transition in mobility, known in the ongoing academic debate as the paradigm shift to sustainable mobility (Banister 2008). That discussion is connected to a broader discourse on the sustainable transition and new visions for economy and society. Sustainable mobility paradigm (although in its different forms) plays a vital part in visions such as doughnut economy, post-growth, eco-modernism and post-humanism. This paper touches on ongoing discourse on the future of mobility by studying mobility through its relation to power and ideology it and by explicitly reflecting on the transition in mobility paradigm.

Furthermore, this paper addresses three types or research gaps in mobility studies: (i) new and understudied field of barriers to transition to sustainable mobility, (ii) politics of sustainable mobility, and (iii) a geographical gap of researching cycling in southern Europe.

### 1.3.2 Societal relevance

Social relevance of this paper is concerned with giving planners, activists, politicians or other stakeholders a conceptual tool of understating potential barriers to modal shift to cycling.

As the urgency of climate action and social inequality grow, the transition to sustainable mobility is increasingly relevant to residents of cities all across the world. In Europe the focus on sustainable mobility is continuously strengthened by the requirement of a Sustainable Urban Mobility Plan in order to access European funds intended for a transition to sustainable mobility (Rupprecht Consult, 2019). Many cities on the continent will face barriers to increasing cycling split and to the transition to sustainable mobility in general. Providing understanding of these barriers can accelerate this proceeds and empower actors enabling deeper transition to sustainable mobilities. Since the mobility system is based on the convectional paradigms in majority of the developed world, the barriers and underlying processes of the transition can be ubiquitous. Providing understanding of barriers can help to build local and global capacity to overcome them.

## 1.4 Structure

The structure of this paper is following: Chapter 1 – introduction provides a background for this study. Chapter 2 -literature review presents and discusses relevant literature and define theories used in this paper. The literature review is organised by addressing theoretical sub-questions. Concluding that review a theoretical model for this research is presented. Next the Chapter 3 discusses Methodology focusing on data collection and analysis. Chapter 4 – Results, presents outcomes of the data analysis. This chapter is organised by empirical sub-questions. After each session a discussion is presented, linking the results to the literature. Next Chapter 5 – Conclusion summarises and genialises those results, providing reflection, limitations and recommendations for further research. Following that is 8 – references, 9 – list of figures and tables and 10- appendix.

## 2 Literature review

### 2.1 Transition to sustainable mobility

#### 2.1.1 Paradigms of mobility

There are two fundamental theories of mobility: the first is the conventional paradigm, also known as productivist or traditional, which is rooted in neo-liberal economics. This is currently the dominant model world-wide. The second one is the new sustainable mobility (SM) paradigm.

Most notably Banister (2008) in his paper *The sustainable mobility paradigm* consolidates the theory of the sustainable paradigm by combining the critique points of conventional mobility into a coherent alternative vision. That theory challenges the fundamental principle of the conventional mobility paradigm. The first challenged principle is understanding travel as simply derived demand from the activity at the destination, not an activity that can have any intrinsic value. So the only value of travel comes from the activity at the destination (Banister, 2008). According to the second principle, people minimize their general travel cost which is understood as a combination of time and cost (Banister, 2008). Studies show that people operate with a travel budget, an amount of time that they are willing to spend on commuting, which, in spite of modernisation and mechanisation of transport, remained similar in the last century (Gregory et al, 2008). Moreover, many aspects of travel, especially sustainable travel have intrinsic value, such as pleasure from movement, casual interaction with others and connection to one's surroundings (Pucher & Buehler, 2008).

However, these assumptions of travel have allowed a development of hyper-automobility by accommodating growth in faster and longer travel distances as the increased speed outweighed the increased costs of travel (Banister, 2008). Moreover, it justified widespread



public investments in car-supporting infrastructure under the premise of reducing travel costs for all. This has led to a situation in which average travel time remains constant, but the cities have spread aggressively, forcing car-dependency and transport induced greenhouse gasses, air and noise pollution and other problems associated with hyper-automobility that poses significant risks to urban well-being worldwide (Deakin, 2006).

Banister (2008) argues that since sustainable modes such as cycling, walking and public transport are disadvantaged in the frame of the *productivist* paradigm, in order to achieve fundamental change to a new sustainable mobility a paradigm shift is critically needed. In the new paradigm, it is crucial to underline the intrinsic qualities of sustainable mobility, such as pleasure, health and community which can be done by interrelation between land-use and mobility (Banister, 2008). Below is presented an overview of the two mobility paradigms table 4 (Banister, 2008; Rupprecht consultant, 2018)

Table 1: Overview of two paradigms of mobility

Conventional transport paradigm	Sustainable mobility paradigm
Physical dimensions	Social dimensions
Car oriented	All modes with slow modes preferred
Transport	Accessibility
Forecasting traffic flow	Visioning cities as a whole
Economic evaluation	Social and environmental evaluation
Growth oriented	Integrated goals with social and environmental goals protected
Planning by experts	involvement of stakeholders and residents
Segregation of modes	Integration of modes
Speeding up traffic	Slowing down movement
Street as a road	Street as multi-functional space

Overall, the sustainable mobility paradigm offers a holistic and sustainable approach to transportation, one that considers social and environmental factors and promotes more equitable and accessible forms of transportation.

The change from the conventional mobility paradigm to the sustainable mobility paradigm is not easy, due to its long-lasting dominance in science, policy, and planning (Spinney 2021). The productivist paradigm has been deeply ingrained in the ways of understanding and

planning mobility for decades, and the prevailing transportation planning and policy frameworks are built around it (Deakin, 2006). Moreover, the interests of powerful stakeholders such as the automobile industry and construction companies are aligned with the productivist paradigm, and they have a considerable influence on the political decision-making process (Deakin, 2006). This has led to significant resistance to change, making it difficult for the sustainable mobility paradigm to gain traction in policy and planning. However, there is a growing recognition of the unsustainability of the current mobility paradigm, especially in academia and civil society, and efforts are being made to shift towards more sustainable modes of transportation (Jordova 2021) This requires a deep change in the ways the society thinks about transportation and a commitment to building new, sustainable transportation systems that are grounded in the principles of the sustainable mobility paradigm (Jordova 2021). Such change of rationale towards the sustainable mobility paradigm, however, requires a profound and purposeful effort of multiple actors, a real transition, first in the way people think about mobility and second in the way the mobility is planned.

### **2.1.2 Transition theory**

The systemic change between the paradigms is a transition, it involves a deep change in the function and understanding of transport. Transition theory conceptualises change between socio-technical regimes. Geels (2011) describes the socio-technical regime as a system of measurable elements: infrastructure, rules and regulations combined with underlying mechanisms such as norms, informal institutions, rationale, and behaviour (Geels, 2011).

These regimes are reproduced and upheld by many actors including private sectors, policy makers and politicians, civil society and scholars and educators; therefore, the transition is a complex and long-term process including many stakeholders (Geels, 2011). Van den Bergh et al. (2008) defines transition as a shift between two dynamic equilibria. Loorbach, (2010) underlines the non-linear nature of this process, dotted with disturbances and discontinuities such as back-sliding and reverse to the mean.

Rothmans et al. (2000) conceptualize transitions through their four different phases, depending on the pace of change (figure 1). In the first phase – pre-development – there are no visible changes to the system yet, however, there may arise readiness for change and experimentation. The second phase – take off – is when the system begins to shift and the elements of transition start to reinforce each other, increasing the speed of change. Third phase – acceleration – is where the change is fastest. In this phase breakthroughs happen when the new system becomes wide-spread. During that process a collective learning, diffusion and embedding occur. Finally, the fourth phase – stabilization – takes place when the new system replaces the old one and the change slows down reaching equilibrium (Kemp & Rotmans, 2005; Geels, 2018).

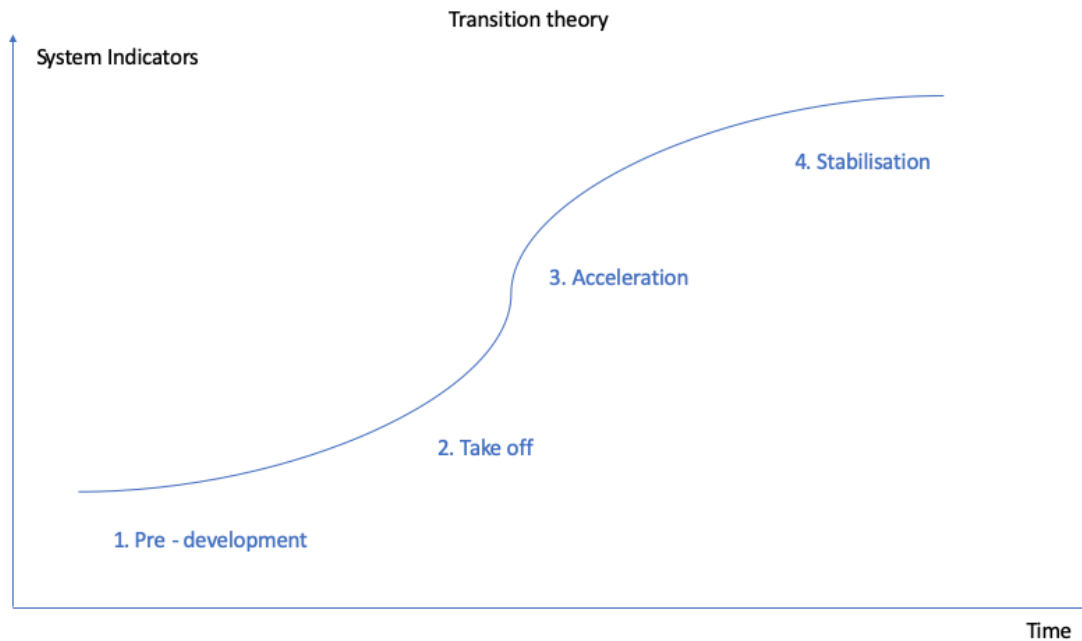


Figure 1 – Four phases of a transaction (Rothmans et al. 2000)

Major events like wars, accidents or crises can accelerate the transition, however they are not enough cause it entirely (Kemp & Rotmans, 2005). This is because a fundamental change results from a deep and slow societal change that determine the need for the transition. Although events are often seen as important catalysts of transitions (Kemp & Rotmans, 2005).

Smith, et al. (2015) underlines that the transition to sustainability is a specific one, characterized by its goal-oriented and purposeful character to address the environmental problem. Historically many transitions were *emergent* which meant that they were driven by commercial opportunities linked to innovation (Smith, et al., 2015). Private sector actors have a limited incentive to be involved in the sustainability transition as its goal is a collective good – sustainability. Lack of a direct incentive for private companies to be involved in a sustainable transition leads to the prisoner’s dilemma and the free rider problem (Geels, 2011). Moreover, sustainable solutions often do not provide tangible user benefit, they are collective goods (Geels, 2011). Consequently, the state and the civil society bear a disproportionately big responsibility in leading that transformation (Elzen et al., 2011). As such, the role of policy in this transition is fundamental, as it is a main tool of the public authorities. Therefore, to succeed, environmentally oriented innovation needs a change in economic conditions e.g subsidies, regulations, tax incentives, or a general overhaul of a broad socio-economic system. All those cases can create a power struggle due to invested interests trying to resist the change (Geels 2011). Consequently, a transition to sustainability is policy-driven and it is an inherently political and disputed process.

## 2.2 Policy and transition to suitable mobility.

There are multiple policy approaches to support the transition to sustainable mobility. The SM policy, in addition to cycling, can include reduction of car usage, increasing walkability and ridership of public transport, or decreasing total demand for mobility (Gregory, 2008). Due to the focus of this study case on cycling, this section is focused mostly on reviewing cycling policy.

### 2.2.1 What is cycling policy?

Cycling policy is outlined as sets of measures aimed at increasing modal share of bikes in a mobility system (Pucher and Buehler, 2007). Cycling policy may include infrastructure, regulation, education and promotion (Pucher and Buehler, 2007) It is usually a part of a broader sustainable mobility policy. Due to the local dimension of mobility, cycling planning is often done on a regional or municipal level (Gregory, 2008) Additionally, there are national cycling plans implemented in some European countries that provide a nationwide strategy. (ECF, 2022). Italy currently does not have a National Cycling Strategy in place, however, one is supposed to be currently in preparation (ECF, 2020).

### 2.2.2 Modal shift to cycling

Modal shift and split are well-established terms in mobility literature and practice. Modal split is defined as follows:

Modal split is an outline of transportation choice. It shows the percentage of trips by a particular mode of transport compared to the ratio of all trips made (Ungvarai, 2019).

Table 2 presents an overview of definitions of modal shift created by other scholars. Some of the definitions already include the focus of the shift to cycling.

Table 2 - Overview of definitions of modal shift to cycling

Ahanchian et al. (2019)	A behavioural change in mobility: e.g., shifting to non-motorized transport, increasing the occupancy factor of private vehicles, and higher utilization of public or active transportation.
Pucher and Buehler (2007)	Increase in the number of people carrying out cycling trips.
Banister (2005)	The shift in choice of personal transport from the car to the bicycle.

Le Heron (2010)	An increase in the number of bike trips as personal transportation, including commuting, leisure and other daily activities, over the private car.
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In this paper the modal shift to cycling is understood as:

Sustained increase in the share of trips taken by bike in the overall modal split.

### 2.2.3 How to achieve a modal shift to cycling?

There is a rich body of academic (e.g. Pucher & Buehler, 2019; Zuev, et al., 2021) and non-academic (e.g. DCE, 2018; Buntlet, 2020; Montgomery, 2013) literature concerned with prescribing methods of achieving a high cycling level. The approach of these authors is based on the analysis of successful examples and reproducing them in a generalised way. The highest modal shares of cycling are in the Netherlands and Denmark (Pucher & Buehler 2008) and thus, these are the mobility systems that serve as exemplary cases used most in cycling literature (Pucher & Buehler, 2019; Zuev, et al., 2021).

The most comprehensive outline was created by Pucher & Buehler (2008) as a framework for "making cycling irresistible". It is a 7-point list of direct measures accompanied by supporting indirect measures. These are as follows:

1. System of separated cycling paths
2. Intersection modifications and priority traffic
3. Traffic calming
4. Bike parking
5. Coordination with public transport
6. Education and training
7. Traffic laws

Next to these direct measures Pucher & Buehler (2008) stress the importance of supporting measures, such as increasing density and proximity, as well as a system of push and pull factors focused on discouraging driving (Pucher & Buehler, 2008).

#### 1.1.1 Integrated cycling policy

In the literature on innovation, there is a common distinction into 3 areas: Hardware, Software and the lesser-known Orgware. Karszenberg et al. (2016) uses them in the context of placemaking, understanding those concepts as built environment (hardware), use (software), and coalitions and tools (orgware). It is not uncommon to borrow these terms for other aspects of planning and governance. For example, The Dutch cycling embassy (2021) splits cycling planning into the same three aspects: (i) hardware – focused on cycling infrastructure,

parking etc; (ii) software – education, events, and knowledge sharing; and (iii) orgware – the interaction between actors, marketing, advocacy and relation with the general public.

Currently, cycling literature is mostly concerned with two topics. First, there is considerable literature on the software aspect, but concentrated on proving and promoting the vast benefits of cycling. Second, a sizable cluster of papers is about the prerequisites for achieving high cycling levels, however, focuses mostly on hardware such as density and land-use, and zooms in on specific technical solutions. These two main literature groups describe and prescribe best cycling practices mostly located in the Netherlands and Denmark (Anaya-Boig 2021; Pucher & Buehler 2021; Bannister 2005).

While “making cycling irresistible” is the most cited cycling paper so far and it is believed to be a masterful framework, it is criticised for its focus on the hardware. In an attempt to broaden the perspective Anaya-Boig (2021) creates an integrated cycling policy model (figure 2). It is aimed at addressing the complexity of transportation planning in a holistic way that is able to provide sustained results in terms of modal shift. That follows the ongoing discussion that the hardware and to lesser extent the software of cycling policy is well researched and available, but what is under-researched is the orgware of the process.

As Oldenziel and de la Bruhèze (2011, p.30) say: *A singular focus on building bicycle lanes without embedding them in broad-based cycling cultures is likely to lead to technological rather than user-driven designs and solutions.* Only a combination of socially innovative arrangements, alongside new technologies, regulations and infrastructure can establish long-lasting cycling practices (Oldenziel & de la Bruhèze, 2011).

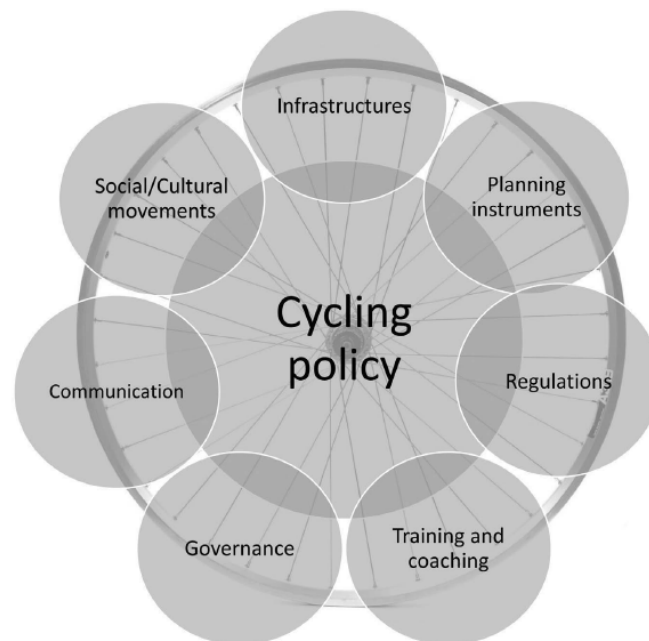


Figure 2 – Integrated cycling policy (Anaya-Boig, 2021).

In that sense, the cycling motto popularised (next to others) by Brömmelstroet: *Build it and they will come*, while true in an early stage, is fast becoming an oversimplification that tends to leave the other aspect of cycling policy behind. Hence Anaya-Boing (2021) shows, that the integrated approach is necessary to achieve the set level. The model is as follows (figure 2), and is based on the multi-focus on cycling policy, bringing additional 6 aspects other than infrastructure to the table (Anaya-Boing, 2021).

## 2.2.4 History of Dutch and Danish cycling policy

Cycling has become a widespread and attractive mode in only two places in the western world (figure 3); in the Netherlands with a modal share of cycling at 27% and in Denmark with 18% (Pucher & Buehler, 2008).

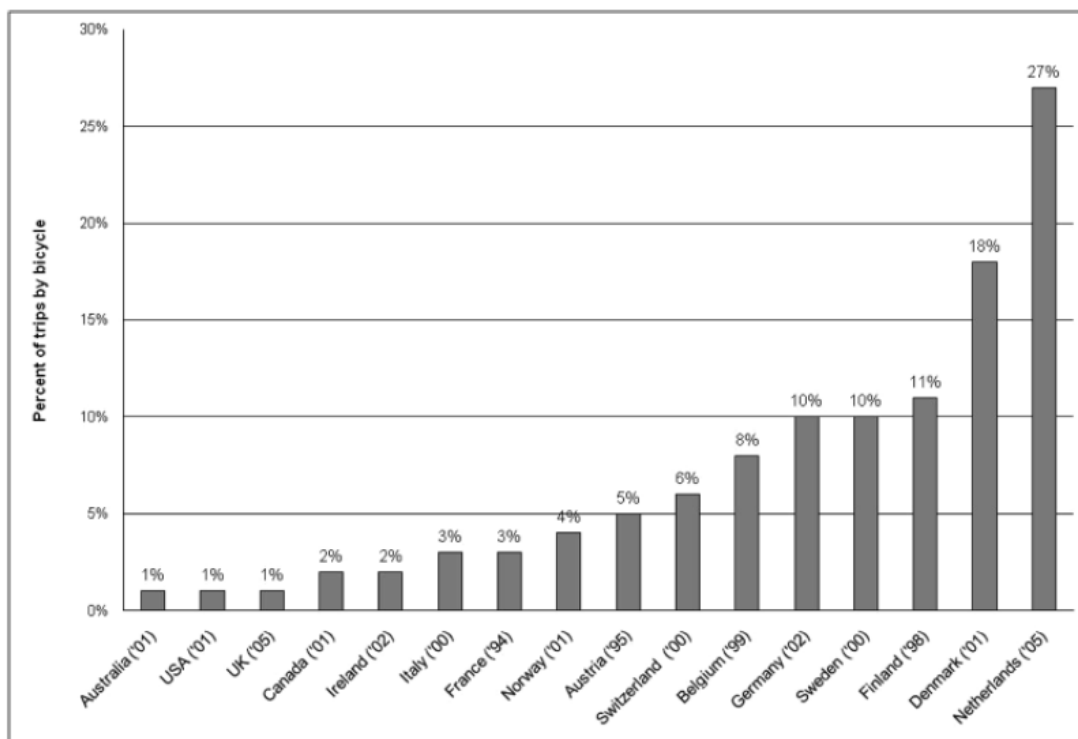


Figure 3 - Bicycle share of trips, percentage of total trips by bike (Pucher & Buehler, 2008)

In both cases, the shift to cycling it was a result of bottom-up pressure. Brömmelstroet et al. (2021) tells following story of cycling in the Netherlands.

Modern Dutch cycling begins in the 70s, when, similarly to other developed countries, planners were working towards hyper-automobility, a type of mobility system heavily dependent on the usage of private cars. That model was based on promoting car dependency by investing in car infrastructure often cutting through old cities and encouraging mass suburbanisation. With the increase of car traffic, the road casualties rose accordingly, and the centres of cities became overwhelmed with traffic and pollution., Unlike in other countries, the Dutch public has not accepted that. A large social movement united under the banner of





Similarly to the Netherlands, in Denmark the transport planners realising the policy of hyper-automobility attempted to demolish old social housing neighbourhoods to create space for a new motorway. That led to popular public protests in Copenhagen, which were organized by the Danish Cyclist Federation and were supported by thousands of Copenhageners (Koglin 2015). The protests against reallocating roadway space from cyclists to cars were the political foundation for setting alternative policies of expanding and improving cycling infrastructure in the following years and decades (Koglin 2015). Interestingly, however, this change was local to Copenhagen, and unlike the Netherlands that has not caused a redesign of the entire national policy.

## 2.3 Theories of policy

To discuss cycling policy in a broader context, it is relevant to first present the knowledge on policy in general, and to discuss its relation to power. Below policy theories are presented and discussed.

### 2.3.1 Scope levels of mobility policy

There are three levels of policy plans: (i) Strategic, (ii) Tactical and (iii) Operational (Beria, 2012). Strategic policy is the highest level of broader scope. It includes visions, general goals and main direction. It is done in a medium to long time scope and on the whole concerned area (Beria, 2012) Second level is tactical planning. It includes specific actions, projects, and its actuating goals. It is more detailed and is usually done for a medium time frame. Operational plans are project specific, detailed operational aspects and are done for a short time frame. It is a strategic policy where a vision is important and subsequent levels of policy are supposed to be corresponding to the strategic policy. This paper focuses on the strategic policies, as it is where the goal for a mobility transition is first set.

### 2.3.2 Kingdon's policy streams model

Kingdon's policy streams model (1995) is a framework created to explain how policy formulation happens. It originated from a preceding theory called the garbage can model and was later adapted to include multiple policy streams (Rwat & Morris, (2016). While several studies have pointed out its limitations, it remains as one of the most popular models used to understand policy processes (Rwat & Morris, 2016). Below is the graphical interpretation of the model (figure 5).

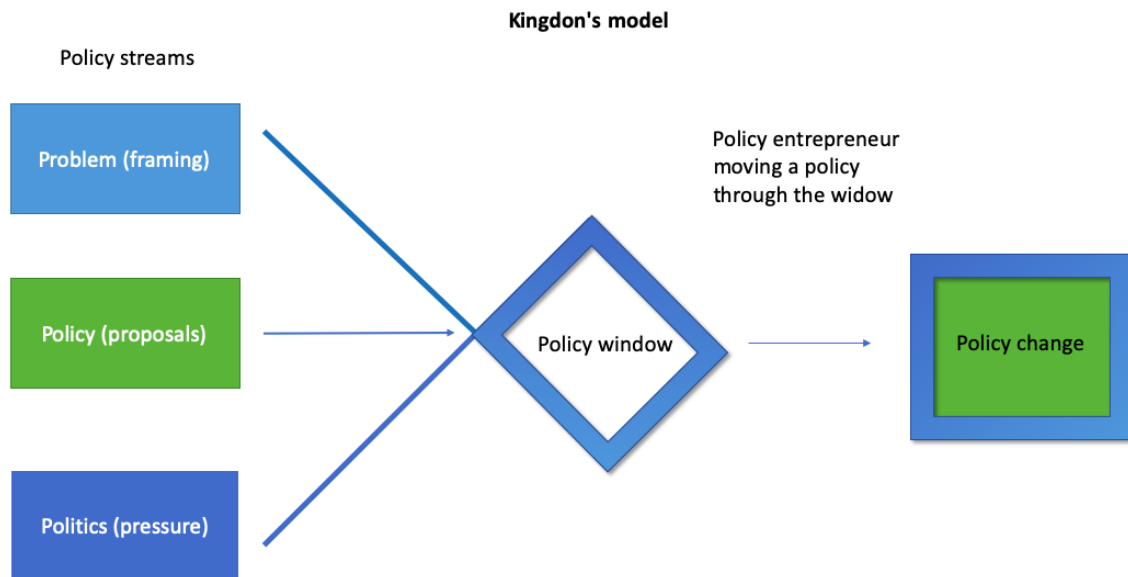


Figure 5 - Kingdon's policy streams model

The model starts with the identification of three streams of policy making and it understands the policy change as a result of interaction between those policy streams (Kingdon, 1995). Those streams are the following:

(i) Problems – Policymakers pay attention to the problem through the way they learn about it. The decision of what a problem is or is not and how that problem is defined is crucial (Kingdon, 1995).

(ii) Policies – Policy ideas and proposals to later choose from. For one to be chosen it needs to be feasible and acceptable. It is important to formulate different ideas to create a pool of possible solutions. This model is based on the previously developed garbage can model, according to which the policy is often selected from already existing policy proposals that are waiting for the right time to introduce them (Kingdon, 1995).

(iii) Politics – National sentiments, pressure groups, administrative and legislative turnover. Politics and public pressure play a crucial role in determining the priority of a policy. A common example of this stream is the change in the government after an election. However, civil society and the market also have a significant, though less direct, influence on this stream, exerting pressure on the existing regime or ensuring its change (Kingdon, 1995).

While the three streams might operate independently of each other, they need to come together in order for a policy window to emerge. In other words, when these streams meet at the same time, then a possible policy window opens. The policy window is defined as a time when a new policy can be implemented. To do that a policy entrepreneur is needed – a person or a group that connects the streams and links the problem to a solution (Kingdon, 1995).

This framework can be very useful as an organizing theory to identify and place different elements of policy development. It is, however, criticized for being difficult to empirically observe, and therefore not that useful in the real-life setting (Rwat & Morris, 2016). For example, Bundgaard and Vrangbæk (2007) in a paper on reforming policy process in Denmark criticize this model for not providing any tools for micro- or meso-analysis of the streams and for understanding of the process of connecting the streams. They conclude that while theoretically this model is relevant for building understanding, it lacks the practical side (Bundgaard and Vrangbæk 2007).

For the purpose of this research I attempt to modify this framework to fit to the study case, the approach and the terms that are used through this thesis. To do so, the policy streams are renamed to focus on the aspect that is the most relevant to this research. Therefore, the stream of *problems* is turned into *values*; the identification of a problem is a result of prevalent values. The stream of *policy*, can be connected to a vision, as a policy proposal is a mean to achieve a particular vision. Finally, the stream of *politics* is reframed as a stream of power.

### **2.3.3 Heuristic model of policymaking**

Another very common theory of policy is called the policy cycle model, also known as *heuristic model* or *the textbook approach* (Darity, et al., 2008). This circular model divides the policy process into 5 consecutive steps and is a result of the work of multiple early political scientist, based on the original idea of a model by Lasswell (1956). It claims that policy-making is not a single decision but a sequence of multiple decisions and actions that are influenced by past actions (Hill, 1997). It assumes that public policy creation involves six steps: (i) agenda setting, which recognises the problem; (ii) policy formulation, where a solution is proposed; (iii) decision-making, where the solution is chosen and legitimised; (iv) implementation, in which the solution is put into action; (v) evaluation, or the monitoring of the results (Darity, et al., 2008). The model is illustrated in figure 6.

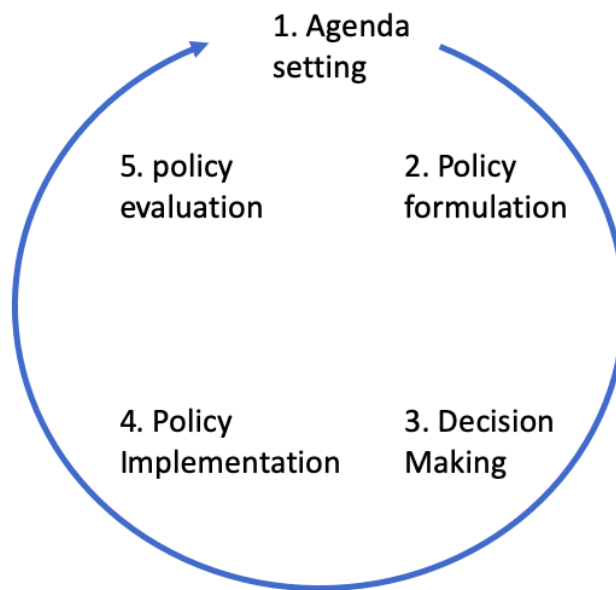


Figure 6 - Policy cycle model

This model starts with an Agenda setting, also known as problem Identification and definition. Similarly to Kingdon's model, framing and defining the problem is crucial, depending on the political environment (Rinfret et al., 2019)

Policy formulation corresponds to a policy section in Kingdon's model and describes a stage when a new policy is drafted. In this model compared it is the problem that first insisted policy design process, tailor-made for this instance. Then, decision making is a political process (Rinfret et al., 2019).

Policy evaluation is the final step of the process which assesses whether and to what extent the policy has responded to the problem that was defined in the first step. It is not uncommon that the public does not behave in the way that policymakers wished for and that difference is called the Behaviour-Policy gap (Rinfret et al., 2019).

### 2.3.4 Theories of policy and local politics

Planning mobility is a deeply political and complex process. Political involvement is needed in multiple stages of policy and implementation and multiple actors are involved. Therefore, analysing the relationship between politics and policy is important to gain a full picture, especially while aiming to discover roots of policy decisions. It is also a method embraced by critical scholars to study special relations through its relation to power. Here are selected theories on relationship between (local) politics and policy.

Public Choice Theory, rooted in neo-classical economics, suggests that politicians are self-interested actors who are primarily motivated by their desire to get elected and re-elected

(Gregory, et al., 2009). According to the theory, politicians make policy choices that are in the interest of their re-election, rather than in the best interests of the citizens. They are seen as *vote-maximizers* who seek to adopt policies that will appeal to the largest number of voters, and will avoid controversial policy in order to increase their chances of being re-elected (Gregory, et al., 2009). While this theory was criticized for reducing political actors to a political form of cynical Homo-Economics, there is a merit in acknowledging the imperative of political survival that impacts decisions made by political actors. This theory can be relevant to cycling policy and the transition to sustainable mobilities in general as can be controversial due to the strength of the conventional paradigm and invested interests and habits and therefore vote-maximising politicians might avoid engaging in them (Spinney 2021).

Spatial Theory suggests that policy is primarily influenced by the spatial distribution of interests, resources, and most importantly power. Harvey (1996) argues that spatial relations are fundamental to the organization of political power. He brings previously excluded in political sciences dimension of space. In essence, political actor's policy choices are influenced by the preferences of their voters and the local system of power dynamics. In comparison to the public choice theory, spatial theory argues that, political decisions are not only motivated by the imperative of holding to power, but rather are the effects of a local power structure. A power structure that is resulting from spatial distribution of resources (Harvey, 1996). Spinney (2021) discusses the spatial theory in the context of cycling; he underlines the political aspect of planning for cycling, which is in the opposition from the powerful oil and car lobby. He finds that the local governments are often wary of the political consequences of changing the status quo, or even unable to (Spinney, 2021). In that context it is relevant to use the perspective of spatial theory to look closely on the power relation present in the local mobility context.

Resource Dependence Theory: This theory suggests that policy outcomes are influenced by the resources available to local governments. According to this theory, local governments will make policy choices that are influenced by their access to financial, human, and other resources (Darity et al., 2008). That theory can be relevant to the transition to cycling which can require resources and knowledge.

New Institutionalism: This theory suggests that policy outcomes are influenced by the interplay between formal institutions, informal norms, and political actors. According to this theory, local governments will make policy choices that are influenced by the formal rules and regulations that govern their behaviour, as well as by the informal norms and practices that shape their decision-making processes (Lane & Ersson, 2000) The new institutionalism argues that public institutions are not neutral and that institutions, loosely defined as the human-created constraints on interactions between individuals, really do matter. In fact, institutions shape individuals wants and preferences, as well as their behaviour (Lane & Ersson, 2000). The new Institutionalism appears to be relevant to the paradigm shift, as the dominance of the conventional mobility paradigms is influenced both in formal and informal institutions and as such it can influence policy.

The Advocacy Coalition Framework (ACF) suggests that policy change is the result of the interaction between different actors, including policymakers, interest groups, experts, and the public, who form coalitions based on shared beliefs and values (Cairney et al., 2019). These coalitions are composed of actors who have common goals, work together to achieve them, and share a common view of the problem at hand. This theory emphasizes the importance of beliefs, values, and policy-oriented learning in shaping policy change (Cairney et al., 2019). It also recognizes the role of external factors, such as political institutions but formal and informal and the socio-political context, in shaping policy outcomes (Cairney et al., 2019). The advocacy Coalition Framework shows a power of bottom-up initiatives, a possible way to balance the power of companies with invested interest in cars. ACF echoes the history of Dutch and Danish popular resistance to automobility and can be a very relevant perspective on transition to cycling.

These theories describe different approaches to the relationship between policy and politics. In the results chapter I reflect which theory best describes the process of cycling policy in the case of Milan.

### 2.4 Barriers to sustainable mobility

There are multiple ways of understating the barriers to sustainable mobility. The integrated cycling policy by Anya-Boing (2021) is one of the examples that planning for a modal shift for cycling is more complex than infrastructure design. Especially in places where cycling is not yet established in the mobility system, a transition can meet unfamiliar barriers at different moments and in different aspects of the process. In the context of sustainable mobility policy, the SUMP (Rupprecht Consult, 2019) defines a barrier as any obstacle that prevents or delays a plan from being implemented or limits the way it can be implemented.

Banister (2005) creates an overview of 6 distinctive barriers to sustainable policy development, presented in table 3 below. It is a comprehensive framework for identifying barriers to sustainable mobility policy, and to it, more relevant in the table includes a cycling-related example and a link to the integrated cycling policy model.

Table 3: Categorisation of barriers to the development of sustainable mobility policy and review.

Type of Barrier (Banister, 2005)	Description (Banister, 2005)	An example related to cycling (Wang, 2018)	Link to integrated cycling policy (Anaya-Boing, 2021)
Resource	Lack of adequate financial or physical resources available.	Not enough investments in cycling infrastructure	Governance

Institutional and Political	Problems with coordination between departments and conflicting policy	Lack of leadership and political will	Governance/Communication
Social and Cultural	Lack of social acceptability	Resistance from the public, bikelash	Social and Cultural Movements
Legal	Conflict with existing laws and regulations	Cycling lane designation not permitted on certain roads	Regulations
Side effects	Effects on other actives	Increased accidents with cyclists	x
Physical and Others	Restriction of space and topography	Lack of space, hilly landscape	Urban Form

Interestingly, Banister (2005) does not identify the lack of know-how as a distinctive barrier, which supports the notion that the most common barriers to SM are not necessarily technological. Wang, (2018) based on his review of cycling papers provides a cycling related example. Finally, the types of barriers are linked to different parts of the integrated cycling policy by Anaya-Boing (2021) than can address these barriers in an attempt to link different theories. Notably, there was no clear link between side effects and physical barriers in the integrated policy model.

There are other attempts to identify barriers to sustainable mobility policy. Most notably May et al. (2006) who identifies four following categories: (i) legal and institutional, (ii) political and cultural, (iii) practical and technological, and (iv) financial. Interestingly, this division brings on the technological barriers, an aspect that is not explicitly mentioned in Banister’s classification. Another example is Vigar (2000) who also proposes a division into four types of barriers: (i) financial, (ii) organizational, (iii) cultural, and (iv) political, again not explicitly mentioning the hardware aspects.

Importantly, these three attempts of the classification of barriers differ in name and number of categories. Different typologies create the focus and expectations. However, in essence those frameworks do not contradict to each other, what gives them all a degree of validity and allows to use them interchangeably, at least to compare between findings. Banister’s classification is the most elaborate, and has the flexible “other” category that allows to identify barriers that were not predicted. Therefore, Banister’s (2005) classification and definitions are chosen as a point of reference for this paper. The suitability of this framework is further reflected in the conclusion chapter.

#### 2.4.1 Similar research

Wang (2018) writes about barriers to development of cycling policy in Hamburg. He uses Banister's classification of barriers. Based on interviews with experts knowledgeable on mobility policy in Hamburg, mostly urban and traffic planners, he measures the numbers of references to one of the barriers mentioned. That paper concludes that the barriers to the

implementation of cycling Policy in Hamburg are in order of importance: Physical, Political and Institutional, Social and cultural. There are, however, significant limitations to that paper, firstly, the number of mentions does not provide a strong validity to assess the importance of barriers. Secondly, there is no reflection on the position of the participants and therefore it does not prove nuanced scrutiny of the results.

Hull & Tricker (2005) summarise barriers to sustainable transport policy in multiple local transport agencies. This qualitative paper is based on a survey sent to 16 local authorities. It asks for the identification and level of impact of barriers to the implementation of sustainable transportation policy. The key barriers they identify are a lack of decision support tools and a lack of funding. Linking these findings to Banister's barriers, the lack of decision support tools is linked to Institutional and Political barriers and the lack of funding is linked to Resource barriers. A limitation of this paper can be the fact that all these barriers were self-reported, and as such there might be bias in those responses.

### 2.4.2 Vicious Cycle of Automobile Dependency

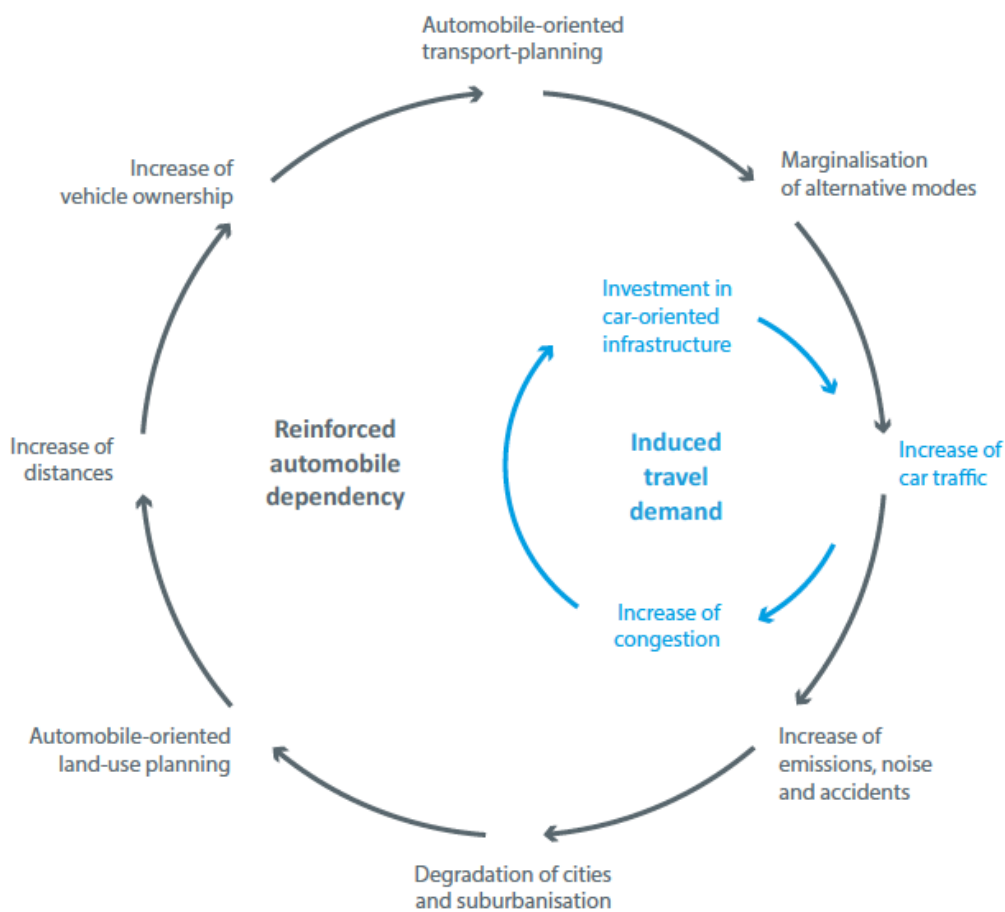


Figure 7 - Vicious Cycle of Automobile Dependency (Broaddus, et al., 2009).



Reliance on the conventional mobility paradigm can lead to the vicious cycle of automobility. Vicious cycle of automobility describes the self-reinforcing phenomenon of how dependence on automobiles as the primary mode of transportation leads to negative consequences that perpetuate the cycle of dependence (Figure 7; Broaddus, et al., 2009). The cycling begins with increased car traffic that leads to decreasing the quality of urban space, what consequently leads to suburbanisation and increased traffic distance. This increases the car ownership rates, leading to a car-based Transport Planning, resulting in marginalisation of other modes, leaving the car as the only viable option and closing the cyclone by further increasing car use (Broaddus, et al., 2009). Another relationship is the induced demand where in response to congestion more car infrastructure is provided, again increasing car usage by making the car the only viable option (Broaddus, et al., 2009). A radical example of this relationship is visible in the USA where 92% of households own at least one car and with 22% owning more than 3 (U.S. Census Bureau, 2020). The effects of that dependency are huge, ranging from huge energy consumption and emissions, to obesity and deep inequalities (Broaddus, et al., 2009).

There is another side of it, as often car-oriented places struggle to challenge their mobility because public opinion does not favour it, for instance, because there is a tendency to support a transport policy for one's current mode (Rissel, et al., 2018). There is even a name coined for anti-cycling resistance – bikelash (Anaya-Boig, 2021). Therefore, even though globally cycling is on the rise both in the numbers of users and in publicity (e.g. increasing number of academic publications and political campaigns) the cities that try to invest in cycling, often do it conservatively, cautious not to disturb the dominant car-centred system (Spinney, 2021; Banister, 2005). That usually yields limited results, due to incoherent accessibility possibilities, scattered networks and lack of incentives for modal shift. Moreover, such half-hearted attempts can be used as an illustration of the failure of the cycling policy and obstruct further investments. (Spinney, 2021).

### **2.4.3 Interaction between car-based mobility and cycling mobility**

Mobility system is complex and different modes are interdependent, and as such cycling policy cannot exist in separation to the car policy. Cycling and driving are locked in relation where one heavily impacts another, most essentially heavy car-usage marginalises other modes, including cycling (Broaddus, et al., 2009) Below different faces of the relationship between car and cycling policy are discussed.

Conflict over the use of space happens where different modes are not compatible due to the scarcity of space, which occurs often in cities, as the physical capacity is finite. Therefore, to create or enlarge the infrastructure for one mode of transport, it is necessary to take the space from another one (Broaddus, et al., 2009). Cycling infrastructure is often created by limiting car space or pedestrian space, what can cause conflicts and be a barrier to enlarging cycling network (Broaddus, et al., 2009).

Car – bike safety relation. The major hazard for cyclists is a collision with a car (Pucher & Buehler, 2019). In places with high car traffic, weak regulation and aggressive driving culture, cycling is significantly more dangerous (Pucher & Buehler, 2019). The biggest deterrence to cycling are concerns about safety (Pucher & Buehler, 2019). People will not cycle if it is not safe to do it (Pucher & Buehler, 2019) The purpose of cycling infrastructure is to separate bikes from cars in order to provide safety (Pucher & Buehler, 2019). Which means that in absence of cars there is no need for any special cycling infrastructure.

Mobility demand and supply – The demand for mobility is finite. The more cars are allowed on roads, the more of that demand is supplied by cars. Mode choice is often connected to a financial investment and habit and as such does not change easy (Broaddus, et al., 2009). So limiting possibility to drive, especially preventing new drivers will allow cycling to fulfil that demand (Broaddus, et al., 2009).

#### **2.4.4 Effects of hyper-automobility**

The overall effects of auto-mobility are detrimental. On average globally 1.35 million people die each year, car crashes are a leading cause of death in age group 5-29, and in car dependent places like the USA in age brackets 1-55 (WHO, 2020). Every 26 seconds a person dies as a result of a car crash (WHO, 2020). Traffic induced air pollution causes around 3.6 million premature deaths yearly (Nieuwenhuijsen et al., 2022). Petrol used in transport accounts for 15% of global GHG emissions (Nieuwenhuijsen et al., 2022). Car produces noise pollution, causes significant decrease in life quality (WHO, 2020). The infrastructure that it requires occupies vast amounts of land making it unusable for other purposes and not permeable to water, contributing to urban heat island, floods and land scarcity (Conley, 2016). Automobility enabled urban sprawl, which is the most land and energy consuming type of human settlement ever created (Conley, 2016). Auto-dependency is used as a tool of racial, class and gender violence (Conley, 2016). In car-dependent households that can afford only one car, typically women, children, elderly and disabled people are denied accessibility to services and social network. Highways are used to create racial and class ghettos (Conley, 2016). Profits from oil extraction are found to coincide with rise of dictatorships, wars and terrorism (Conley, 2016). Finally, car interest coalition, including fossil fuels companies, knew about the severity of climate change and decided to withhold that information, and accelerated fossil extraction and dependency (Conley, 2016).

It is difficult to think about another object that harms humanity with similar severity. Therefore, it is not only an environmental but, first and foremost, a moral imperative to dismantle car and oil dominance.

#### **2.4.5 Sump model SUMP**

Across European Union, there is an increasing attention to SM, including more comprehensive cycling policy. It is partially caused by the popularisation of standardised Sustainable Urban Mobility Policy (SUMP). It is a local policy document that is necessary for a city (region) to

access funding for sustainable mobility from European budget and it is a standardised model of urban transport planning (Beria, 2012). SUMP includes the following key elements:

- Analysis of the current state of transportation,
- Vision, including goals and objectives for areas such as sustainability, safety, and accessibility,
- Set of resources and actions to achieve the vision,
- Monitoring and evaluation plan.

The plan is initiated by the local government which decides goals, resources and strategies towards sustainable mobility (Beria, 2012). It is a result of Urban Mobility package of 2013, a European Union's policy that has defined the concept of SUMP. Rupprecht Consult (2019) periodically publishes guidelines that serve as a framework for cities to base their SUMP on. Therefore, a rise in cycling policy became more common and standardised thanks to the introduction of SUMP that carries explicit recommendations for including cycling in mobility policy (Rupprecht Consult, 2019).

Jordova (2021) finds that the implementation of SUMP generally has a positive impact on urban mobility, including increased public transport usage, improved air quality, reduced traffic congestion, and improved public health. However, the success of SUMP implementation depends on several factors, including political will, stakeholder engagement, and available resources (Jordova, 2021)

In order to support development of sustainable mobility, with the support of the European Union a guideline to the development of SUMP was published (Rupprecht Consult, 2019). That advisory paper proposes a model of policy making, made especially in the context of sustainable mobility. This model is based on a policy cycle model, but is more nuanced and tailored to mobility policy. Importantly, it identifies 10 areas of political involvement (figure 8) on different stages of the process, such as resources allocation, vision building, target setting, and implementation and evaluation. This shows that the relationship between sustainable mobility and politics is constant (Rupprecht Consult, 2019).



Figure 8 - SUMP policy model (Rupprecht Consult, 2019).

## 2.5 Enablers of transition to cycling

### 2.5.1 Key elements in promoting the public acceptability of sustainable mobility

Corresponding to the need of addressing soft and orgware side of cycling policy, Banister (2008) provides a practical overview on how to design cycling policy paying attention to social and cultural aspects. The overview of key elements in promoting the public acceptability of sustainable mobility is presented below in table 2 (Banister, 2008).

Table 4 – Key elements in promoting the public acceptability of sustainable mobility. (Banister, 2008)

Element	Explanation and recommendation
Information	Propagating the need for sustainable mobility. Emphasising positive economic, social, health and environmental benefits. Using education, awareness campaigns and other social and mainstream media tools.
Involvement and Communication	Gaining support and understanding, selling it to the stakeholders.

Packaging	Creation of self-reinforcing push and pull strategies. When restricting car use, provide alternatives such as well-done programs to improve the availability, attractiveness and feasibility of PT cycling and walking.
Selling the benefits	Widely publicise benefits that broad parts of the society can support E.g.: Car drivers would benefit from less congestion, overweight rates will decline, everyone benefits from cleaner air and less noise, etc
Adopt controversial policies in stages	Support can be built up by positive outcomes and measurable improvements.
Consistency between deferent measures and policy sectors	Integrate all policy aspects, and a consistency message is key.
Adaptability	Current decisions do not need to restrict the future scope of possibilities. Plan for an uncertain future.

## 2.6 Summary and theoretical model

This literature review chapter aims to present and discuss existing research related to cycling policy, theories of policy and barriers to sustainable mobility.

The first section of literature review discusses two paradigms of mobility by comparing conventional mobility to sustainable mobility. As the rationality based on the conventional mobility paradigm is incompatible with a modal shift to cycling, in order to change mobility, the understanding of mobility must change as well. Next part explores the transition theory, which describes the shifts between socio-technical regimes. This theory fits the narrative of two paradigms of mobility and it underlines the importance of policy in that process. That forms the background for this research, as it positions itself in studying the transition between conventional and sustainable mobility.

Next fragment provides the context for the transition to sustainable mobility and cycling, how it is conceptualised and what the successful examples are. First, cycling policy, modal split and modal shift are defined, followed by an outline of the successful history of cycling in the Netherlands and Denmark, leading to a conclusion that in both cases the social support was crucial to change the course of policy. This history highlights the power of citizen pressure in mobility planning which results in changes in the mobility vision. The Dutch and Danish planners had developed the best set of planning and design measures to support the development of cycling mobility. Pucher & Buehler (2008) provide an overview of that planning practice in a framework called *Making cycling irresistible*. Anaya-Boig (2021) creates an overview of multiple elements of successful cycling policy including social and institutional

perspective. This knowledge gives background to studying cycling in Milan and allows to think which processes are transferable.

Next section reviews relevant theories related to policymaking, including the multiple streams model, policy cycle and the coalition advocacy framework. It concludes that political support, as well as pressure, is very influential to policy setting on multiple stages of the process. The SUMP model offers a tailored approach to strategic policymaking for sustainable mobility based on the policy cycle model. The relationship between policy and politics is then analysed through various theories such as Public Choice Theory, Spatial Theory, Resource Dependence Theory, and New Institutionalism. These theories suggest that policy outcomes are influenced by factors such as politicians' self-interest, spatial distribution of resources and power dynamics, access to resources, and the interaction between institutions, informal norms, and political actors. Having these theories of policy laid out allows to critically assess policy mobility policy and to reflect on political and institutional aspects. Since policy is crucial in the transition to sustainable mobility, it is central to this research.

The subsequent section focuses on the barriers to sustainable mobility. It discusses different frameworks of barriers that impede the take-off to sustainable mobility. The Banister's framework is chosen as the most suitable for this paper as it is the most comprehensive and flexible. Its use allows for systematic approach to address the main goal of this research – finding barriers to cycling and cycling policy, which then relates directly to the transition to sustainable mobility.

Then a vicious cycle of automobile dependency is presented, describing the effects of car-based mobility on other aspects, most importantly marginalisation of other modes, and its self-reinforcing properties. I elaborate on marginalisation of cycling by driving, concluding that safety concerns are the most prominent barrier preventing people from cycling. Limiting cars is very much crucial in mobility policy and can be a significant barrier to the transition.

Finally, the chapter presents a theoretical model (figure 9) that integrates the main concepts in the following way. First, it places this research in the context of the transition theory, more specifically in the transition to sustainable mobility. It zooms in between the pre-development and take-off phases, and focuses on policy as a catalyst of transition. The main part of this model consists of the aim of the paper, which is finding barriers that obstruct the modal shift to cycling. Moreover, these barriers are linked to the policy, as following the transition theory I believe that addressing the barriers to cycling policy is a priority. To do that I use Banister's framework of barriers to sustainable mobility. Next, linking to sub-questions I suspect that the root cause of these barriers lies in both the dominance of the conventional mobility paradigms as well as in the political context resulting in a power distribution that is unfavourable to cycling. All in all, understanding existing barriers can help to overcome, and in a greater view, facilitate the transition to sustainable mobility.

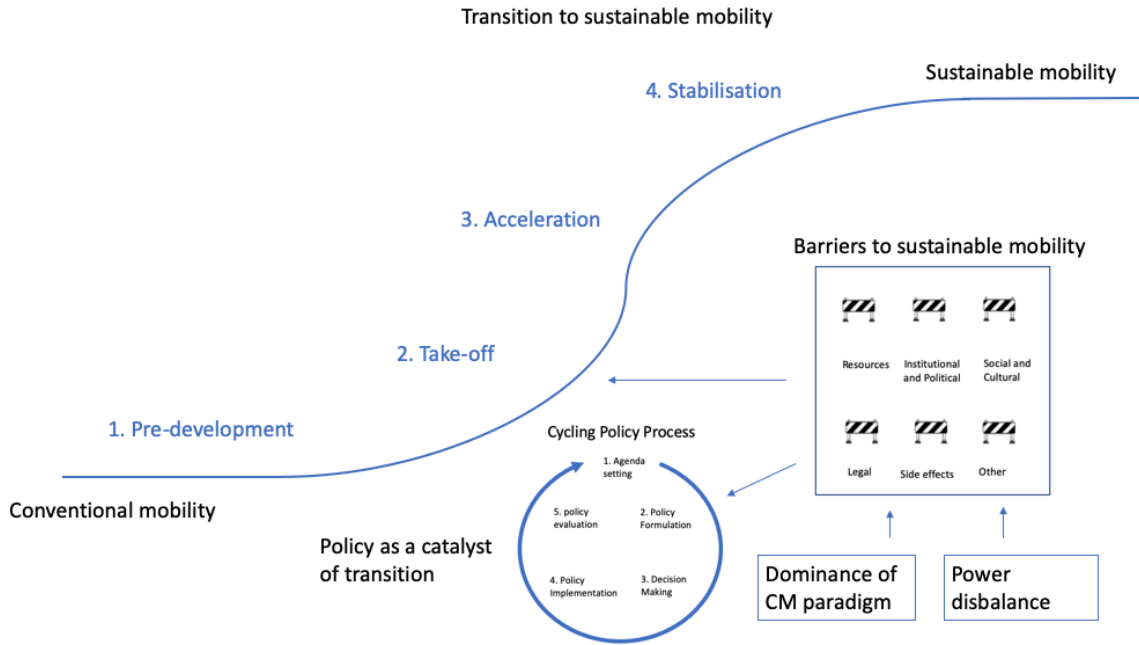


Figure 9– Theoretical model

## 3 Methods

### 3.1 Case study description

Milan is the second biggest city in Italy with a total metropolitan area population of 3 million inhabitants. With a population density of 2780/Km<sup>2</sup>, it is similarly populated to Copenhagen. It has a car ownership rate of around 500 cars per 1000 inhabitants (Municipality of Milan, 2020). Milan is the second regional capital after Venice with such a relatively low number for Italy. However, it is high in comparison to other European cities (Armondi & Simonetta, 2018). Additionally, Milan is one of the most polluted cities in Europe with an average annual concentration of fine particular matter of 19.8 units. It is four times over the safe limit of 5 units recommended by the WHO (EEA, 2020). It means that a transition to sustainable mobility is needed not only on the environmental and social level but crucially also on the level of health and life quality.

### 3.2 Research Design

This research is a single case study, spatially bounded to the Municipality of Milan, it describes the process of transition to cycling. The data selection is based on the theory of triangulation. To strengthen the validity of findings, three sources of data are being used. First and foremost, the data comes from a series of in-depth interviews with purposefully selected local experts who are knowledgeable about the subject of research. Secondly, this is complemented by policy document analysis and field observations that are used to observe and experience the physical results of these processes. The rationale for choosing those methods was to gain in-depth and nuanced understanding.

### 3.3 Data collection and plurality

In-depth interviews with eight expert participants are the main data source of this research. Following a standard practice for a qualitative study, it uses a purposeful sampling method, understood as a deliberate selection of specific participants with a purpose of accessing their knowledge or experience about the researched topic (Punch, 2014).

The method for identifying potential participants used in the paper involves stakeholder mapping method to identify individuals and organisations that are involved or knowledgeable about mobility in Milan and then reaching out to them. Moreover, it is desirable to involve different parties that are on diverse sides of the debate. The rationale for the multi-perspective approach is to gain a full, nuanced perspective. That is helpful for increasing validity, for instance by reducing impact of biases, such as the *self-serving bias* – a difficulty to see one's own responsibility for mistakes and *in-group bias* where one protects the members of their group (Punch, 2014).



### 3.4 Stakeholder mapping and the triangle of governance.

To ensure the plurality of perspectives and to reflect on participants' positionality I choose to use the tool of the triangle of governance, created by Abbott & Snidal (2009) to map the participants (figure 10).

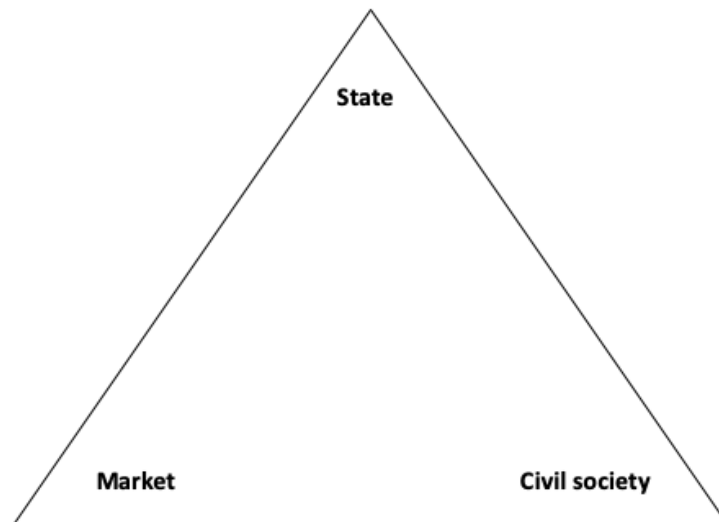


Figure 10 – Triangle of governance (Abbott & Snidal, 2009).

The triangle of governance is a conceptual tool that defines governance as an interaction between three sides: the state, the market and civil society. This model allows to situate the actors in order to illustrate and reflect on their position to power; secondly, it enables to illustrate and analyse the interdependence between involved stakeholders in a given governance context (Abbott & Snidal, 2009).

This tool is usually used in the literature to map organisations and processes, however, I attempt to test if the tool is suitable for mapping individual actors as well. Therefore, this research introduces a unique approach to ask participants to self-identify their professional position on the triangle of governance. The rationale for using this tool is to illustrate plurality of perspective that involves the three areas and to group as well as reflect on participants' answers through their position. Moreover, using the triangle of governance, a researcher can reflect on the position of participants in relation to others and to power, still protecting their anonymity, not naming their exact position.

### 3.5 Overview of participants and analysis

Eight local experts with knowledge about mobility in Milan have taken part in this research. Below their professional position is presented and mapped on the triangle of governance (Figure 11 & table 5). To ensure their anonymity only their participation code (P1-P8), their

imprecise professional position (agreed on in informed consent form) and their position on the triangle of governance is shown.

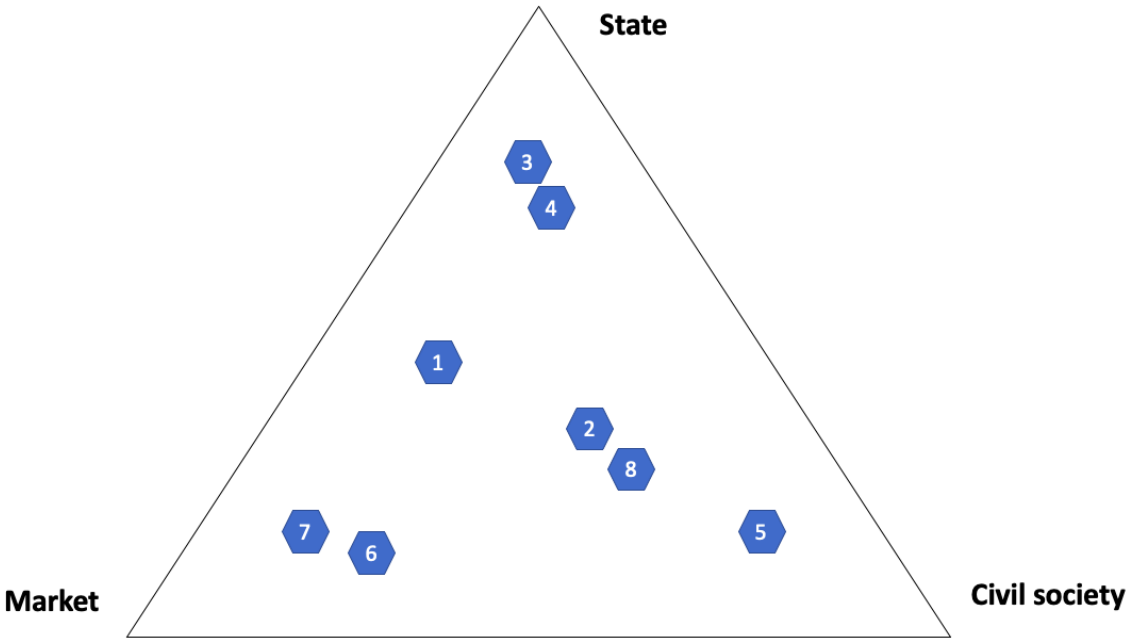


Figure 11 – Research participants on the triangle of governance

Table 5 - Overview of research participants

Participant’s Code	Position
P1	University professor and consultant
P2	University professor
P3	Representative of municipal transport planning agency
P4	Urban planner in municipal agency
P5	Journalist and political activist
P6	Founder of local mobility and planning consultancy company
P7	Representative of international cycling company
P8	PhD student researching urban mobility in Italy

All eight interviewees are local expert participants. This research managed to achieve certain plurality of views by including participants associated with the local government, academia, market and civil society. The interviews are semi-structured and based on an interview guide

(see appendix) and are divided in four sections following the empirical research sub-questions. First, the interviewees were asked about their experience and what their job entails. Next, they were asked about their organisation and its objectives in the context of mobility planning. Then, the interviewees were asked to assess current stage of transition to cycling in Milan and what they see as a successful example. Next, they were asked about the barriers to cycling in the form of an open-ended question. If they were not listed, participants were further asked about barriers from Banister's framework and asked to identify whether they perceived this barrier to be relevant to this case. Next, the participants were requested to indicate the primary barrier and, finally, they were asked about possible solutions and advice to the municipality.

All recordings were audio-recorded, three of them were conducted in person and five online. The interviews were transcribed using voice recognition software and checked manually. The relevant information is identified and grouped using coding method and Atlas.ti software.

### 3.6 Observations and policy analysis

The observations and policy assessments are secondary methods used to achieve data triangulation for higher validity and bias reduction. The policy assessment aims to paint an overview of existing policy situation, the scopes and ongoing trends in cycling planning in Milan. Table 6 below presents an overview of documents that are analysed.

Table 6 - Overview of policy sources

Name	Institution	Publishing Year
PUMS for Milan	Municipality of Milan	2018
Cambio - Cycling Plan for Milan (Il Biciplan della Città Metropolitana di Milano)	Municipality of Milan	2021

The observations are used to assess the results of the policy, for instance, the cycling infrastructure. It is done to analyse and critically evaluate results mentioned by the participants e.g. perception of safety or the policy-behaviour gap. Therefore, field observations were conducted in places mentioned by the participants, to observe infrastructure and people's behaviour. Photos taken during observation session help to illustrate some of the context-specific issues and examples mentioned in the interviews are used in this paper.

### 3.7 Ethical considerations

Conducting social research requires a cautious assessment of research ethics. Given the fact that planning is inherently a political act, it might be perceived as a controversial matter, hence this research attempts to create the most truthful and respectful representation of the

situation and the perspectives shared by the interviewees. This is essential not only from the ethical point of view, but also crucial to obtaining valid results.

Following that approach, before each interview the participants were presented with an informed consent form (see appendix) which clarifies the data collection and data storage process, informs about participants' rights, and enables them to decide on their level of anonymity. All of the interviewed experts chose to be addressed by their non-precise position. Due to the use of an imprecise position and placement on the triangle of governance, a balance is created between transparency and identity protection.

In addition, it is important to consider the researcher's outsider position, devoid of personal interests and familiarity with the local context. A clear power relation is visible between the researcher and the expert interviewees, and as a result the researcher sought to maintain balance with a respectful yet critical and truthful approach. During the research process, I actively questioned my responsibility and position, which raised the concern that I might have imposed my opinions on the participants while interviewing them, as discussed in more detail in the reflection section of the conclusion.

In conclusion, this research was structured to be as objective as reasonable and within the capacity of a master's thesis. This is done by including various perspectives and openly considering the position of the participants and the researcher. However, there is a personal bias and agency of a researcher that might still affect this paper, yet I have determined it to be acceptable.

## 4 Results

This chapter presents and discusses the results of data analysis and is organised by research sub-questions.

### 4.1 Current stage of transition to cycling in Milan – policy and participants' assessment.

#### **4.1.1 Policy goals and strategy**

In recent years, cycling has been increasingly incorporated in mobility policies in Milan. In 2018 Municipality of Milan has adopted its first Sustainable Urban Mobility Plan, a comprehensive strategic policy that sets the city's mobility ambitions until year 2024. The goals of that policy are presented in the table 7.

Table 7: Aims of SUMP (Municipality of Milan, 2018)

Indicator	Unit of measurement	State of affairs	Business as usual scenario	Plan target
Modal share of internal trips by public transport	%	56.7%	58.1%	63.0%
Modal share of intermodal commuting by public transport	%	36.8%	38.2%	43.7%
Modal share of internal trips by bicycle	%	5.7%	6.0%	7.1%
Motorisation rate (passenger cars)	Number of cars/1000* inhabitants	518	-	460

The ambition to go from 5.7% of cycling modal split to 7.1%, decided before 2018, while representing a significant 25% increase in the goal, is far from a cycling revolution (Municipality of Milan, 2018). However, it was the first document that set binding cycling goal in its strategy and it provided budget and tools to achieve that. Additionally, SUMP has aimed at reducing motorisation rate, and in spite of a conservative aim, is an important step forward.

In 2021 another cycling-related document was published: *Cambio – the cycling plan for Milan (Cambio - Il Biciplan della Città Metropolitana di Milano)*. This cycling-specific document sets a new goal of 20% of modal shift in 2035. Contrary to SUMP, this is a very ambitious goal, even considering its prolonged timeframe. *Cambio* plan is a tactical document with a specific action plan, and it is focused on infrastructure. Its main strategy is based on creation of 16 protected cycling corridors from the outskirts to the city centre and 4 circular routes connecting them. It amounts to combined 750 km of cycling infrastructure (Municipality of Milan, 2022; figure 12). Achieving this would create a comprehensive network of cycling infrastructure, linking the city core with its suburbs.

## Cambio

### LA RETE DI CORRIDOI CICLABILI DELLA CITTÀ METROPOLITANA DI MILANO

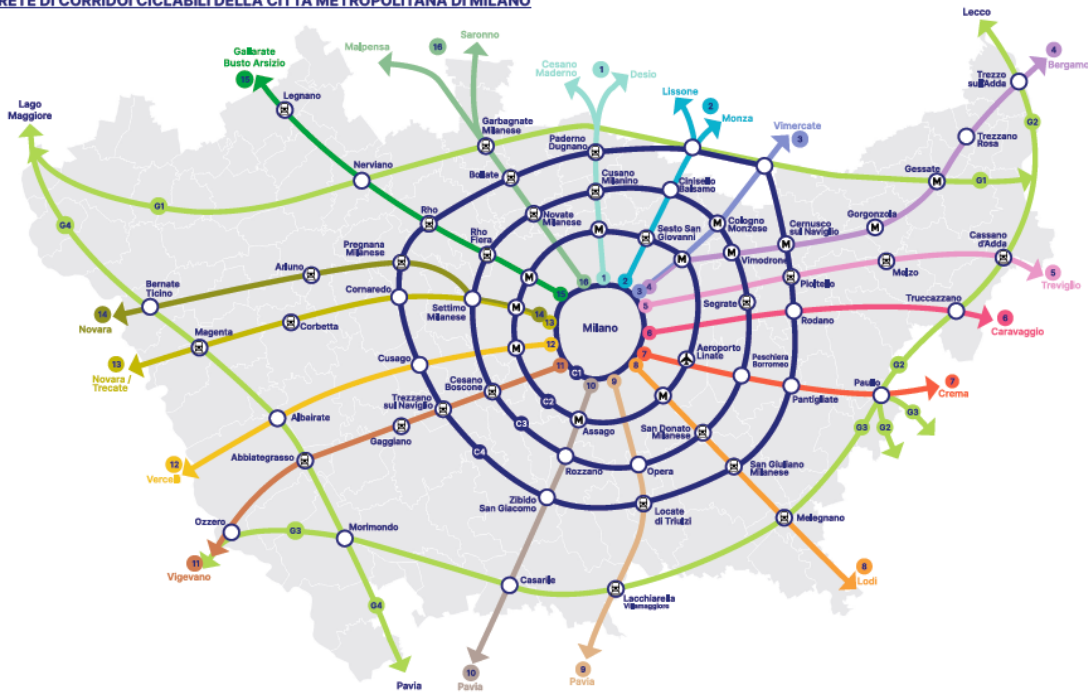


Figure 12: Cycling corridors in Cambio plan (Municipality of Milan, 2022).

Currently (as of 2023), there is another SUMP being prepared, scheduled to be adopted in 2024. It is a document that will shape the mobility planning for the next decade, and has a potential to deliver the other missing aspects of integrated cycling policy complementary to the infrastructure-centred *Cambio* plan.

The mobility policies show the increase of interest in cycling. Starting from a goal indicated in SUMP of 7% modal split, it is sign of limited but significant political commitment to cycling. This commitment expands to another policy document, a non-binding cycling plan, where a new goal was defined as 20%. It is a very ambiguous goal; however, it is focused mostly on the infrastructure, which raises suspicion on its effectiveness. With the next SUMP prepared for the period of 2024-2035 there is a possibility to address those challenges. Therefore, the final date set in the *Cambio* plan of 2035 might have been purposely chosen to co-align with the new SUMP.

#### 4.1.2 Progress towards cycling – assessment by research participants

While cycling is increasingly present in policy goals, including the ambitious goal of 20% modal split, progress on the ground seems to be lagging behind. Since the objective determination through measuring mobility split is not available due to a lack of secondary data, the assessment this research provides is based on the interviews with experts. This approach delivers different perspectives on the matter, allowing to paint more complex picture, however, possibly subjective to bias. The participants were asked to assess the process and to give a successful example, the synthesis of these results is presented in the table 8.

Table 8: Overview of assessments given by research participants

Participant	Assessment of progress towards increasing cycling in Milan	Example of a successful cycling project
<b>P1 – University Professor and Consultant</b>	Progress with visible but limited effectiveness.	Cycling lane on Corso Buenos Aires and Viale Monza
<b>P2 – University professor</b>	Slow improvement, inadequate pace.	Bike sharing, temporary cycling lanes through tactical urbanism
<b>P3 – Representative of municipal transport planning agency</b>	It is going very well.	Cycling lane on Corso Buenos Aires and Viale Monza
<b>P4 – Urban planner in municipal agency</b>	Slow but consistent progress.	Pop-up bike lanes – tactical urbanism
<b>P5 – Journalist and political activist</b>	Slow progress, not enough car limiting policies.	Pop-up bike lanes – tactical urbanism
<b>P6 – Founder of a local mobility research and planning company</b>	Inadequate and bad.	Good ambitions and plans but few examples of good implementation; Tactical urbanism
<b>P7 – Representative of an international cycling company</b>	Very slow progress, the city is a disaster to cycle in.	Bike sharing
<b>P8 – PhD student researching urban mobility in Italy</b>	Limited progress, slow and not enough.	Cycling lane on Corso Buenos Aires and Viale Monza

All participants acknowledge that there is progress in cycling-friendliness comparing to the past or to other Italian cities. The progress is identified in two areas: first in the political attention, for instance in policy, and second in some successful pro-cycling projects in the city. Participants closer to the state on the triangle of governance (P1, P3 and P4) tend to be more positive towards the progress. According to them, in terms of the goals set by policy they are on track.

However, other participants indicate the pace of change as unsatisfactory and underline its unequal distribution. For example, they stress the lack of coherent network of cycling infrastructure, calling it *cycling patchwork* instead of cycling network (P2). Participants associated with the market (P6 and P7) are most critical towards the pace and scope of the improvement.

#### 4.1.3 Breakthrough during the pandemic

All participants have reported a breakthrough that happened during the pandemic. There was a rapid progress towards cycling that was achieved in relatively short time. In that period, many tactical urbanism schemes have succeeded. For example, a successful project of tactical urbanism called *Strade aperte (Open Streets)* and *Piazze aperte (Open squares)*, focused on freeing public space from parking and traffic and offering it to the local community (figure 13). It results in decreased car speed and overall traffic, selective permeability, additional bike

parking, and more pleasant environments (P4). Other than public squares, tactical urbanism also included numerous pop-up cycling lanes, car parking removal and planting of plants. Another successful cycling development that is frequently mentioned by the participants is the continuous cycling connection on Corso Buenos Aires and Viale Monza (figure 13).



Figure 13 Piazze Aperte (Municipality of Milan, 2021)

This project was especially controversial as it is a busy shopping and traffic street. Participants report strong backlash from the shop owners, even though the cycling lane replaced just one extra lane used for illegal parking. As P1 reports, in the case of Milan, informal parking is prevalent and cycling infrastructure is often in conflict with informal rather than formal parking or traffic space. Research participant P3, who was involved in this project, provides the following reflection:

*The first intervention was really symbolic because we never thought before that we can do it, because there's too much traffic on it. But then without the cars during the lockdown we did it. We have measured it three times a week for years. Before and after the intervention. And we have a huge growth from the 5% of cycling modal split before the (cycling) infrastructure, we arrive during the pandemic to more than 20%. And then we never go back under the 15% (P3).*



Others participants also report successes during the pandemic and a general increase in cycling across the city. However, after the pandemic the mobility system started returning to status quo and the progress in cycling projects has slowed down, and cycling levels are observed to be going down.



Figure 14 – Separated cycling lane on Corso Buenos Aires

#### 4.1.4 Current stage of the transition – discussion

This section aims at finding current stage and context of the transition to cycling in Milan. Linking these results back to the transition theory, it seems that the transition to cycling has started to quickly accelerate during the pandemic placing it in the second phase of the transition – take off. However, the pandemic was followed by backsliding, significantly decreasing the speed of the transition, forcing it back somewhere between the pre-development and take off.

A specific relationship between progress in cycling and the pandemic was found. It seems that during the pandemic some previously dominant barriers vanished, allowing for fast progress towards cycling. Referring to the Kingdon's model, the loss of barriers and the fast success of cycling projects has created an opportunity to open a policy window to pass the *Cambio* plan with a 20% goal of cycling modal split. It also shows that the window of opportunity is temporary and circumstantial. Therefore, other than the new policy, the most flexible tool – tactical urbanism – has proved to be very useful in the context of a short opening of a window of opportunity with fast and low-cost interventions, many of which have been very successful.

However, after the pandemic, the mobility is returning to a similar situation to the pre-pandemic status quo, slowing down progress and reducing cycling levels in a process called backsliding. The analysis of this period gives a unique possibility to witness a barrier to mobility diminishing for the duration of a lockdown and then returning. Moreover, it shows the indirect and unintentional power of policy – the lockdown which was a result of a healthcare emergency that has heavily disturbed the mobility system, unintentionally diminished barriers to cycling. Because of that a window of opportunity to start the transition opened which resulted in a new cycling policy – *Cambio* and successful projects, such as *Strade aperte*. Moreover, the reversion to the mean, which occurred after the pandemic, shows that the window of opportunity does not ensure the successful transition itself, and it is just the first step. The next chapter focusses on identifying, understanding and discussing barriers to cycling.

## 4.2 Barriers to achieving modal shift in Milan

### 4.2.1 Findings overview

This section of the results chapter presents and describes what the barriers to improving cycling in Milan are. The empirical data is presented on the previously discussed framework of barriers to sustainable mobility (Banister, 2008). Table 9 shows the results in the following order: the first column presents a barrier label, the second a description. The third one represents these participants who indicated the barriers as relevant. The fourth column shows paraphrased examples provided by the participants. The fifth one represents the participants who indicated the barriers as prevalent. The following results are a combination of the analysis of the data and the analysis of the process that happened during the pandemic

Table 9 - Overview of results - barriers to modal shift to cycling in Milan

1. Type of Barrier (Banister, 2005)	2. Description (Banister, 2005)	3. Indicated as relevant	4. Examples given by participants	5. Indicated as the main challenge
<b>Resource</b>	Lack of adequate financial or physical resources available	P1, P2	Lack of designated budget for sustainable mobility from the central government (P2)	
<b>Institutional</b>	Problems with coordination between departments and conflicting policy	P1, P3, P5, P6	Difficulty to coordinate between municipalities (P3)	
<b>Political</b>	Lack of political will	P2, P5, P6, P7, P8	Political aversion to remove cars (P2) Lack of vision (P6) Lack of cycling coalition or an interest group to counterbalance car lobby (P2, P5)	P2, P5, P6, P7, P8
<b>Social and Cultural</b>	Lack of social acceptability	P1, P3, P4, P5, P6, P7, P8	Competition for the public space (P3) Backlash from the business owners and drivers (P7) Lack of understanding benefits of cycling (P8)	P3, P4
<b>Legal</b>	Conflict with existing laws and regulations	P1, P2, P3	Lack of cycling infrastructure in the highway code (P1)	
<b>Side effects</b>	Effects on other activities	P3, P6	Possibility of more accidents with bikes (P6)	
<b>Physical</b>	Restriction of space and topography	P1, P3, P4	Conflict for space with car parking (P1)	P1

### 4.3 Primary barrier - socio-political

The results of this analysis indicate that the main barrier to cycling is the strong position of the car, which blocks attempts to decrease its usage. It is an outcome of a combined socioeconomic process.

In the interviews five participants have pointed to the political barrier as both a significant and a major barrier to transition to cycling. Given examples cover a range of problems, such as lack of leadership and determination, and the power disbalance.

Seven participants indicated social and cultural barriers as significant and two indicated it as the main barrier. As example they name a conflict over space between car users and cyclists, lack of understanding of the benefits of cycling and resistance from drivers and shop owners.

Upon considering these examples, I find that they all result from the same underlying process. The issue of car-dependency runs through the entire theme of transition to cycling and to SM in general. It relates directly and indirectly to most other barriers. It is particularly strong in the context of Milan, where physical capacity of the public space is overextended by heavy car traffic and parking, therefore reducing number of cars is necessary to substantially increase cycling. In words of P8:

*The space is too limited to accommodate current level of driving and parking with safe and pleasant cycling. It can't be done (P8).*

The theoretical motion of interdependence between car and bike was proven in the context of Milan. The main evidence is the flourishing of cycling projects and the usage of bikes that happened during the pandemic when the demand for automobility was lowest. With that unusually low level of car usage, a vast progress towards cycling was achieved in a relatively short time. The strength of that barrier is further demonstrated when the mobility returned to car-dominated status quo and the progress towards cycling lost its momentum. This means that increase in driving causes backsliding in transition to cycling. The research participants indicate that relationship by strongly emphasising the acute conflict over public space and the crucial issue of road safety. Participant 3 gives an example of the conflict over public space:

*The difficulty is the competition for the public space. Who wants more neighbourhood use, like for walking, for cycling, and people who need to use the car park to go around the city. And this is a challenge to build the opportunity for the people who don't use the private car. This is very, very difficult (P3).*

In line of that, multiple participants (5 out of 8), are concluding that the best pro-cycling policy for Milan, at this stage, is to limit car usage. All of them, however, express that it is difficult due to the complex relation of cars to society and politics. Furthermore, the participants

indicate that it is not the idea of increasing cycling that is contested per se, but the idea of reducing cars.

Next to the main socio-political barrier, this research also finds other secondary barriers. While the main barrier is most influential, especially on this stage of transition, other barriers can also influence and hinder those attempts. Below are presented the results on each barrier from the framework.

## 4.4 Secondary barriers

### 4.4.1 Resources

In general, the participants were not concerned about the lack of financial or any other resource at this stage. Only two participants indicated it as significant. The participant P1 said that in the future this might be a problem as redesigning existing infrastructure can be very costly. Another participant said that, while there is far less money invested in cycling compared to other modes, it is a result of a lack of political support rather than general limitation of resources (P2). A realisation that allows to link this barrier to the primary barrier.

### 4.4.2 Institutional

Acknowledgment of institutional barriers is shared by four participants. There are two ways in which it is manifested. First is the lack of intergradation between departments resulting in *watered down responsibility*. The other is divergence in aims, political allegiance and lack of integration between neighbouring municipalities.

### 4.4.3 Legal barriers

Three participants indicated legal barriers as relevant. This is manifested by a lack of inclusion of cycling measures in existing codes and regulations. Participant 1 explains it in the following words:

*The highway code sets out road design and the elements of the road, if the type of cycling lane is not included in the manual, you cannot do it because if someone gets killed, you, the civil servant are responsible for that. So no one is doing something that is not legalized by the highway code (P1).*

P4 says that the legal limitations were one of the reasons why tactical urbanism was chosen as a tool, as temporary modification are less regulated and easier to implement. However, the participants indicate that this is changing, and there are progressively more amendments to the highway code and other documents that include cycling infrastructure. Moreover, the highway code is dependent on the central government, rather than local.

#### 4.4.4 Side effects

Side effect barrier was indicated to be relevant by two participants and they both provide the example of safety. As there are more cyclists on the roads, there is an increased possibility for conflict with cars, and in absolute numbers, more accidents tend to happen. Especially P3 says that this is very much something that they, as a public agency, are concerned with.

#### 4.4.5 Physical

Three participants indicate physical barrier as relevant and Participant 1 specifies it as the main barrier. He states it is the scarcity of space in the city that makes accommodating both cars and bikes difficult. This concern was commonly reported by other participants as a belief often expressed by many inhabitants and stakeholders. Interestingly however, most of other participants do not believe that this is the root barrier, as participant 6 summarises when asked about it:

*No! It's never a matter of lack of space. It is a matter of how you imagine the usage of space (P6).*

Which again links this barrier to the primary barrier.

### 4.5 Barriers to cycling transition – discussion

Banister's (2008) framework proved to be useful for anticipating barriers, but it needed to be adjusted to paint more nuanced picture of this specific context. It provides a structured and relevant list of potential problems as all of listed barriers were found relevant to research participants who identified them and gave relevant examples in the context of Milan. However, there were areas where this framework was not specific enough, areas that are critical for this paper. For example, as a result of information collected, I decided to separate previously merged categories of *Political & Institutional*, and *Physical & Others*. That was done in response to barriers reported by participants that seemed to have different roots and therefore needed to be addressed separately. For example, institutional barriers such as difficulty to cooperate between municipalities, are partially caused by a lack of established regulations on how to integrate a policy, while political barriers are found to be resulting from a socio-political context. Moreover, participants often linked political barriers to the social ones, sometimes forcing dilemmas on researcher, how to categorise given examples. For instance, lack of cycling coalition, which was identified as a political barrier, is connected to the backlash from car owners who fear decreased accessibility. This was identified by different participants either as a social barrier or as a physical barrier, explained as a competition over limited public space.

All these aspects are different sides of the same phenomenon, linked to high dependency on car-mobility and its political consequences. And this has proven to be the strongest, as well as

the most complex barrier. Therefore, in constructing the answer to the research question on barriers to sustainable mobility, I step out of self-imposed limitation of Banister’s barriers and argue that the primary barrier to limiting cars is a complex socio-political process that makes limiting cars, a step necessary to transition to cycling, very difficult. Based on these findings, a concrete socio-political relationship emerges. To illustrate this relationship, I propose a following model of Socio-Political Vicious Cycle of Car Dependency, an original model inspired by, and complementary to, the Vicious Cycle of Automobile Dependency. This model, however, is focused on socio-political context of support and power (figure 15).

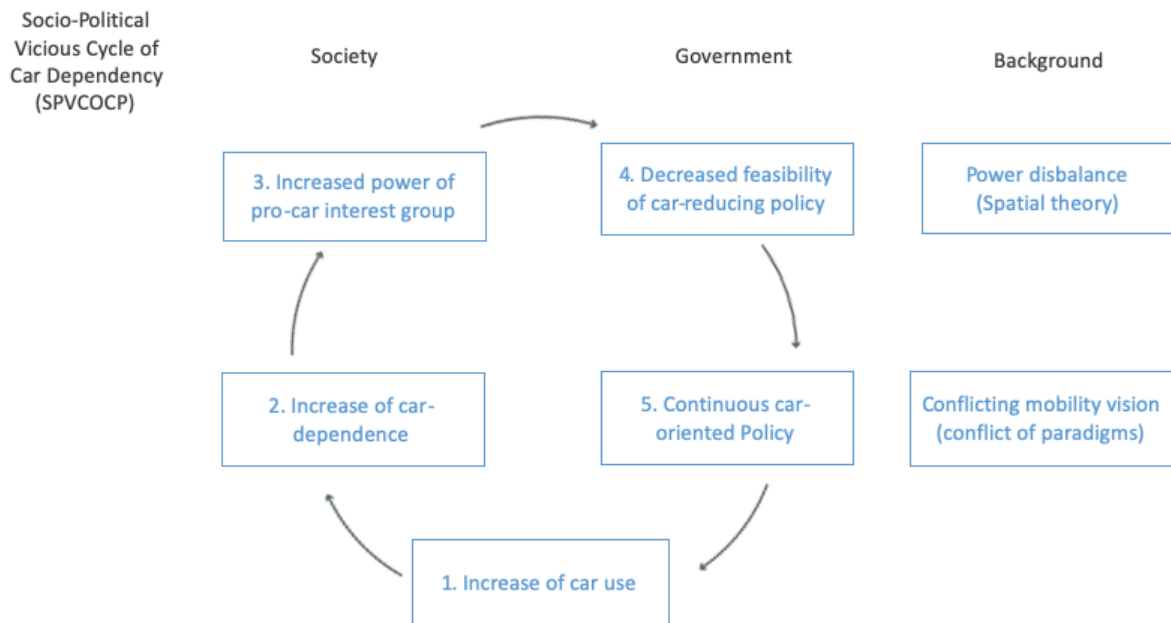


Figure 15 - Socio-political vicious cycle of car dependency

The incapacity to limit cars is a result of a vicious cycle consisting of self-reinforcing socio-political interdependences. The process is divided in 5 main elements and discussed on the study case of Milan:

1. High car usage – the status quo is a high level of car-dependence, motorisation rate of 52% (Milan municipality, 2018). Great number of residents depend fully or partially on the car, while cycling is marginalised, vast majority of public space is occupied by traffic, legal and illegal parking.

2. Increased car dependence causes a lack of social support for a change to sustainable mobility. Car users do not support car-limiting policy. They mostly do not see the value for themselves in transition to sustainable mobility, and do not imagine changing their behaviour. Moreover, due to the current level of marginalisation of other modes, they associate the loss of the car with a loss of accessibility. P8 gives the following example:

*If you go to work by car every day you don't see how restricting (cars) will help you. You don't imagine yourself cycling because it would be easier. No, the people like that feel that they are attacked when we propose that (P8).*

This reaction shows the lack of popular sustainable mobility vision, as residents do not know or do not believe that the SM will not harm their accessibility. While it is counterintuitive to oppose sustainable mobility knowing its vast benefits and the costs of negative externalities of automobility, this is reported to be a dominant perception in Milan. Next, the dominance of conventional mobility paradigm, where the idea of freedom and status which is attached to a car is prevalent. Finally, the status quo bias, where any change is hard to achieve in a complex issue like mobility.

3. High car-dependency and low support for change leads to increased power of pro-car interest groups and low social power of the cycling coalition. High number of car-users, the powerful car-manufactures and oil lobby create a huge power disbalance and pressure on government and the society against shift to sustainable mobility. The history of cycling shows that both in the Netherlands and Denmark social pressure was necessary to change the policy direction.

4. Without pressure, the local government does not feel empowered to pass progressive car-reducing policy. Participant 6 provides the following example:

*The main issue is convincing the administration that what has been done somewhere else can be done also in Milan. If you see it, what was done in Paris or in Berlin, or even in Valencia. In Milan that's not the priority, right? So, the main issue is really the lack of political will. They don't want to have a cycling city (P6).*

That corresponds to the public choice theory and the spatial theory, as the power misbalance makes it impossible to push policy that is controversial with voters and existing power structure.

5. That results in a continuous car-based policy without making a necessary step of limiting cars. This approach is summarised by P1:

*The idea of moving by bicycle instead of the car is not the main idea of our urban policy. Our urban policy is to use the bicycle without leaving the possibility to use the car (P1)*

Which will have limited effectiveness as it does not address the main 3 issues: conflict for space, safety, and demand for cycling. As P8 said:

*It is not possible to have both: the current numbers of cars and the sustainable mobility. One must go, and it shouldn't be a difficult decision when one kills children and makes air cancerogenic and another makes you lose fat! (P8)*



Finally, the circle is completed, with a mobility policy that is designed to not disturb automobility. The lack of a progressive car-curbing policy results in a further increase of car usage as other modes are marginalised.

#### **4.5.1 Conflict of paradigms**

This research identifies the dominance of a conventional paradigm of mobility as one of the two main underlying causes which impact the societal attitude and policy. The conventional mobility paradigm, is a rationale for upholding the status quo of car-dominant system. In the dominance of that paradigm even envisioning the transition is difficult, as P2 says:

*It is politically difficult to remove the cars, even to imagine that change. It difficult for them to imagine what a pleasant revolution is for people (P2).*

The conventional mobility paradigm has been dominant in the last decades across the Western world, also in Milan. Here are examples from the interviews of how that rationale manifests itself in thinking about mobility on the example of Milan:

*Cars are seen both by residents and the state as the default mobility choice, a necessary tool of going about the daily life as well as a bloodstream of business (P2).*

Participant 5 brings attention to the understanding of the role of governance as an engine of economic growth. In the idea of the cities as growth machines, both private cars and delivery trucks are seen as necessary to achieve that.

Participant 8 says that the conventional understanding of mobility planning is focused on commuting, especially on bringing people (traditionally men) from suburbs of the city straight to the business districts. This creates a situation in which the 'fast' traffic is accommodated at the cost of local accessibility, performed more by women, children and the elderly.

P5 underlines that cycling suffers from so called 'weak profile' where the benefits of cycling are often framed as a novelty and recreation option, rather than seriously considered as an alternative to car transport. Bikes are considered toys, while cars are a the only 'serious option'.

P1 says that it is unreasonable to expect a number of cars to drop below a certain level as they are necessary, the only real possibility is to decrease on-street parking by providing underground parking.

All these aspects make sense according to the rationality of conventional mobility paradigm. When aiming at growth speed and capacity, the idea of reducing the number of cars seems irrational. The arguments of liveability, sustainability and human scale does not hold against

the arguments of efficiency, capacity and growth. Looking at the conventional mobility paradigm through a critical lens it becomes apparent that it is a product of its time, it is a man-centric, hyper-consumption and material-oriented model of mobility. The sustainable mobility paradigm can challenge those presumptions, presenting a vision for a new mobility system.

However, it is crucial to mention that while in the academic literature these rationalities are presented in a binary way, the reality is more nuanced. The need for creating a new vision is being realised by the activists and practitioners who do not talk of the paradigm shift but do it one step at a time. They focus on values that are related to this rationality, such as accessibility, sustainability, safety. It is visible especially in urban planners working for the municipality, who function in both of these contradicting rationalities, slowly trying to change the status quo by mixing different aspects of those rationalities in their work.

#### **4.5.2 Power disbalance**

Another underlying cause for sustaining the vicious cycle of automobility is a problem of power disbalance. This issue is directly relating to step 3 and 4 of the vicious cycle. That corresponds to the spatial theory, which sees policy as a result of local power landscape. The history of Dutch and Danish transitions to cycling illustrates that bottom-up pressure has the power to reverse the policy direction away from car-dependent mobility. This aspect additionally corresponds to the stream of politics in the Kingdon's model.

In the context of Milan, the power relations are set in the following way. Cycling advocacy does not have a strong backing, due to both the fragmentation of cycling business, e.g. cycling shops are mostly small, and the fact that cycling manufacture is far less powerful than car, oil and commercial interest groups. As P5 says:

*Cars in northern Italy are untouchable. In Milan in particular. There is a lot I can say lobby working for automotive boards... it's very powerful here in Milan. (P5)*

All in all, it is the power that shapes the policy, and as such a strong change in policy direction is only possible when the forces that favour it hold enough support. There is an inherent advantage of the forces that favour car-dependency due to a heavy concentration of financial and political power in hands of car and oil industry. However, learning from the history, it is the popular social support that has the power to overcome the power misbalance, especially in the time of an open window of opportunity, such as the oil crisis of the 70s or the energy crisis of 2020s.

## **4.6 Overcoming challenges**

Having recognized the primary barrier, this chapter explores what can be done to overcome it. The overview of those results is presented in Table 10.

Participants' recommendations are centred around increasing the understanding and supporting sustainable mobility. This corresponds to the conflict of paradigms, and the need to create a popular vision. According to the participants there is a capacity to involve residents, especially children, in the process of democratic vision building. A vision that answers the fears of decreased accessibility and one that is attractive and exciting, so it does not feel imposed on them.

Table 10 Overview of results – Overcoming barriers

Participant's Number	What is needed to move towards cycling?	Advice to municipality
P1	To lessen the conflict with car owners it is needed to build more underground car parking	Continue on its way, be brave
P2	Create a new special cycling task force inside the municipality	Be bold, Involve the citizens more
P3	Better communication with the public	Deeper integration between departments and municipalities and integrating cycling policy with PT
P4	Education campaign about benefits and safety of cycling	Involve the citizens
P5	Building a cycling coalition – lobby to balance pressure municipality	Create a team in municipality specially for cycling
P6	Focus on decreasing car usage as a priority.	Get children and young people on board.
P7	Communication campaign , involving children	Be courageous
P8	Involve the citizens, create information campaign	Just do it

Another proposed action is to solidify cycling interest coalition in order to address the power imbalance. Participant 5 believes in creating a network of cyclists, civil society organisations and businesses working together to create pressure and show support for the transition to cycling. An example of such coalition forming in Milan was a grass-roots demonstration following the death of a young boy on a bike (Figure 16). Demonstrators formed the missing separator between the busy road (Viale Monza) and the bike lane with their bodies, demanding the creation of protective infrastructure. That was a rare demonstration of power of the cycling coalition to create a tangible pressure on local government. It directly corresponds to advocacy coalition framework where building a coalition based on a shared belief is a powerful tool to impact both the popular option and the policy. A coalition like that is much more robust than individual actors and is more resilient to changes of a political power.



Figure 16 – Protest on Viale Monza

Next, when asked for advice to municipality, the overwhelming majority of experts recommended bravery and perseverance in implementing cycling changes. Most of the participants believe that the local government and planning agency, or at least some people in it, are aligned with the values of sustainable mobility paradigm. What they wish to happen is for them to succeed, regardless of the power pressure that is against it.

While it is possible to some extent, as exemplified by the passing of the progressive *Cambio* Plan, it is relevant to look at this issue through the lens of spatial theory. According to this theory, local government can do as much as the power structure allows for it. Therefore, following the conducted analysis, the recommendation of this paper is to first engage in a deep vision-building process. A popular vision can initiate addressing the issue of paradigm conflict, by allowing to understand the benefits and respond to opposition, which includes the fear of loss of accessibility. It is crucial to involve the citizens, as research participants emphasized, to engage them in the process in a democratic and adaptive way. The newly formed broader and deeper understanding will allow to create a more powerful cycling coalition, enabling to address the issue of power. Finally, the new policy must be implemented carefully, for which the guide to increase accessibility of SM created by Banister (2008) is very relevant. Altogether, these measures can break the vicious cycle of car-dependency, creating the possibility for a true mobility transition.

## 5 Conclusion

This chapter concludes this research by linking the results to the research aim, academic debate and by reflecting on its internal and external validity.

The aim of this research is to identify and understand barriers to modal shift to cycling on a study case of Milan. This was done in the context of a broader transition to sustainable mobility.

First, an assessment on the current stage of the transition to cycling was undertaken. It finds that during the pandemic a policy addressing a health emergency caused a deep change in mobility behaviour opening a window of opportunity for cycling. As a result, a significant progress was done on the ground and a progressive cycling policy – *Cambio* plan – was published. Linking it back to the transition theory it appears that it was the unintentional effect of a healthcare policy that accelerated the transition and that the window of opportunity is limited in time and dependent on the circumstances. However, after the pandemic despite the successful projects and new policy, the transition to cycling slowed down significantly and even reversed in some areas in a process called backsliding. It illustrates that the policy by itself is not enough to take off the transition.

Witnessing the erosion and then reappearance of barriers to sustainable mobility, creates a possibility to study them in detail. Therefore, addressing the key research question, this paper concludes that the main barrier to cycling is linked to the powerful position of a car. This situation blocks attempts to decrease car usage – a step which is necessary for a substantial modal shift to cycling due to the marginalising effects that automobility has on cycling and the scarcity of public space. This barrier was classified as socio-political as it relates both to policy and to general perception of mobility.

An analysis of this barrier uncovered self-reinforcing socio-political process which upholds the powerful position of the car. To illustrate that process, I have created a model of socio-political vicious cycle of car-dependency, an original conceptual tool. This model is complimentary to Vicious Cycle of Automobile Dependency and it describes missing interaction between car usage, public support and policy. This model illustrates that increased car usage impacts social and political environment leading to additional car-oriented policy and further increase of car usage. I argue that increased car usage leads to increased dependency and it decreases the social support for change in fear of decreased accessibility. This leads to increased power of car-oriented interest groups resulting in a continuation in mobility policy that favours cars usage. The cycle closes leading to a further increased car usage by marginalising other modes.

The findings suggest that the underlying causes for this process can be linked to theoretical motions of the dominance of conventional mobility paradigm rationale and the power disbalance. The evidence for this relationship was found in examples given by the research participants, as well as in analysis of the cycling boom and subsequent backsliding that

happened during the pandemic. Spatial theory fits the findings best as it explains the role of power and its impact on policy. A relationship that was found to be present in the case of mobility policy in Milan.

Therefore, in the last section of the results, in the chapter on overcoming barriers, this paper prescribes addressing both of these underlying barriers. Based on the data, it suggests building a popular vision of sustainable mobility that will be convincing to the people. That will allow to build a broader coalition, which according to the advocacy coalition framework has a potential to challenge the power structure, in a way similar to the history of Dutch and Danish cycling.

### **5.1.1 Discussion**

Linking the results back to the theoretical framework provides a possibility to reflect on used theories and assumptions. I find that Banister's framework has limited applicability. On one hand, it provided an overview that was relevant to this study case and to the research participants. On the other hand, it was under-specific for the area crucial for this research – car-dependence and its socio-political consequences. As such, the realisation of the importance of cars in modal shift to cycling was somehow unexpected and it was not an integral part of the theoretical model. This is why the main finding of this paper transgresses the initial assumptions of the theoretical model.

However, the predicted underlying causes are rooted in the dominance of the conventional mobility paradigm, as well as the political context of power imbalance. Both were found to be prominent parts of the socio-political vicious cycle of car-dependency. The advocacy coalition framework combined with Banister's framework of social acceptability and sustainable mobility paradigm were relevant theories to formulate recommendations of overcoming barriers. Kingdon's model was however less relevant than expected and the circular policy model, especially the one adopted for SUMP was more fitting this case. In the collected data the distinction between the barriers to cycling policy and barriers to the transition to SM was lost. That resulted in a shift of focus from the policy to the transition in a broader term.

The core of the results is dependent on the dominance of conventional mobility paradigm and power relations favouring cars. Both of these factors are relevant to many cities across the globe, therefore it is possible that this relation is true for other cities.

The fact that the car use marginalises other modes is not innovative and was proven by other mobility scholars. What this model brings to the debate is the explicit link of that relationship to social and political environment and its underlying causes. Relating cycling to power, it addresses the gap in examining the political and social side of cycling planning. However, the contribution of this paper is modest, and more critical research can be done to explore this relationship in depth.

This paper finds that a popular vision has a potential of breaking this vicious cycle of car dependency, and therefore, achieving mobility transition needs vision building. A vision that allows residents and stakeholders to embrace the possibility of reducing cars without a decrease in life quality. Moreover, that vision must be created in collaboration with residents and stakeholders and can be a great step towards a creation of a strong sustainable mobility coalition. Interesting research direction would be to explicitly study the effects of vision on the transition to sustainable mobility.

## 5.2 Reflection and limitations

This paper was initially focused on policy, due to its fundamental role in the transition to sustainable mobility. Nonetheless, the results of this paper find that the barriers reported by participants are significant both to the policy as well as to the transition as a whole, and in the collected data that distinction between the two is lost. This results in a limitation to the findings of this paper in a lack of precision in answering the research question regarding its effect on policy and on the transition in general.

Another limitation that needed to be considered is a lack of defining bounds to the Vicious Cycle of Automobile Dependency. It is difficult to imagine the self-reinforcing mechanism go on indefinitely. There is another not included aspect – externalities of automobility. I suspect that there is a moment in time when the externalities of automobility and the physical limitations are impacting the society to the extent that the policy making is forced to respond by limiting it. However, I did not see that in the collected data. Nonetheless, it is another relevant direction for further research to explore.

Next, the initial idea of using the tringle of governance and to ask participants to self-position themselves was harder to do and less useful than expected. Firstly, because participants had troubles to do so on the spot. Therefore, around half participants did not position themselves on the triangle and the researcher had to interpolate their position based on their introduction and job title. That is sensitive to researcher's bias and gives less validity for this method. Therefore, in the end it was not used to draw conclusions.

Another issue that arose was an apprehension that I might have imposed my view on the participants in my questions and introduction, by assuming that all respondents share the importance of increasing cycling. Especially, even though I acknowledge the dominance of conventional mobility paradigm, I did not realise that I have wrongly assumed that all my respondents share the values of sustainable mobility paradigm. Consequently, I might have shown an expectation from the participants to normatively prefer SM to CM. Therefore, there is an ethical problem that arose which, after consideration, did not cause considerable harm to the research nor the participants. Other than that, however, it made me miss a chance to analyse the mobility paradigm through a discourse analysis method by comparing the understanding of mobility from multiple sides of the paradigms conflict. That approach would not only be innovative by using linguistics in mobility research, but it would help to

comprehend first-hand the values and narratives that exist in conventional mobility. That would further contribute to understanding the relation of mobility to power and might contribute to providing more tools to dismantle conventional mobility paradigms. An aspect that, as I have found in this paper, is fundamental in mobility transition. I recommend this approach for further research.

Another limitation was the scale of the research. This study case was focused on a local transition in the city of Milan. However, many of the processes that influence that transition are of a larger, national, European or even global scale – out of reach of a local policy. For instance, the paradigm shift from conventional mobility to sustainable mobility, is such a deep change that it is difficult to imagine Milan undergo it just by itself, in spite of the unfavourable socio-economical context.

## Acknowledgments

Embarking on this project that is writing my master thesis I did not anticipated how many obstacles there will be. I am happy to have completed this project, and it would not be possible without people who supported me on the way. Firstly, I would like to again thank all my participants for their contribution which was crucial for this paper. I would like to thank my friends and family, most importantly Ola, who with kindness, patience and hard work contributed to making this paper possible. Finally, I would like to thank my supervisor Viviana, for her invaluable support and guidance.

To those and many others who helped me on my journey, I thank you and dedicate this quote to you.

*Green and just city is possible, but to achieve it we must go there together (P8).*



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## Appendix

### Participation information and consent from

Thank you for your participation in this master thesis research project. It is done by Albert Kolodziejczyk, master student at the Faculty of Spatial Science, University of Groningen in The Netherlands.

The first page contains general information about the study and the data protection, the second page contains a form to be fulfilled by participants.

#### Purposes:

The aim of this study is to identify and describe barriers to modal shift to cycling in Milan. The research is based on in-depth interviews with professionals that are involved or knowledgeable about the process. The interviews are planned to take around 40 minutes.

#### Collection and protection of data:

The data for this research is collected in Autumn 2022 and consists of on semi-structured interviews, conducted in person or online. The talks are audio-recorded and latter transcribed and analysed. The recordings are stored safely on the hard drive and protected by a password. They are being used only for the purpose of this research and are not shared with other people other than the researcher and the supervisor.

#### Participant can anytime:

- Indicate desired level of identity protection: (either pseudonymized, with all identifying elements erased or being referred by position e.g *urban planner*, or *university lecturer*)
- Completely withdraw from the study

#### Contact Information

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The participant declares that:

- They have read and understood the information about the research project and the purpose of the data processing.
- They had the opportunity to ask questions;
- They voluntarily agree to participate;
- They agree that the interview is recorded
- They have been informed of their rights;
- They understand that they can withdraw at any time

Please select desired level of identity reveal. (It can be changed after the interview)

I wish to be fully anonymous

I wish to be referred to by my approximate position (e.g *urban planner*, or *university lecturer*)

Other:

Signature of the participant and date:

Thank you for your participation!

Albert Kolodziejczyk, November 2022.

## Interview Guide draft

### Warm-up

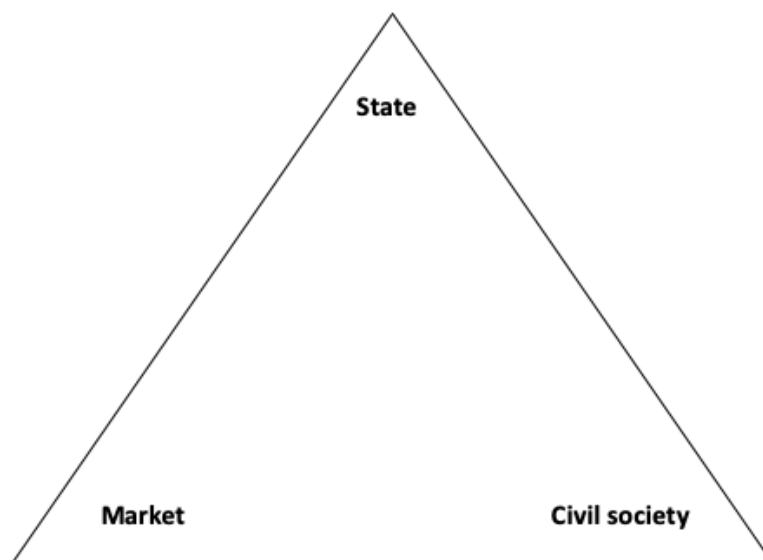
What do you do?

How long do you work for this organisation?

What are the objectives (your organization) is working towards?

### Position mapping

Where would you position yourself or your organisation on the triangle of governance? Please put an x on the diagram.



### Part 1 - Transition of the city towards cycling in general

- What is the current situation with cycling in Milan?
- How important do you think cycling is for the city of Milan?

### Part 2 - How did the sustainable mobility policy was developed and approved

- How was the sustainable mobility policy developed?
- Is there political support for cycling policy?



Part 3 - How much progress has the city made and what are the barriers for the implementation of the policy

- How do you assess the progress towards development of cycling in Milan?
- What are the successes?
- What are the main challenges?

What do you think is the biggest barrier to cycling policy in Milan and why?

What about:

Type of Barrier (Banister, 2005)	Description (Banister, 2005)	An example related to cycling (Wang, 2018)	Link to integrated cycling policy (Anaya-Boing, 2021)
Resource	Lack of adequate financial or physical resources available.	Not enough investments in cycling infrastructure.	Governance
Intuitional and Political	Problems with coordination between departments and conflicting policy.	Lack of leadership and political will.	Governance/Communication
Social and Cultural	Lack of social acceptability.	Resistance from the public, bikelash.	Social and Cultural Movements
Legal	Conflict with existing laws and regulations.	Cycling lane designation not permitted on certain roads.	Regulations
Side effects	Effects on other activities.	Increased accidents with cyclists.	x
Other e.g. physical	Restriction of space and topography.	Lack of space, hilly landscape.	x

What do you think is needed to achieve modal shift to cycling in Milan?

What would you advise to the municipality?

End

Would you like to add anything?

Thank you for participation.